ETSI TS 136 521-1 V14.5.0 (2018-02)



LTE;
Evolved Universal Terrestrial Radio Access (E-UTRA);
User Equipment (UE) conformance specification;
Radio transmission and reception;
Part 1: Conformance testing
(3GPP TS 36.521-1 version 14.5.0 Release 14)





Reference
RTS/TSGR-0536521-1ve50

Keywords
LTE

ETSI

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The present document is part 1 of a multi-parts TS:

3GPP TS 36.521-1: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification Radio transmission and reception; Part 1: Conformance Testing.

3GPP TS 36.521-2 [11]: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification Radio transmission and reception; Part 2: Implementation Conformance Statement (ICS).

3GPP TS 36.521-3 [12]: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification Radio transmission and reception; Part 3: Radio Resource Management (RRM) conformance testing.

1 Scope

The present document specifies the measurement procedures for the conformance test of the user equipment (UE) that contain transmitting characteristics, receiving characteristics and performance requirements as part of the 3G Long Term Evolution (3G LTE). Conformance test for the support of RRM (Radio Resource Management) are specified in TS 36.521-3 [12].

The requirements are listed in different clauses only if the corresponding parameters deviate. More generally, tests are only applicable to those mobiles that are intended to support the appropriate functionality. To indicate the circumstances in which tests apply, this is noted in the "*definition and applicability*" part of the test.

For example only Release 8 and later UE declared to support LTE shall be tested for this functionality. In the event that for some tests different conditions apply for different releases, this is indicated within the text of the test itself.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document unless the context in which the reference is made suggests a different Release is relevant (information on the applicable release in a particular context can be found in e.g. test case title, description or applicability, message description or content).

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 36.101: "E-UTRA UE radio transmission and reception".

[3] ITU-R Recommendation SM.329-10, "Unwanted emissions in the spurious domain"

[4] 3GPP TS 36.133: "E-UTRA requirements for support of radio resource management".

[5] 3GPP TS 36.331: "E-UTRA Radio Resource Control (RRC): protocol specification".

[6] 3GPP TS 36.304: "E-UTRA UE procedures in idle mode".

[7] 3GPP TS 36.508: "Common test environments for User Equipment (UE)".

[8] 3GPP TS 36.211: "Physical Channels and Modulation".

[9] 3GPP TS 36.212: "E-UTRA Multiplexing and channel coding".

[10] 3GPP TS 36.213: "E-UTRA Physical layer procedures".

[11] 3GPP TS 36.521-2: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Implementation Conformance Statement (ICS)".

[12] 3GPP TS 36.521-3: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Radio Resource Management (RRM) conformance testing".

[13] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[14] 3GPP TS 36.423: "X2 application protocol (X2AP) ".

[15] 3GPP TS 36.306: "E-UTRA User Equipment (UE) radio access capabilities".

[16] 3GPP TS 36.307: “Requirements on User Equipments (UEs) Supporting a release-independent frequency band”.

[17] 3GPP TR 36.904: “Derivation of test tolerances for User Equipment (UE) radio reception conformance tests”.

[18] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[19] 3GPP TR 36.905: "Derivation of test points for radio transmission and reception conformance test cases".

[20] 3GPP TR 36.860: "3rd Generation Partnership Project;Technical Specification Group Radio Access Networks;LTE Advanced Dual Uplink Inter-band Carrier Aggregation "

[21] 3GPP TR 36.833-4: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE-Advanced intra-band non-contiguous Carrier Aggregation (CA) for 2 uplinks (2UL); Framework".

[22] 3GPP TS 23.303: "Technical Specification Group Services and System Aspects; Proximity-based services (ProSe); Stage 2".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

Aggregated Channel Bandwidth: The RF bandwidth in which a UE transmits and receives multiple contiguously aggregated carriers.

Aggregated Transmission Bandwidth Configuration: The number of resource block allocated within the aggregated channel bandwidth.

Carrier aggregation: Aggregation of two or more component carriers in order to support wider transmission bandwidths.

Carrier aggregation band: A set of one or more operating bands across which multiple carriers are aggregated with a specific set of technical requirements.

Carrier aggregation bandwidth class: A class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by a UE.

Carrier aggregation configuration: A combination of CA operating band(s) and CA bandwidth class(es) supported by a UE.

Channel edge: The lowest and highest frequency of the carrier, separated by the channel bandwidth.

Channel bandwidth: The RF bandwidth supporting a single E-UTRA RF carrier with the transmission bandwidth configured in the uplink or downlink of a cell. The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

Contiguous carriers: A set of two or more carriers configured in a spectrum block where there are no RF requirements based on co-existence for un-coordinated operation within the spectrum block.

Contiguous resource allocation: A resource allocation of consecutive resource blocks within one carrier or across contiguously aggregated carriers. The gap between contiguously aggregated carriers due to the nominal channel spacing is allowed.

Contiguous spectrum: Spectrum consisting of a contiguous block of spectrum with no sub-block gaps.

Enhanced performance requirements type A: This defines performance requirements assuming as baseline receiver reference symbol based linear minimum mean square error interference rejection combining.

Enhanced performance requirements type B: This defines performance requirements assuming as baseline receiver using network assisted interference cancellation and suppression.

Enhanced performance requirements type C: This defines performance requirements assuming as baseline receiver inter-stream interference cancellation.

Inter-band carrier aggregation: Carrier aggregation of component carriers in different operating bands**.**

NOTE: Carriers aggregated in each band can be contiguous or non-contiguous.

Intra-band contiguous carrier aggregation: Contiguous carriers aggregated in the same operating band.

Intra-band non-contiguous carrier aggregation: Non-contiguous carriers aggregated in the same operating band.

Lower sub-block edge: The frequency at the lower edge of one sub-block. It is used as a frequency reference point for both transmitter and receiver requirements.

NB-IoT stand-alone operation: A NB-IoT is operating standalone when it utilizes its own spectrum, for example the spectrum used by GERAN systems as a replacement of one or more GSM carriers, as well as scattered spectrum for potential IoT deployment.

NB-IoT guard band operation: NB-IoT is operating in guard band when it utilizes the unused resource block(s) within a E-UTRA carrier's guard-band

NB-IoT in-band operation: NB-IoT is operating in-band when it utilizes the resource block(s) within a normal E-UTRA carrier

Non-contiguous spectrum: Spectrum consisting of two or more sub-blocks separated by sub-block gap(s).

ProSe-enabled UE: A UE that supports ProSe requirements and associated procedures.

NOTE: As defined in TS 23.303 [22].

ProSe Direct Communication: A communication between two or more UEs in proximity that are ProSe-enabled.

NOTE: As defined in TS 23.303 [22].

ProSe Direct Discovery: A procedure employed by a ProSe-enabled UE to discover other ProSe-enabled UEs in its vicinity.

NOTE: As defined in TS 23.303 [22].

Maximum Output Power: The mean power level per carrier of UE measured at the antenna connector in a specified reference condition.

Maximum Wgap: Largest achievable sub-block gap size for an intra-band non-contiguous CA configuration with two sub-blocks, where one sub-block is placed in the low range of the operating band and the other one in the high range.

Mean power: When applied to E-UTRA transmission this is the power measured in the operating system bandwidth of the carrier. The period of measurement shall be at least one subframe (1ms) unless otherwise stated.

Narrowband: A narrowband is defined as six non-overlapping consecutive physical resource blocks in the frequency domain.

Narrowband index: The narrowbands are numbered $n_{\mathrm{NB}} = 0,..., N_{\mathrm{NB}}^{\mathrm{UL}} - 1$ in order of increasing physical resource-block number.

Low Wgap: Sub-block gap size of 5MHz centered in the middle of the operating band, with one sub-block on each side of the gap, with lowest N_{RB} for PCC and SCC(s).

Occupied bandwidth: The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage $\beta/2$ of the total mean power of a given emission.

Output power: The mean power of one carrier of the UE, delivered to a load with resistance equal to the nominal load impedance of the transmitter.

PMI delay: The rate in basic time unit at which PMI is updated.

Reference bandwidth: The bandwidth in which an emission level is specified.

Sub-block: This is one contiguous allocated block of spectrum for transmission and reception by the same UE. There may be multiple instances of sub-blocks within an RF bandwidth.

Sub-block bandwidth: The bandwidth of one sub-block.

Sub-block gap: A frequency gap between two consecutive sub-blocks within an RF bandwidth, where the RF requirements in the gap are based on co-existence for un-coordinated operation.

Synchronized operation: Operation of TDD in two different systems, where no simultaneous uplink and downlink occur.

Transmission bandwidth: Bandwidth of an instantaneous transmission from a UE or BS, measured in Resource Block units.

Transmission bandwidth configuration: The highest transmission bandwidth allowed for uplink or downlink in a given channel bandwidth, measured in Resource Block units.

Transmit Diversity: Transmit diversity is based on space-frequency block coding techniques complemented with frequency-shift time diversity when four transmit antennas is used.

Unsynchronized operation: Operation of TDD in two different systems, where the conditions for synchronized operation

Upper sub-block edge: The frequency at the upper edge of one sub-block. It is used as a frequency reference point for both transmitter and receiver requirements.

V2X Communication: V2X (Vehicle to Everything) service is operating in ITS spectrum and/or LTE licensed operating bands.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

$BW_{Channel}$	Channel bandwidth
$BW_{Channel,block}$	Sub-block bandwidth, expressed in MHz. $BW_{Channel,block} = F_{edge,block,high} - F_{edge,block,low}$.
$BW_{Channel_CA}$	Aggregated channel bandwidth, expressed in MHz.
BW_{GB}	Virtual guard band to facilitate transmitter (receiver) filtering above / below edge CCs.
E_{RS}	Transmitted energy per RE for reference symbols during the useful part of the symbol, i.e. excluding the cyclic prefix, (average power normalized to the subcarrier spacing) at the eNode B transmit antenna connector
$\hat{E}_s$	The averaged received energy per RE of the wanted signal during the useful part of the symbol, i.e. excluding the cyclic prefix, at the UE antenna connector; average power is computed within a set of REs used for the transmission of physical channels (including user specific RSs when present), divided by the number of REs within the set, and normalized to the subcarrier spacingF Frequency
F	Frequency
$F_{agg_alloc_low}$	Aggregated Transmission Bandwidth Configuration. The lowest frequency of the simultaneously transmitted resource blocks.
$F_{agg_alloc_high}$	Aggregated Transmission Bandwidth Configuration. The highest frequency of the simultaneously transmitted resource blocks.
$F_{Interferer}$ (offset)	Frequency offset of the interferer
$F_{Interferer}$	Frequency of the interferer
F_C	Frequency of the carrier centre frequency
F_{C_agg}	Aggregated Transmission Bandwidth Configuration. Center frequency of the aggregated carriers.$F_{C,block,\ high}$ Center frequency of the highest transmitted/received carrier in a sub-block.
$F_{C,block,\ low}$	Center frequency of the lowest transmitted/received carrier in a sub-block.
F_{CA_low}	The centre frequency of the *lowest carrier*, expressed in MHz.
F_{CA_high}	The centre frequency of the *highest carrier*, expressed in MHz.
F_{DL_low}	The lowest frequency of the downlink operating band
F_{DL_high}	The highest frequency of the downlink operating band
F_{UL_low}	The lowest frequency of the uplink operating band
F_{UL_high}	The highest frequency of the uplink operating band
$F_{edge,block,low}$	The lower sub-block edge, where $F_{edge,block,low} = F_{C,block,low} - F_{offset}$.
$F_{edge,block,high}$	The upper sub-block edge, where $F_{edge,block,high} = F_{C,block,high} + F_{offset}$.
F_{edge_low}	The *lower edge* of aggregated channel bandwidth, expressed in MHz.
F_{edge_high}	The *higher edge* of aggregated channel bandwidth, expressed in MHz.
F_{offset}	Frequency offset from F_{C_high} to the *higher edge* or F_{C_low} to the *lower edge*.
$F_{offset,block,low}$	Separation between lower edge of a sub-block and the center of the lowest component carrier within the sub-block
$F_{offset,block,high}$	Separation between higher edge of a sub-block and the center of the highest component carrier within the sub-block
I_o	The power spectral density of the total input signal (power averaged over the useful part of the symbols within the transmission bandwidth configuration, divided by the total number of RE for this configuration and normalised to the subcarrier spacing) at the UE antenna connector, including the own-cell downlink signal

I_{or} The total transmitted power spectral density of the own-cell downlink signal (power averaged over the useful part of the symbols within the transmission bandwidth configuration, divided by the total number of RE for this configuration and normalised to the subcarrier spacing) at the eNode B transmit antenna connector

$\hat{I}_{or}$ The total received power spectral density of the own-cell downlink signal (power averaged over the useful part of the symbols within the transmission bandwidth configuration, divided by the total number of RE for this configuration and normalised to the subcarrier spacing) at the UE antenna connector

I_{ot} The received power spectral density of the total noise and interference for a certain RE (average power obtained within the RE and normalized to the subcarrier spacing) as measured at the UE antenna connector

L_{CRB} Transmission bandwidth which represents the length of a contiguous resource block allocation expresse in units of resources blocks

N_{cp} Cyclic prefix length

N_{DL} Downlink EARFCN

N_{oc} The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as measured at the UE antenna connector.

N_{oc1} The power spectral density of a white noise source (average power per RE normalized to the subcarrier spacing), simulating interference in non-CRS symbols in ABS subframe from cells that are not defined in a test procedure, as measured at the UE antenna connector.

N_{oc2} The power spectral density of a white noise source (average power per RE normalized to the subcarrier spacing), simulating interference in CRS symbols in ABS subframe from all cells that are not defined in a test procedure, as measured at the UE antenna connector.

N_{oc3} The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing), simulating interference in non-ABS subframe from cells that are not defined in a test procedure, as measured at the UE antenna connector.

$N_{oc}{}'$ The power spectral density (average power per RE normalised to the subcarrier spacing) of the summation of the received power spectral densities of the strongest interfering cells explicitly defined in a test procedure plus N_{oc} , as measured at the UE antenna connector. The respective power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value, or the respective power spectral density of each interfering cell relative to N_{oc} is defined by its associated Es/Noc value.

$N_{Offs\text{-}DL}$ Offset used for calculating downlink EARFCN

$N_{Offs\text{-}UL}$ Offset used for calculating uplink EARFCN

N_{otx} The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing) simulating eNode B transmitter impairments as at the eNode B transmit antenna connector

N_{RB} Transmission bandwidth configuration, expressed in units of resource blocks

Highest N_{RB} Highest N_{RB} defined for the band

N_{RB_agg} The number of the aggregated RBs within the fully allocated Aggregated Channel bandwidth.

Highest N_{RB_agg} The highest N_{RB_agg} across Bandwidth Combination Sets supported by the UE as part of the CA Configuration.

Lowest N_{RB_agg} The lowest N_{RB_agg} across Bandwidth Combination Sets supported by the UE as part of the CA Configuration.

L_{Ctone} Transmission bandwidth which represents the length of a contiguous sub-carrier allocation expressed in units of tones

N_{RB_alloc} Total number of simultaneously transmitted resource blocks in Channel bandwidth or Aggregated Channel Bandwidth configuration.

$N_{RB,c}$ The transmission bandwidth configuration of component carrier *c*, expressed in units of resource blocks

$N_{RB,largest\ BW}$ The largest transmission bandwidth configuration of the component carriers in the bandwidth combination, expressed in units of resource blocks

N_{RX} Number of receiver antennas

N_{tone} Transmission bandwidth configuration for category NB1, expressed in units of tones.

$N_{tone\ 3.75kHz}$ Transmission bandwidth configuration for category NB1 with 3.75 kHz sub-carrier spacing, expressed in units of tones.
$N_{tone\ 15kHz}$ Transmission bandwidth configuration for category NB1 with 15 kHz sub-carrier spacing, expressed in units of tones.
N_{UL} Uplink EARFCN
P Number of cell-specific antenna ports
p Antenna port number
P_{CMAX} The measured configured maximum UE output power.
$P_{CMAX,c}$ The configured maximum UE output power for serving cell *c*.
P_{EMAX} Maximum allowed UE output power signalled by higher layers. Same as IE *P-Max*, defined in [5].
$P_{EMAX,c}$ Maximum allowed UE output power signalled by higher layers for serving cell *c*. Same as IE *P-Max*, defined in [7].
$P_{Interferer}$ Modulated mean power of the interferer
$P_{PowerClass}$ $P_{PowerClass}$ is the nominal UE power (i.e., no tolerance).
P_{UMAX} The measured configured maximum UE output power. Maximum UE Power with possible power reduction due to modulation type, network signalling values and location near the edge of the band; it equals P_{CMAX} when the IE *P-Max*, defined in [5], is not signalled.
Puw Power of an unwanted DL signal
Pw Power of a wanted DL signal
P_L_{CRB} Number of transmitted resource blocks on the Primary Component Carrier
Rav Minimum average throughput per RB
RB # Position of the RB in the channel bandwidth.
RB_{start} Indicates the lowest RB index of transmitted resource blocks.
RB_{end} Indicates the highest RB index of transmitted resource blocks.
S_L_{CRB} Number of transmitted resource blocks on the Secondary Component Carrier
ΔF_{OOB} Δ Frequency of Out Of Band emission
$\Delta R_{IB,c}$ Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell *c*.
$\Delta T_{IB,c}$ Allowed maximum configured output power relaxation due to support for inter-band CA operation, for serving cell *c*.
ΔT_C Allowed operating band edge transmission power relaxation.
$\Delta T_{C,c}$ Allowed operating band edge transmission power relaxation for serving cell *c*.
ΔT_{ProSe} Allowed operating band transmission power relaxation due to support of E-UTRA ProSe on an operating band.
σ Test specific auxiliary variable used for the purpose of downlink power allocation, defined in Annex C.3.2.
W_{gap} Sub-block gap size

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

ABS Almost Blank Subframe
ACLR Adjacent Channel Leakage Ratio
ACS Adjacent Channel Selectivity
A-MPR Additional Maximum Power Reduction
AWGN Additive White Gaussian Noise
BCCH Broadcast Control Channel
BCH Broadcast Channel
BS Base Station
CA Carrier Aggregation
CA_X Intra-band contiguous CA of component carriers in one sub-block within Band X where X is the applicable E-UTRA operating band
CA_X-X Intra-band non-contiguous intra band CA of component carriers in two sub-blocks within Band X is the applicable E-UTRA operating band
CA_X-Y Inter-band CA of component carrier(s) in one sub-block within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable E-UTRA operating band

CA_X-X-Y	CA of component carriers in two sub-blocks within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable E-UTRA operating bands
CC	Component Carriers
CP	Cyclic Prefix
CoMP	Coordinated Multi-Point
CPE	Customer Premise Equipment
CPE_X	Customer Premise Equipment for E-UTRA operating band X
CQI	Channel Quality Indicator
CW	Continuous Wave
DC	Dual Connectivity
DC_X-Y	Inter-band DC of component carrier(s) in one sub-block within Band X and component carrier(s) in one sub-block within Band Y where X and Y are the applicable E-UTRA operating band
DCI	Downlink Control Information
DIP	Dominant Interferer Proportion
DPS	Dynamic Point Switch
eDL-MIMO	Down Link Multiple Antenna transmission
DL	Downlink
DTX	Discontinuous Transmission
DwPTS	Downlink Pilot Time-Slot
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
EPRE	Energy Per Resource Element
E-UTRA	Evolved UMTS Terrestrial Radio Access
EUTRAN	Evolved UMTS Terrestrial Radio Access Network
EVM	Error Vector Magnitude
FDD	Frequency Division Duplex
FRC	Fixed Reference Channel
FSTD	Frequency-Shift Time Diversity
HARQ	Hybrid ARQ
HD-FDD	Half- Duplex FDD
MAC	Medium Access Control
MBMS	Multimedia Broadcast Multicast Service
MCS	Modulation and Coding Scheme
MCG	Main Carrier Group
MOP	Maximum Output Power
MPR	Maximum Power Reduction
MSR	Maximum Sensitivity Reduction
OCNG	OFDMA Channel Noise Generator
OFDMA	Orthogonal Frequency Division Multiple Access
OOB	Out-of-band
P-MPR	Power Management Maximum Power Reduction
PA	Power Amplifier
PBCH	Physical Broadcast Channel
PCC	Primary Component Carrier
PCCH	Paging Control Channel
PCFICH	Physical Control Format Indicator Channel
PDCCH	Physical Downlink Control Channel
PDSCH	Physical Downlink Shared Channel
PDU	Packet Data Unit
PHICH	Physical Hybrid ARQ Indicator Channel
Pm-dsg	Probability of miss-detection of the Downlink Scheduling Grant
PMI	Precoding Matrix Indicator
PRACH	Physical Random Access Channel
PRB	Physical Resource Block
ProSe	Proximity-based Services
PSBCH	Physical Sidelink Broadcast CHannel
PSCCH	Physical Sidelink Control CHannel
PSDCH	Physical Sidelink Discovery CHannel
PSS	Primary Synchronization Signal
PSS_RA	PSS-to-EPRE ratio for the channel PSS
PSSCH	Physical Sidelink Shared CHannel
PSSS	Primary Sidelink Synchronization Signal
PUCCH	Physical Uplink Control Channel

PUSCH	Physical Uplink Shared ChannelRE Resource Element
RE	Resource Element
REFSENS	Reference Sensitivity power level
RI	Rank Indicator
RLC	Radio Link Control
RMC	Reference Measurement Channel
r.m.s	Root Mean Square
RNTI	Radio Network Temporary Identifier
RRC	Radio Resource Control
RS	Reference Signal
RSRP	Reference Signal Received Power
SCC	Secondary Component Carrier
SCG	Secondary Carrier Group
SCH	Synchronization Channel
SDU	Service Data Unit
SFBC	Space-Frequency Block Coding
SINR	Signal-to-Interference-and-Noise Ratio
SNR	Signal-to-Noise Ratio
SRS	Sounding Reference Signal
SSS	Secondary Synchronization Signal
SSSS	Secondary Sidelink Synchronization Signal
SSS_RA	SSS-to-RS EPRE ratio for the channel SSS
TDD	Time Division Duplex
TP	Transmission Point
TPC	Transmit Power Control
TPMI	Transmitted Precoding Matrix Indicator
TTI	Transmission Time Interval
UE	User Equipment
UL	Uplink
UL-MIMO	Up Link Multiple Antenna transmission
UMTS	Universal Mobile Telecommunications System
UpPTS	Uplink Pilot Time-Slot
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network
V2X	Vehicle to Everything
xCH_RA	xCH-to-RS EPRE ratio for the channel xCH in all transmitted OFDM symbols not containing RS
xCH_RB	xCH-to-RS EPRE ratio for the channel xCH in all transmitted OFDM symbols containing RS

4 General

Unless otherwise stated, the following reference conditions used by all test cases in this document are specified in TS 36.508 [7]:

- Connection Diagrams,
- Test Frequencies,
- Cell Settings,
- Reference Environments,
- Environmental Conditions,
- Generic Connection Setup Procedures,
- System Information (SI),
- Message Contents.

Where a test requires one of the above reference conditions that are different, this will be specified within the test itself.

The Minimum Requirements defined in each test make no allowance for Measurement Uncertainty. Therefore, Test Tolerances are used to relax the Minimum Requirements. If the Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for that test is non-zero. For each test the Test Tolerances are individually calculated to create the Test Requirements. The Test Tolerance for each test and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.3.

Downlink and Uplink transmissions are organized into radio frames with $T_f = 307200 \times T_s = 10\,\text{ms}$ duration. Two radio frame structures are supported in this document:

- Type 1, applicable to FDD,
- Type 2, applicable to TDD.

In clauses 6 and 7 TX and RX test cases for FDD/TDD test cases are defined. FDD and TDD test scenarios/ requirements are included within the same test case. For test cases with any difference between the FDD and TDD branches the test description part of the test case has been separated in two sections to cover the two technologies. The applicability for the FDD and TDD branches are specified in TS 36.521-2. For some test cases requiring a complex test coverage analysis, TR 36.905 [19] is used for this purpose.

In clause 8 the performance requirement test cases are defined. FDD and TDD performance requirement test cases are defined in different clauses accordingly to the requirements specified in TS 36.101.

Unless otherwise stated, each test case is tested for every operating band supported by the UE and repeated with the applicable test configurations (i.e. test environment, test frequencies, test channel bandwidths, channel bandwidth parameters) indicated in each test case. For test cases in clauses 6, 7, 8 the initial conditions of the downlink physical channels signal levels and downlink physical channels required are specified in Annex C.0, Annex C.1 and Annex C.2.

For test cases in clauses 6 and 7 that require measurements with maximum output power, the UE shall transmit at its maximum output power state with output power level of P_{UMAX} level. This range of maximum output power shall not be modified for any further additional relaxation.

For UL-MIMO cases, the UE output power is the sum of mean powers as measured at each antenna connector unless otherwise stated.

For test cases in clauses 6 and 7, the partial RB allocations refer to any RB allocation less than full RB allocation except 1 RB allocation.

4.1 Categorization of test requirements in CA, UL-MIMO, ProSe, Dual Connectivity, UE category 0, UE category M1, UE category 1bis, UE category NB1 and V2X Communication

The test requirements for Clauses 6 (Tx Characteristics) and 7 (Rx Characteristics), which are specific to CA, UL-MIMO, ProSe, Dual Connectivity, UE category 0, UE category M1, UE category, UE category 1bis, UE category NB1 and V2X Communication are specified as suffix A, B, C, D, E , F and G where;

a) Suffix A additional requirements need to support CA

b) Suffix B additional requirements need to support UL-MIMO

c) Suffix C additional requirements need to support Dual Connectivity

d) Suffix D additional requirements need to support ProSe

e) Suffix E additional requirements need to support UE category 0, category M1, and category 1bis

f) Suffix F additional requirements need to support UE category NB1

g) Suffix G additional requirements need to support V2X Communication

A terminal which supports the above features needs to meet both the general requirements and the additional requirement applicable to the additional sub-clause (suffix A, B, C, D, E, F and G).

Where there is a difference in requirement between the general requirements and the additional subclause requirements (suffix A, B, C, D, E, F and G) in clauses 5, 6 and 7, the tighter requirements are applicable unless stated otherwise in the additional subclause.

A terminal which supports more than one feature (CA, UL-MIMO, ProSe, Dual Connectivity, UE category 0, UE category M1, UE category, UE category 1bis, UE category NB1 and V2X Communication) in clauses 5, 6 and 7 shall meet all of the separate corresponding requirements.

For a terminal supporting CA, compliance with minimum requirements for non-contiguous intra-band carrier aggregation in any given operating band does not imply compliance with minimum requirements for contiguous intra-band carrier aggregation in the same operating band.

For a terminal supporting CA, compliance with minimum requirements for contiguous intra-band carrier aggregation in any given operating band does not imply compliance with minimum requirements for non- contiguous intra-band carrier aggregation in the same operating band.

A terminal which supports a DL CA configuration shall support all the lower order fallback DL CA combinations and it shall support at least one bandwidth combination set for each of the constituent lower order DL combinations containing all the bandwidths specified within each specific combination set of the upper order DL combination.

A terminal which supports CA, for each supported CA configuration, shall support Pcell transmissions in each of the aggregated Component Carriers unless indicated otherwise in clause 5.4.2A.1.

Terminal supporting Dual Connectivity configuration shall meet the minimum requirements for corresponding CA configuration (suffix A), unless otherwise specified.

NOTE 1: Test Case 6.5.2.1A, PUSCH-EVM with exclusion period, is a Release 8 non-CA test case and does not indicate a requirement to support CA.

NOTE 2: This categorization of test requirements reflects only the categorization of minimum requirements as done by RAN4 in 3GPP TS 36.101. For the categorization of the tests requirements done on behalf of RAN5 follow the information given in Annex I.

For a terminal that supports ProSe Direct Communication and/or ProSe Direct Discovery, the minimum requirements are applicable when

- the UE is associated with a serving cell on the ProSe carrier, or

- the UE is not associated with a serving cell on the ProSe carrier and is provisioned with the preconfigured radio parameters for ProSe Direct Communications and/or ProSe Direct Discovery that are associated with known Geographical Area, or

- the UE is associated with a serving cell on a carrier different than the ProSe carrier, and the radio parameters for ProSe Direct Discovery on the ProSe carrier are provided by the serving cell, or

- the UE is associated with a serving cell on a carrier different than the ProSe carrier, and has a non-serving cell selected on the ProSe carrier that supports ProSe Direct Discovery and/or ProSe Direct Communication.

When the ProSe UE is not associated with a serving cell on the ProSe carrier, and the UE does not have knowledge of its geographical area, or is provisioned with preconfigured radio parameters that are not associated with any Geographical Area, ProSe transmissions are not allowed, and the requirements in Section 6.3.3D apply.

A terminal that supports simultaneous E-UTRA ProSe sidelink transmissions and E-UTRA uplink transmissions for the inter-band E-UTRA ProSe/E-UTRA bands specified in Table 5.2D-2, shall meet the minimum requirements for the corresponding inter-band UL CA configuration (suffix A), unless otherwise specified. For transmitter characteristics specified in clause 6, the terminal is required to meet the conformance tests for the corresponding inter-band UL CA configuration and is not required to be retested with simultaneous E-UTRA ProSe sidelink and E-UTRA uplink transmissions.

A terminal that supports E-UTRA V2X intra-band multi-carrier operation for the band specified in Table 5.5G-3, shall meet the corresponding transmitter characteristics requirements (in subclauses with suffix G in Section 6) only when there are multiple active transmissions on all of the configured carrier components. When there is only one active transmission on one of the configured carrier components, the corresponding requirements for V2X single carrier operation apply for the corresponding active carrier component.

4.2 RF requirements in later releases

The standardisation of new frequency bands may be independent of a release. However, in order to implement a UE that conforms to a particular release but supports a band of operation that is specified in a later release, it is necessary to specify some extra requirements. TS 36.307 [16] specifies requirements on UEs supporting a frequency band that is independent of release.

NOTE: For UEs conforming to the 3GPP release of the present document, some RF requirements of later releases may be mandatory independent of whether the UE supports the bands specified in later releases or not. The set of RF requirements of later releases that is also mandatory for UEs conforming to the 3GPP release of the present document is determined by regional regulation.

5 Frequency bands and channel arrangement

5.1 General

The channel arrangements presented in this clause are based on the frequency bands and channel bandwidths defined in the present release of specifications.

NOTE: Other operating bands and channel bandwidths may be considered in future releases.

5.2 Operating bands

E-UTRA is designed to operate in the operating bands defined in Table 5.2-1.

Table 5.2-1: E-UTRA operating bands

E-UTRA Operating Band	Uplink (UL) eNode B receive UE transmit	Downlink (DL) eNode B transmit UE receive	Duplex Mode
	F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	

1	1920 MHz	–	1980 MHz	2110 MHz	–	2170 MHz	FDD
2	1850 MHz	–	1910 MHz	1930 MHz	–	1990 MHz	FDD
3	1710 MHz	–	1785 MHz	1805 MHz	–	1880 MHz	FDD
4	1710 MHz	–	1755 MHz	2110 MHz	–	2155 MHz	FDD
5	824 MHz	–	849 MHz	869 MHz	–	894MHz	FDD
6[1]	830 MHz	–	840 MHz	875 MHz	–	885 MHz	FDD
7	2500 MHz	–	2570 MHz	2620 MHz	–	2690 MHz	FDD
8	880 MHz	–	915 MHz	925 MHz	–	960 MHz	FDD
9	1749.9 MHz	–	1784.9 MHz	1844.9 MHz	–	1879.9 MHz	FDD
10	1710 MHz	–	1770 MHz	2110 MHz	–	2170 MHz	FDD
11	1427.9 MHz	–	1447.9 MHz	1475.9 MHz	–	1495.9 MHz	FDD
12	699 MHz	–	716 MHz	729 MHz	–	746 MHz	FDD
13	777 MHz	–	787 MHz	746 MHz	–	756 MHz	FDD
14	788 MHz	–	798 MHz	758 MHz	–	768 MHz	FDD
15	Reserved			Reserved			FDD
16	Reserved			Reserved			FDD
17	704 MHz	–	716 MHz	734 MHz	–	746 MHz	FDD
18	815 MHz	–	830 MHz	860 MHz	–	875 MHz	FDD
19	830 MHz	–	845 MHz	875 MHz	–	890 MHz	FDD
20	832 MHz	–	862 MHz	791 MHz	–	821 MHz	FDD
21	1447.9 MHz	–	1462.9 MHz	1495.9 MHz	–	1510.9 MHz	FDD
22	3410 MHz	–	3490 MHz	3510 MHz	–	3590 MHz	FDD
23[1]	2000 MHz	–	2020 MHz	2180 MHz	–	2200 MHz	FDD
24	1626.5 MHz	–	1660.5 MHz	1525 MHz	–	1559 MHz	FDD
25	1850 MHz	–	1915 MHz	1930 MHz	–	1995 MHz	FDD
26	814 MHz	–	849 MHz	859 MHz	–	894 MHz	FDD
27	807 MHz	–	824 MHz	852 MHz	–	869 MHz	FDD
28	703 MHz	–	748 MHz	758 MHz	–	803 MHz	FDD
29	NA			717 MHz	–	728 MHz	FDD[2]
30	2305 MHz	–	2315 MHz	2350 MHz	–	2360 MHz	FDD[15]
31	452.5 MHz	–	457.5 MHz	462.5 MHz	–	467.5 MHz	FDD
32	N/A			1452 MHz	–	1496 MHz	FDD[2]
33	1900 MHz	–	1920 MHz	1900 MHz	–	1920 MHz	TDD
34	2010 MHz	–	2025 MHz	2010 MHz	–	2025 MHz	TDD
35	1850 MHz	–	1910 MHz	1850 MHz	–	1910 MHz	TDD
36	1930 MHz	–	1990 MHz	1930 MHz	–	1990 MHz	TDD
37	1910 MHz	–	1930 MHz	1910 MHz	–	1930 MHz	TDD
38	2570 MHz	–	2620 MHz	2570 MHz	–	2620 MHz	TDD
39	1880 MHz	–	1920 MHz	1880 MHz	–	1920 MHz	TDD
40	2300 MHz	–	2400 MHz	2300 MHz	–	2400 MHz	TDD
41	2496 MHz	–	2690 MHz	2496 MHz	–	2690 MHz	TDD
42	3400 MHz	–	3600 MHz	3400 MHz	–	3600 MHz	TDD
43	3600 MHz	–	3800 MHz	3600 MHz	–	3800 MHz	TDD
44	703 MHz	–	803 MHz	703 MHz	–	803 MHz	TDD
45	1447 MHz	–	1467 MHz	1447 MHz	–	1467 MHz	TDD
46	5150 MHz	–	5925 MHz	5150 MHz	–	5925 MHz	TDD[8,9]
47	5855 MHz	–	5925 MHz	5855 MHz	–	5925 MHz	TDD[11]
48	3550 MHz	–	3700 MHz	3550 MHz	–	3700 MHz	TDD
…							
64	Reserved						
65	1920 MHz	–	2010 MHz	2110 MHz	–	2200 MHz	FDD
66	1710 MHz	–	1780 MHz	2110 MHz	–	2200 MHz	FDD[4]
67	N/A			738 MHz	–	758 MHz	FDD[2]
68	698 MHz	–	728 MHz	753 MHz	–	783 MHz	FDD
69	N/A			2570 MHz	–	2620 MHz	FDD[2]
70	1695 MHz	–	1710 MHz	1995 MHz	–	2020 MHz	FDD[10]

NOTE 1: Band 6, 23 is not applicable.
NOTE 2: Restricted to E-UTRA operation when carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Pcell.
NOTE 3: A UE that complies with the E-UTRA Band 65 minimum requirements in this specification shall also comply with the E-UTRA Band 1 minimum requirements.
NOTE 4: The range 2180-2200 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured.
NOTE 5: A UE that supports E-UTRA Band 66 shall receive in the entire DL operating band
NOTE 6: A UE that supports E-UTRA Band 66 and CA operation in any CA band shall also comply with the minimum requirements specified for the DL CA configurations CA_66B, CA_66C and CA_66A-66A.
NOTE 7: A UE that complies with the E-UTRA Band 66 minimum requirements in this specification shall also comply with the E-UTRA Band 4 minimum requirements.
NOTE 8: This band is an unlicensed band restricted to licensed-assisted operation using Frame Structure Type 3.
NOTE 9: In this version of the specification, restricted to E-UTRA DL operation when carrier aggregation is configured.
NOTE 10: The range 2010-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 300 MHz The range 2005-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 295 MHz.
NOTE 11: This band is unlicensed band used for V2X communication. There is no expected network deployment in this band so both Frame Structure Type 1 and Frame Structure Type 2 can be used.
NOTE 12 to 14:
NOTE 15: Uplink transmission is not allowed at this band for UE with external vehicle-mounted antennas.

5.2A Operating bands for CA

E-UTRA carrier aggregation is designed to operate in the operating bands defined in Tables 5.2A-1 and 5.2A-2.

Table 5.2A-1: Intra-band contiguous CA operating bands

E-UTRA CA Band	E-UTRA Band (Table 5.2-1)
CA_1	1
CA_2	2
CA_3	3
CA_5	5
CA_7	7
CA_8	8
CA_12	12
CA_23	23
CA_27	27
CA_38	38
CA_39	39
CA_40	40
CA_41	41
CA_42	42
CA_66	66
CA_70	70

Table 5.2A-2: Inter-band CA operating bands (two bands)

E-UTRA CA Band	E-UTRA Band (Table 5.2-1)
CA_1-3	1, 3
CA_1-3-3	1, 3
CA_1-5	1, 5
CA_1-7	1, 7
CA_1-7-7	1, 7
CA_1-8	1, 8
CA_1-11	1, 11
CA_1-18	1, 18
CA_1-19	1, 19
CA_1-20	1, 20
CA_1-21	1, 21
CA_1-26	1, 26
CA_1-28	1, 28
CA_1-38	1, 38
CA_1-40	1, 40
CA_1-41	1, 41
CA_1-42	1, 42
CA_1-46	1, 46
CA_2-4	2, 4
CA_2-2-4	2, 4
CA_2-2-4-4	2, 4
CA_2-4-4	2, 4
CA_2-5	2, 5
CA_2-2-5	2, 5
CA_2-7	2, 7
CA_2-7-7	2, 7
CA_2-12	2, 12
CA_2-2-12	2, 12
CA_2-2-12-12	2, 12
CA_2-12-12	2, 12
CA_2-13	2, 13
CA_2-2-13	2, 13
CA_2-17	2, 17
CA_2-28	2, 28
CA_2-29	2, 29
CA_2-30	2, 30
CA_2-2-30	2, 30
CA_2-46	2, 46
CA_2-46-46	2, 46
CA_2-66	2, 66
CA_2-2-66-66	2, 66
CA_2-2-66	2, 66
CA_2-66-66	2, 66
CA_3-5	3, 5
CA_3-7	3, 7
CA_3-3-7	3, 7
CA_3-3-7-7	3, 7
CA_3-7-7	3, 7
CA_3-8	3, 8
CA_3-3-8	3, 8
CA_3-11	3, 11
CA_3-19	3, 19
CA_3-20	3, 20
CA_3-3-20	3, 20
CA_3-21	3, 21

CA_3-26	3, 26
CA_3-27	3, 27
CA_3-28	3, 28
CA_3-31	3, 31
CA_3-32	3, 32
CA_3-38	3, 38
CA_3-40	3, 40
CA_3-40-40	3, 40
CA_3-41	3, 41
CA_3-42	3, 42
CA_3-46	3, 46
CA_3-69	3, 69
CA_4-5	4, 5
CA_4-4-5	4, 5
CA_4-7	4, 7
CA_4-4-7	4, 7
CA_4-7-7	4, 7
CA_4-12	4, 12
CA_4-4-12	4, 12
CA_4-4-12-12	4, 12
CA_4-12-12	4, 12
CA_4-13	4, 13
CA_4-4-13	4, 13
CA_4-17	4, 17
CA_4-27	4, 27
CA_4-28	4, 28
CA_4-29	4, 28
CA_4-4-29	4, 29
CA_4-30	4, 30
CA_4-4-30	4, 30
CA_4-46	4, 46
CA_4-46-46	4, 46
CA_5-7	5, 7
CA_5-7-7	5, 7
CA_5-12	5, 12
CA_5-12-12	5, 12
CA_5-13	5 ,13
CA_5-17	5, 17
CA_5-25	5, 25
CA_5-29	5, 29
CA_5-30	5, 30
CA_5-38	5, 38
CA_5-40	5, 40
CA_5-40-40	5, 40
CA_5-41	5, 41
CA_5-46	5, 46
CA_5-66	5, 66
CA_5-5-66	5, 66
CA_5-66-66	5, 66
CA_5-5-66-66	5, 66
CA_7-8	7, 8
CA_7-7-8	7, 8
CA_7-12	7, 12
CA_7-20	7, 20
CA_7-22	7, 22
CA_7-26	7, 26
CA_7-7-26	7, 26

CA_7-28	7, 28
CA_7-32	7, 32
CA_7-40	7, 40
CA_7-42	7, 42
CA_7-42-42	7, 42
CA_7-46	7, 46
CA_7-66	7, 66
CA_8-11	8, 11
CA_8-20	8, 20
CA_8-28	8, 28
CA_8-39	8, 39
CA_8-40	8, 40
CA_8-41	8, 41
CA_8-42	8, 42
CA_8-46	8, 46
CA_11-18	11, 18
CA_11-28	11, 28
CA_11-41	11, 41
CA_11-42	11, 42
CA_11-46	11, 46
CA_12-25	12, 25
CA_12-30	12, 30
CA_12-66	12, 66
CA_12-66-66	12, 66
CA_13-46	13, 46
CA_13-66	13, 66
CA_13-66-66	13, 66
CA_18-28[1]	18, 28
CA_19-21	19, 21
CA_19-28[2]	19, 28
CA_19-42	19, 42
CA_19-46	19, 46
CA_20-28[1]	20, 28
CA_20-31	20, 31
CA_20-32	20, 32
CA_20-38	20, 38
CA_20-40	20, 40
CA_20-42	20, 42
CA_20-42-42	20, 42
CA_20-67	20, 67
CA_21-28	21, 28
CA_21-42	21, 42
CA_21-46	21, 46
CA_23-29	23, 29
CA_25-26	25, 26
CA_25-41	25, 41
CA_26-41	26, 41
CA_26-46	26, 46
CA_28-40	28, 40
CA_28-41	28, 41
CA_28-42	28, 42
CA_28-46	28, 46
CA_29-30	29, 30
CA_29-66	29, 66
CA_29-66-66	29, 66
CA_29-70	29, 70
CA_30-66	30, 66

CA_30-66-66	30, 66
CA_38-40	38, 40
CA_38-40-40	38, 40
CA_39-41	39, 41
CA_39-46	39, 46
CA_40-41	40, 41
CA_40-42	40, 42
CA_40-46	40, 46
CA_41-42	41, 42
CA_41-46	41, 46
CA_42-46	42, 46
CA_46-66	46, 66
CA_46-46-66	46, 66
CA_46-66-66	46, 66
CA_46-70	46, 70
NOTE 1: The frequency range in band 28 is restricted for this CA band combination to 703-733 MHz for the UL and 758-788 MHz for the DL NOTE 2: The frequency range in band 28 is restricted for this CA band combination to 718-748 MHz for the UL and 773-803 MHz for the DL	

Table 5.2A-2a: Inter-band CA operating bands (three bands)

E-UTRA CA Band	E-UTRA Band (Table 5.2-1)
CA_1-3-5	1, 3, 5
CA_1-3-7	1, 3, 7
CA_1-3-7-7	1, 3, 7
CA_1-3-8	1, 3, 8
CA_1-3-3-8	1, 3, 8
CA_1-3-11	1, 3, 11
CA_1-3-19	1, 3, 19
CA_1-3-20	1, 3, 20
CA_1-3-21	1, 3, 21
CA_1-3-26	1, 3, 26
CA_1-3-28	1, 3, 28
CA_1-3-38	1, 3, 38
CA_1-3-40	1, 3, 40
CA_1-3-41	1, 3, 41
CA_1-3-42	1, 3, 42
CA_1-5-7	1, 5, 7
CA_1-5-7-7	1, 5, 7
CA_1-5-40	1, 5, 40
CA_1-5-46	1, 5, 46
CA_1-7-8	1, 7, 8
CA_1-7-20	1, 7, 20
CA_1-7-26	1, 7, 26
CA_1-7-7-26	1, 7, 26
CA_1-7-28	1, 7, 28
CA_1-7-40	1, 7, 40
CA_1-7-42	1, 7, 42
CA_1-7-46	1, 7, 46
CA_1-8-11	1, 8, 11
CA_1-8-28	1, 8, 28
CA_1-8-40	1, 8, 40
CA_1-11-18	1, 11, 18
CA_1-11-28	1, 11, 28
CA_1-18-28[1]	1, 18, 28
CA_1-19-21	1, 19, 21
CA_1-19-28[2]	1, 19, 28
CA_1-19-42	1, 19, 42
CA_1-20-42	1, 20, 42
CA_1-21-28	1, 21, 28
CA_1-21-42	1, 21, 42
CA_1-28-42	1, 28, 42
CA_1-41-42	1, 41, 42
CA_2-4-5	2, 4, 5
CA_2-2-4-5	2, 4, 5
CA_2-4-4-5	2, 4, 5
CA_2-4-12-12	2, 4, 12
CA_2-5-12-12	2, 5, 12
CA_2-2-5-30	2, 5, 30
CA_2-2-5-66	2, 5, 66
CA_2-2-12-30	2, 12, 30
CA_2-2-12-66	2, 12, 66
CA_2-2-13-66	2,13, 66
CA_2-2-30-66	2, 30, 66
CA_2-4-7	2, 4, 7
CA_2-4-7-7	2, 4, 7
CA_2-4-12	2, 4, 12
CA_2-2-4-12	2, 4, 12
CA_2-2-5-66-66	2, 5, 66
CA_2-4-4-12	2, 4, 12
CA_2-4-13	2, 4, 13
CA_2-4-29	2, 4, 29
CA_2-4-30	2, 4, 30
CA_2-5-12	2, 5, 12
CA_2-2-5-12	2, 5, 12

CA_2-5-13	2, 5, 13
CA_2-5-29	2, 5, 29
CA_2-5-30	2, 5, 30
CA_2-5-66	2, 5, 66
CA_2-5-66-66	2, 5, 66
CA_2-7-12	2, 7, 12
CA_2-7-66	2, 7, 66
CA_2-12-30	2, 12, 30
CA_2-12-66	2, 12, 66
CA_2-12-66-66	2, 12, 66
CA_2-13-66	2, 13, 66
CA_2-13-66-66	2, 13, 66
CA_2-29-30	2, 29, 30
CA_2-30-66	2, 30, 66
CA_2-30-66-66	2, 30, 66
CA_2-46-66	2, 46, 66
CA_2-46-46-66	2, 46, 66
CA_3-5-7	3, 5, 7
CA_3-5-7-7	3, 5, 7
CA_3-5-40	3, 5, 40
CA_3-3-7-8	3, 7, 8
CA_3-3-7-7-8	3, 7, 8
CA_3-7-7-8	3, 7, 8
CA_3-7-8	3, 7, 8
CA_3-7-20	3, 7, 20
CA_3-7-26	3, 7, 26
CA_3-7-7-26	3, 7, 26
CA_3-7-28	3, 7, 28
CA_3-7-32	3, 7, 32
CA_3-7-38	3, 7, 38
CA_3-7-40	3, 7, 40
CA_3-7-42	3, 7, 42
CA_3-8-11	3, 8, 11
CA_3-8-28	3, 8, 28
CA_3-8-40	3, 19, 40
CA_3-11-28	3, 11, 28
CA_3-19-21	3, 19, 21
CA_3-19-42	3, 19, 42
CA_3-20-32	3, 20, 32
CA_3-20-42	3, 20, 42
CA_3-21-28	3, 21, 28
CA_3-21-42	3, 21, 42
CA_3-28-40	3, 28, 40
CA_3-28-41	3, 28, 41
CA_3-28-42	3, 28, 42
CA_3-41-42	3, 41, 42
CA_4-5-12	4, 5, 12
CA_4-4-5-12	4, 5, 12
CA_4-5-12-12	4, 5, 12
CA_4-5-13	4, 5, 13
CA_4-5-29	4, 5, 29
CA_4-5-30	4, 5, 30
CA_4-4-5-30	4, 5, 30
CA_4-7-12	4, 7, 12
CA_4-12-30	4, 12, 30
CA_4-4-12-30	4, 12, 30
CA_4-29-30	4, 29, 30
CA_4-4-29-30	4, 29, 30
CA_5-7-46	5, 7, 46
CA_5-12-66	5, 12, 66
CA_5-30-66	5, 30, 66
CA_5-30-66-66	5, 30, 66
CA_5-40-41	5, 40, 41
CA_7-8-20	7, 8, 20
CA_7-20-38	7, 20, 38

CA_7-20-42	7, 20, 42
CA_8-11-28	8, 11, 28
CA_8-28-41	8, 28, 41
CA_12-30-66	12, 30, 66
CA_19-21-42	19, 21, 42
CA_21-28-42	21, 28, 42
CA_28-41-42	28, 41, 42
CA_29-46-66	29, 46, 66
NOTE 1: The frequency range in band 28 is restricted for this CA band combination to 703-733 MHz for the UL and 758-788 MHz for the DL NOTE 2: The frequency range in band 28 is restricted for this CA band combination to 718-748 MHz for the UL and 773-803 MHz for the DL	

Table 5.2A-2b: Inter-band CA operating bands (four bands)

E-UTRA CA Band	E-UTRA Band (Table 5.2-1)
CA_1-3-5-7	1, 3, 5, 7
CA_1-3-5-7-7	1, 3, 5, 7
CA_1-3-5-40	1, 3, 5, 40
CA_1-3-7-8	1, 3, 7, 8
CA_1-3-7-20	1, 3, 7, 20
CA_1-3-7-28	1, 3, 7, 28
CA_1-3-7-40	1, 3, 7, 40
CA_1-3-7-42	1, 3, 7, 42
CA_1-3-8-11	1, 3, 8, 11
CA_1-3-8-40	1, 3, 8, 40
CA_1-3-19-21	1, 3,19, 21
CA_1-3-19-42	1, 3,19, 42
CA_1-3-20-42	1, 3, 20, 42
CA_1-3-21-28	1, 3, 21, 28
CA_1-3-21-42	1, 3, 21, 42
CA_1-3-28-42	1, 3, 28, 42
CA_1-5-7-46	1, 5, 7, 46
CA_1-7-20-42	1, 7, 20, 42
CA_1-19-21-42	1, 19, 21, 42
CA_1-21-28-42	1, 21, 28, 42
CA_2-2-5-12-66	2, 5, 12, 66
CA_2-2-5-30-66	2, 5, 30, 66
CA_2-2-12-30-66	2, 12, 30, 66
CA_2-4-5-12	2, 4, 5, 12
CA_2-4-5-29	2, 4, 5, 29
CA_2-4-5-30	2, 4, 5, 30
CA_2-4-7-12	2, 4, 7, 12
CA_2-4-12-30	2, 4, 12, 30
CA_2-4-29-30	2, 4, 29, 30
CA_2-5-12-66	2, 5, 12, 66
CA_2-5-30-66	2, 5, 30, 66
CA_2-5-30-66-66	2, 5, 30, 66
CA_2-12-30-66	2, 12, 30, 66
CA_3-7-20-42	3, 7, 20, 42
CA_3-19-21-42	3, 19, 21, 42
CA_3-28-41-42	3, 28, 41, 42

Table 5.2A-2c: Inter-band CA operating bands (five bands)

E-UTRA CA Band	E-UTRA Band (Table 5.5)
CA_1-3-7-20-42	1, 3, 7, 20, 42

Table 5.2A-3: Intra-band non-contiguous CA operating bands (with two sub-blocks)

E-UTRA CA Band	E-UTRA Band (Table 5.2-1)
CA_2-2	2
CA_3-3	3
CA_4-4	4
CA_5-5	5
CA_7-7	7
CA_12-12	12
CA_23-23	23
CA_25-25	25
CA_40-40	40
CA_41-41	41
CA_42-42	42
CA_48-48	48
CA_66-66	66

5.2B Operating bands for UL-MIMO

E-UTRA UL-MIMO in Rel-10 is designed to operate in the operating bands defined in Table 5.2-1.

5.2C Operating bands for Dual Connectivity

E-UTRA dual connectivity is designed to operate in the operating bands defined in Table 5.2C-1.

Table 5.2C-1: Inter-band dual connectivity operating bands (two bands)

E-UTRA DC Band	E-UTRA Band (Table 5.5)
DC_1-3	1, 3
DC_1-5	1, 5
DC_1-7	1, 7
DC_1-8	1, 8
DC_1-19	1, 19
DC_1-21	1, 21
DC_1-42	1, 42
DC_2-4	2, 4
DC_2-5	2, 5
DC_2-7	2, 7
DC_2-12	2, 12
DC_2-13	2, 13
DC_3-5	3, 5
DC_3-7	3, 7
DC_3-8	3, 8
DC_3-19	3, 19
DC_3-20	3, 20
DC_3-21	3, 21
DC_3-26	3, 26
DC_3-28	3, 28
DC_3-42	3, 42
DC_4-5	4, 5
DC_4-7	4, 7
DC_4-12	4, 12
DC_4-13	4, 13
DC_4-17	4, 17
DC_5-7	5, 7
DC_5-12	5,12
DC_5-17	5,17
DC_7-8	7, 8
DC_7-20	7, 20
DC_7-28	7, 28
DC_8-39	8, 39
DC_8-41	8, 41
DC_19-21	19, 21
DC_19-42	19, 42
DC_21-42	21, 42
DC_21-28	21, 28
DC_28-42	28, 42
DC_39-41	39, 41
DC_41-42	41, 42

5.2D Operating bands for ProSe

E-UTRA ProSe is designed to operate in the operating bands defined in Table 5.2D-1.

Table 5.2D-1: E-UTRA ProSe operating band

E-UTRA ProSe Band	E-UTRA Operating Band	ProSe UE transmit	ProSe UE receive	ProSe Duplex Mode	ProSe Direct	
		$F_{UL_low} – F_{UL_high}$	$F_{DL_low} – F_{DL_high}$		Disc.	Comm.
2	2	1850 MHz – 1910 MHz	1850 MHz – 1910 MHz	HD	Yes	
3	3	1710 MHz – 1785 MHz	1710 MHz – 1785 MHz	HD	Yes	Yes
4	4	1710 MHz – 1755 MHz	1710 MHz – 1755 MHz	HD	Yes	
7	7	2500 MHz – 2570 MHz	2500 MHz – 2570 MHz	HD	Yes	Yes
14	14	788 MHz – 798 MHz	788 MHz – 798 MHz	HD	Yes	Yes
20	20	832 MHz – 862 MHz	832 MHz – 862 MHz	HD	Yes	Yes
26	26	814 MHz – 849 MHz	814 MHz – 849 MHz	HD	Yes	Yes
28	28	703 MHz – 748 MHz	703 MHz – 748 MHz	HD	Yes	Yes
31	31	452.5 MHz – 457.5 MHz	452.5 MHz – 457.5 MHz	HD	Yes	Yes
41	41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	HD	Yes	
68	68	698 MHz – 728 MHz	698 MHz – 728 MHz	HD	Yes	Yes

E-UTRA ProSe is designed to operate concurrent with E-UTRA uplink/downlink on the operating bands combinations listed in Table 5.2D-2.

Table 5.2D-2 Inter-band E-UTRA ProSe / E-UTRA operating bands

E-UTRA ProSe Band [Note 1]	E-UTRA band / E-UTRA CA band [Note 2]
2	4
	CA_2-4[Note 3]
28	1
	CA_1-28[Note 3]

NOTE 1: As specified in Table 5.2D-1
NOTE 2: As specified in Table 5.2-1 and Table 5.2A-2
NOTE 3: Applies when E-UTRA uplink is assigned to one E-UTRA band and ProSe operation is restricted to the uplink frequencies paired with either PCC or SCC.
NOTE 4: The concurrency for E-UTRA ProSe Direct Discovery with E-UTRA uplink/downlink applies after allowing for any transmission and/or reception gap requested by the UE.

5.2E Operating bands for UE category 0, UE category M1, M2 and UE category 1bis

UE category 0 is designed to operate in the E-UTRA operating bands 2, 3, 4, 5, 8, 13, and 20 in both half duplex FDD mode and full-duplex FDD mode and in bands 39 and 41 in TDD mode. The E-UTRA bands are defined in Table 5.2-1.

UE category M1 is designed to operate in the E-UTRA operating bands 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 18, 19, 20, 21, 26, 27, 28, and 31 in both half duplex FDD mode and full-duplex FDD mode, and in band,s40 39 and 41 in TDD mode. The E-UTRA bands are defined in Table 5.2-1.

UE category 1bis is designed to operate in the E-UTRA operating bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 18, 20, 26, 28, and 66 in full duplex FDD mode and in bands 39 and 41 in TDD mode. The E-UTRA bands are defined in Table 5.2-1.

5.2F Operating bands for UE category NB1

NB-IoT is designed to operate in the E-UTRA operating bands 1, 2, 3, 5, 8, 11, 12, 13, 17, 18, 19, 20, 21, 25, 26, 28, 31, 66 and 70 which are defined in Table 5.2-1. NB-IoT system operates in HD-FDD duplex mode.

5.2G Operating bands for V2X Communication

E-UTRA V2X Communication is designed to operate in the the operating bands defined in Table 5.2G-1.

Table 5.2G-1: V2X operating band

E-UTRA Operating Band	E-UTRA V2X Operating Band	V2X UE transmit		V2X UE receive		Duplex Mode	Interface
		F_{UL_low} – F_{UL_high}		F_{DL_low} – F_{DL_high}			
47	47	5855 MHz	5925 MHz	5855 MHz	5925 MHz	HD	PC5

E-UTRA V2X communication is designed to operate concurrent with E-UTRA uplink/downlink on the operating bands combinations listed in Table 5.2G-2.

Table 5.2G-2: Inter-band con-current V2X operating bands

V2X con-current configuration	E-UTRA or V2X Operating Band	Interface	Uplink (UL) operating band BS receive UE transmit	Downlink (DL) operating band BS transmit UE receive	Duplex Mode
			F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	
V2X_3-47	3	Uu	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
	47	PC5	5855 MHz – 5925 MHz	5855 MHz – 5925 MHz	HD
V2X_7-47	7	Uu	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
	47	PC5	5855 MHz – 5925 MHz	5855 MHz – 5925 MHz	HD
V2X_8-47	8	Uu	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
	47	PC5	5855 MHz – 5925 MHz	5855 MHz – 5925 MHz	HD
V2X_39-47	39	Uu	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
	47	PC5	5855 MHz – 5925 MHz	5855 MHz – 5925 MHz	HD
V2X_41-47	41	Uu	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
	47	PC5	5855 MHz – 5925 MHz	5855 MHz – 5925 MHz	HD

E-UTRA V2X communication is also designed to operate for intra-band multi-carrier operation in the operating bands defined in Table 5.2G-3.

Table 5.2G-3: V2X intra-band multi-carrier operation

V2X multi-carrier Band configuration	V2X operating Band	Interface
V2X_47	47	PC5

5.3 TX–RX frequency separation

a) The default EUTRA TX channel (carrier centre frequency) to RX channel (carrier centre frequency) separation is specified in Table 5.3-1 for the TX and RX channel bandwidths defined in Table 5.4.2.1-1

Table 5.3-1: Default UE TX-RX frequency separation

E-UTRA Operating Band	TX - RX carrier centre frequency separation
1	190 MHz
2	80 MHz
3	95 MHz
4	400 MHz
5	45 MHz
6	45 MHz
7	120 MHz
8	45 MHz
9	95 MHz
10	400 MHz
11	48 MHz
12	30 MHz
13	-31 MHz
14	-30 MHz
17	30 MHz
18	45 MHz
19	45 MHz
20	-41 MHz
21	48 MHz
22	100 MHz
23	180 MHz
24	-101.5 MHz
25	80 MHz
26	45 MHz
27	45 MHz
28	55 MHz
30	45 MHz
31	10 MHz
65	190 MHz
66	400 MHz
70	295, 300MHz[1]
NOTE 1: Default TX-RX carrier centre frequency separation.	

b) The use of other TX channel to RX channel carrier centre frequency separation is not precluded and is intended to form part of a later release.

5.3A TX–RX frequency separation for CA

For intra-band contiguous carrier aggregation, the same TX-RX frequency separation as specified in Table 5.3-1 is applied to PCC and SCC, respectively.

5.4 Channel arrangement

5.4.1 Channel spacing

The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between two adjacent E-UTRA carriers is defined as following:

$$\text{Nominal Channel spacing} = (BW_{Channel(1)} + BW_{Channel(2)})/2$$

where $BW_{Channel(1)}$ and $BW_{Channel(2)}$ are the channel bandwidths of the two respective E-UTRA carriers. The channel spacing can be adjusted to optimize performance in a particular deployment scenario.

5.4.1A Channel spacing for CA

For intra-band contiguous carrier aggregation with two or more component carriers, the nominal channel spacing between two adjacent E-UTRA component carriers is defined as the following:

$$\text{Nominal channel spacing} = \left\lfloor \frac{BW_{Channel(1)} + BW_{Channel(2)} - 0.1\left|BW_{Channel(1)} - BW_{Channel(2)}\right|}{0.6} \right\rfloor 0.3 \quad [\text{MHz}]$$

where $BW_{Channel(1)}$ and $BW_{Channel(2)}$ are the channel bandwidths of the two respective E-UTRA component carriers according to Table 5.4.2-1 with values in MHz. The channel spacing for intra-band contiguous carrier aggregation can be adjusted to any multiple of 300 kHz less than the nominal channel spacing to optimize performance in a particular deployment scenario.

For intra-band contiguous carrier aggregation with two or more component carriers in Band 46, the requirements apply for both 19.8 MHz and 20.1 MHz nominal carrier spacing between two 20 MHz component carriers, and for 15.0 MHz nominal carrier spacing between 10 MHz and 20 MHz component carriers.

For intra-band non-contiguous carrier aggregation the channel spacing between two E-UTRA component carriers in different sub-blocks shall be larger than the nominal channel spacing defined in this subclause.

5.4.1F Channel spacing for UE category NB1

Nominal channel spacing for UE category NB1 in stand-alone mode is 200 kHz. For in-band and guard-band cases the nominal channel spacing between two adjacent category NB1 carriers is 180 kHz.

5.4.2 Channel bandwidth

Requirements in present document are specified for the channel bandwidths listed in Table 5.4.2-1

Table 5.4.2-1: Transmission bandwidth configuration N_{RB} in E-UTRA channel bandwidths

Channel bandwidth $BW_{Channel}$ [MHz]	**1.4**	**3**	**5**	**10**	**15**	**20**
Transmission bandwidth configuration N_{RB}	6	15	25	50	75	100

Figure 5.4.2-1 shows the relation between the Channel bandwidth ($BW_{Channel}$) and the Transmission bandwidth configuration (N_{RB}). The channel edges are defined as the lowest and highest frequencies of the carrier separated by the channel bandwidth, i.e. at F_C +/- $BW_{Channel}$ /2.

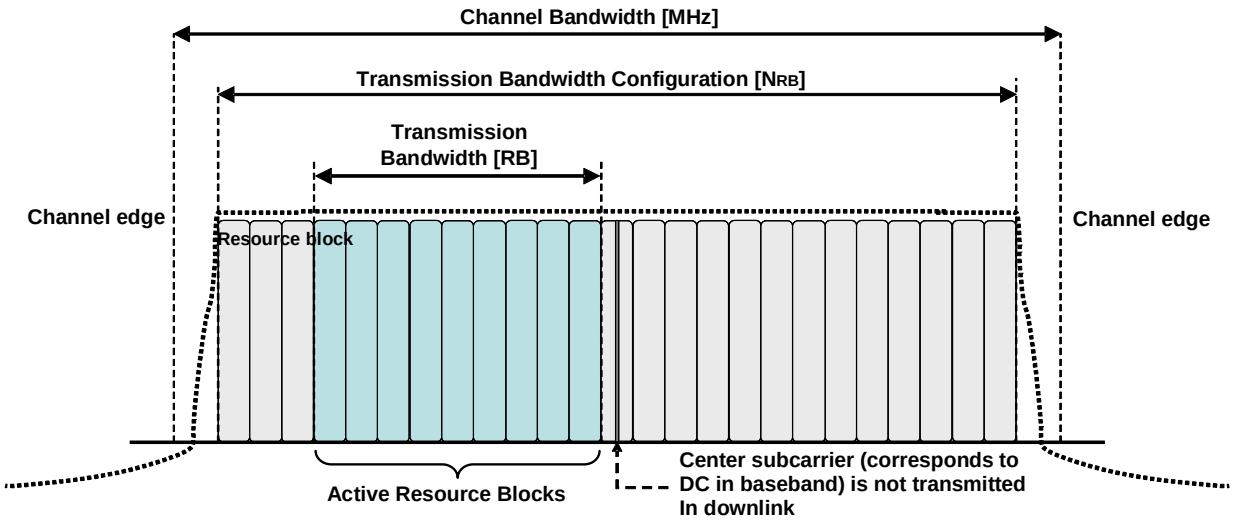


Figure 5.4.2-1: Definition of channel bandwidth and transmission bandwidth configuration for one E-UTRA carrier

5.4.2.1 Channel bandwidths per operating band

a) The requirements in this specification apply to the combination of channel bandwidths and operating bands shown in Table 5.4.2.1-1. The transmission bandwidth configuration in Table 5.4.2-1 shall be supported for each of the specified supported channel bandwidths. The same (symmetrical) channel bandwidth is specified for both the TX and RX path.

Table 5.4.2.1-1: E-UTRA channel bandwidth

E-UTRA band / channel bandwidth						
E-UTRA Band	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
1			Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes[1]	Yes[1]
3	Yes	Yes	Yes	Yes	Yes[1]	Yes[1]
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes[1]		
6			Yes	Yes[1]		
7			Yes	Yes	Yes[3]	Yes[1, 3]
8	Yes	Yes	Yes	Yes[1]		
9			Yes	Yes	Yes[1]	Yes[1]
10			Yes	Yes	Yes	Yes
11			Yes	Yes[1]		
12	Yes	Yes	Yes[1]	Yes[1]		
13			Yes[1]	Yes[1]		
14			Yes[1]	Yes[1]		
...						
17			Yes[1]	Yes[1]		
18			Yes	Yes[1]	Yes[1]	
19			Yes	Yes[1]	Yes[1]	
20			Yes	Yes[1]	Yes[1]	Yes[1]
21			Yes	Yes[1]	Yes[1]	
22			Yes	Yes	Yes[1]	Yes[1]
23	Yes	Yes	Yes	Yes	Yes[1]	Yes[1]
24			Yes	Yes		
25	Yes	Yes	Yes	Yes	Yes[1]	Yes[1]
26	Yes	Yes	Yes	Yes[1]	Yes[1]	
27	Yes	Yes	Yes	Yes[1]		
28		Yes	Yes	Yes[1]	Yes[1]	Yes[1, 2]
30			Yes	Yes[1]		
31	Yes	Yes[1]	Yes[1]			
...						
33			Yes	Yes	Yes	Yes
34			Yes	Yes	Yes	
35	Yes	Yes	Yes	Yes	Yes	Yes
36	Yes	Yes	Yes	Yes	Yes	Yes
37			Yes	Yes	Yes	Yes
38			Yes	Yes	Yes[3]	Yes[3]
39			Yes	Yes	Yes[3]	Yes[3]
40			Yes	Yes	Yes	Yes
41			Yes	Yes	Yes	Yes
42			Yes	Yes	Yes	Yes
43			Yes	Yes	Yes	Yes
44		Yes	Yes	Yes	Yes	Yes
45			Yes	Yes	Yes	Yes
46				Yes		Yes
47				Yes		Yes
48			Yes	Yes	Yes	Yes
…						
64	Reserved					
65	Yes	Yes	Yes	Yes	Yes	Yes
66	Yes	Yes	Yes	Yes	Yes	Yes
68			Yes	Yes	Yes	
…						
70			Yes	Yes	Yes	Yes[4]

NOTE 1:	refers to the bandwidth for which a relaxation of the specified UE receiver sensitivity requirement (subclause 7.3) is allowed.
NOTE 2:	For the 20 MHz bandwidth, the minimum requirements are specified for E-UTRA UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz
NOTE 3:	refers to the bandwidth for which the uplink transmission bandwidth can be restricted by the network for some channel assignments in FDD/TDD co-existence scenarios in order to meet unwanted emissions requirements (subclause 6.6.3.2).
NOTE 4:	For the 20 MHz bandwidth, the minimum requirements are restricted to E-UTRA operation when carrier aggregation is configured.

b) The use of different (asymmetrical)) channel bandwidth for the TX and RX is not precluded and is intended to form part of a later release.

5.4.2A Channel bandwidth for CA

For intra-band contiguous carrier aggregation *Aggregated Channel Bandwidth*, *Aggregated Transmission Bandwidth Configuration* and *Guard Bands* are defined as follows, see Figure 5.4.2A-1.

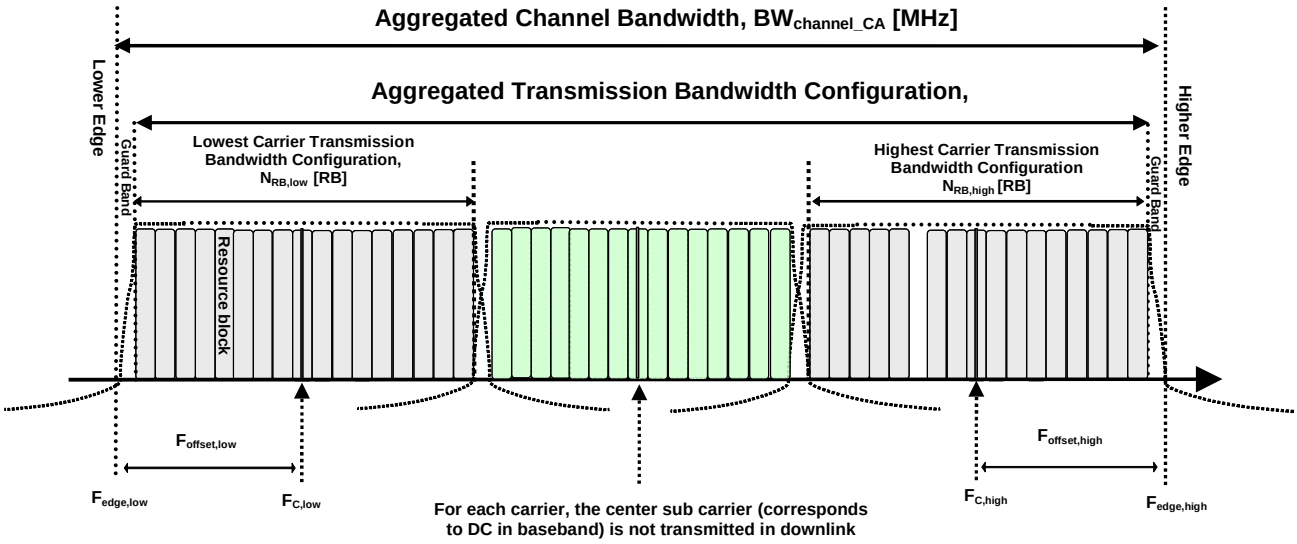


Figure 5.4.2A-1: Definition of Aggregated channel bandwidth and aggregated channel bandwidth edges

The *aggregated channel bandwidth*, $BW_{Channel_CA}$, is defined as

$$BW_{Channel_CA} = F_{edge,high} - F_{edge,low} \text{ [MHz]}.$$

The lower bandwidth edge $F_{edge,low}$ and the upper bandwidth edge $F_{edge,high}$ of the aggregated channel bandwidth are used as frequency reference points for transmitter and receiver requirements and are defined by

$$F_{edge,low} = F_{C,low} - F_{offset,low}$$

$$F_{edge,high} = F_{C,high} + F_{offset,high}$$

The lower and upper frequency offsets depend on the transmission bandwidth configurations of the lowest and highest assigned edge component carrier and are defined as

$$F_{offset,low} = (0.18N_{RB,low} + \Delta f_1)/2 + BW_{GB} \text{ [MHz]}$$

$$F_{offset,high} = (0.18N_{RB,high} + \Delta f_1)/2 + BW_{GB} \text{ [MHz]}$$

where $\Delta f_1 = \Delta f$ for the downlink with Δf the subcarrier spacing and $\Delta f_1 = 0$ for the uplink, while $N_{RB,low}$ and $N_{RB,high}$ are the transmission bandwidth configurations according to Table 5.4.2-1 for the lowest and highest assigned component carrier, respectively. BW_{GB} denotes the *Nominal Guard Band* and is defined in Table 5.4.2A-1, and the factor 0.18 is the PRB bandwidth in MHz.

NOTE: The values of $BW_{Channel_CA}$ for UE and BS are the same if the lowest and the highest component carriers are identical.

Aggregated Transmission Bandwidth Configuration is the number of the aggregated RBs within the fully allocated Aggregated Channel bandwidth and is defined per CA Bandwidth Class (Table 5.4.2A-1).

For intra-band non-contiguous carrier aggregation *Sub-block Bandwidth* and *Sub-block edges* are defined as follows, see Figure 5.4.2A-2.

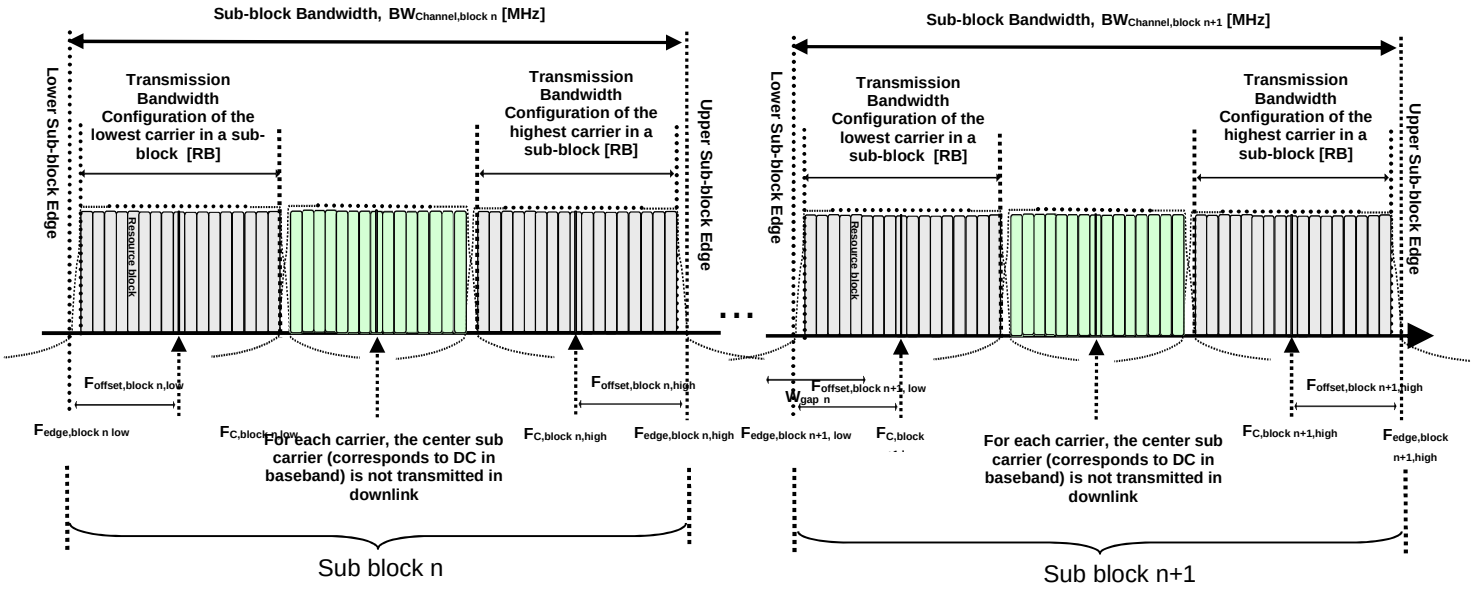


Figure 5.4.2A-2: Non-contiguous intraband CA terms and definitions

The lower sub-block edge of the Sub-block Bandwidth ($BW_{Channel,block}$) is defined as:

$$F_{edge,block,\ low} = F_{C,block,low} - F_{offset,block,\ low.}$$

The upper sub-block edge of the Sub-block Bandwidth is defined as:

$$F_{edge,block,high} = F_{C,block,high} + F_{offset,block,high\ .}$$

The Sub-block Bandwidth, $BW_{Channel,block}$, is defined as follows:

$$BWChannel,block = F_{edge,block,high} - F_{edge,block,low\ [MHz]}$$

The lower and upper frequency offsets $F_{offset,block,low}$ and $F_{offset,block,high}$ depend on the transmission bandwidth configurations of the lowest and highest assigned edge component carriers within a sub-block and are defined as:

$$F_{offset,block,low} = (0.18N_{RB,low} + \Delta f_1)/2 + BW_{GB}\,[MHz]$$

$$F_{offset,block,high} = (0.18N_{RB,high} + \Delta f_1)/2 + BW_{GB}\,[MHz]$$

where $\Delta f_1 = \Delta f$ for the downlink with Δf the subcarrier spacing and $\Delta f_1 = 0$ for the uplink, while $N_{RB,low}$ and $N_{RB,high}$ are the transmission bandwidth configurations according to Table 5.6-1 for the lowest and highest assigned component carrier within a sub-block, respectively. BW_{GB} denotes the *Nominal Guard Band* and is defined in Table 5.4.2A-1, and the factor 0.18 is the PRB bandwidth in MHz.

The sub-block gap size between two consecutive sub-blocks W_{gap} is defined as:

$$W_{gap} = F_{edge,block\ n+1,low} - F_{edge,block\ n,high}\ [MHz]$$

Table 5.4.2A-1: CA bandwidth classes and corresponding nominal guard bands

CA Bandwidth Class	Aggregated Transmission Bandwidth Configuration	Number of contiguous CC	Nominal Guard Band BW_{GB}
A	$N_{RB,agg} \le 100$	1	$a_1\ BW_{Channel(1)} - 0.5\Delta f_1$ (NOTE 2)
B	$25 < N_{RB,agg} \le 100$	2	$0.05\ max(BW_{Channel(1)}, BW_{Channel(2)}) - 0.5\Delta f_1$
C	$100 < N_{RB,agg} \le 200$	2	$0.05\ max(BW_{Channel(1)}, BW_{Channel(2)}) - 0.5\Delta f_1$
D	$200 < N_{RB,agg} \le 300$	3	$0.05\ max(BW_{Channel(1)}, BW_{Channel(2)}, BW_{Channel(3)}) - 0.5\Delta f_1$
E	$300 < N_{RB,agg} \le 400$	4	$0.05\ max(BW_{Channel(1)}, BW_{Channel(2)}, BW_{Channel(3)}, BW_{Channel(4)}) - 0.5\Delta f_1$
F	$400 < N_{RB,agg} \le 500$	5	NOTE 3
I	$700 < N_{RB,agg} \le 800$	8	NOTE 3
NOTE 1: $BW_{Channel(j)}$, j = 1, 2, 3, 4 is the channel bandwidth of an E-UTRA component carrier according to Table 5.4.2-1 and $\Delta f_1 = \Delta f$ for the downlink with Δf the subcarrier spacing while $\Delta f_1 = 0$ for the uplink. NOTE 2: $a_1 = 0.16/1.4$ for $BW_{Channel(1)} = 1.4$ MHz whereas $a_1 = 0.05$ for all other channel bandwidths. NOTE 3: Applicable for later releases.			

The channel spacing between centre frequencies of contiguously aggregated component carriers is defined in subclause 5.4.1A.

5.4.2A.1 Channel bandwidths per operating band for CA

The requirements for carrier aggregation in this specification are defined for carrier aggregation configurations with associated bandwidth combination sets. For inter-band carrier aggregation, a *carrier aggregation configuration* is a combination of operating bands, each supporting a carrier aggregation bandwidth class. For intra-band contiguous carrier aggregation, a carrier aggregation configuration is a single operating band supporting a carrier aggregation bandwidth class.

For each carrier aggregation configuration, requirements are specified for all bandwidth combinations contained in a *bandwidth combination set*, which is indicated per supported band combination in the UE radio access capability. A UE can indicate support of several bandwidth combination sets per band combination.

Requirements for intra-band contiguous carrier aggregation are defined for the carrier aggregation configurations and bandwidth combination sets specified in Table 5.4.2A.1-1. Requirements for inter-band carrier aggregation are defined for the carrier aggregation configurations and bandwidth combination sets specified in Table 5.4.2A.1-2 and 5.4.2A.1-2a. Requirements for intra-band non-contiguous carrier aggregation are defined for the carrier aggregation configurations and bandwidth combination sets specified in Table 5.4.2A.1-3.

The DL component carrier combinations for a given CA configuration shall be symmetrical in relation to channel centre unless stated otherwise in table 5.4.2A.1-1, 5.4.2A.1-2, 5.4.2A.1-2a and 5.4.2A.1-2b.

Table 5.4.2A.1-1: E-UTRA CA configurations and bandwidth combination sets defined for intra-band contiguous CA

E-UTRA CA configuration	Uplink CA configurations (NOTE 3)	E-UTRA CA configuration / Bandwidth combination set						
		Component carriers in order of increasing carrier frequency					Maximum aggregated bandwidth [MHz]	Bandwidth combination set
		Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]		
CA_1C	CA_1C	15	15				40	0
		20	20					
CA_2C		5	20				40	0
		10	15, 20					
		15	10, 15, 20					
		20	5, 10, 15, 20					
CA_3B		5	3				10	0
		3, 5	5					
CA_3C	CA_3C	5, 10, 15	20				40	0
		20	5, 10, 15, 20					
CA_5B		5, 10	10				20	0
		10	5					
		3	5				8	1
		5	3					
CA_7B		15	5				20	0
CA_7C	CA_7C	15	15				40	0
		20	20					
		10	20				40	1
		15	15, 20					
		20	10, 15, 20					
		15	10, 15				40	2
		20	15, 20					
CA_8B	CA_8B	5,10	10				20	0
		10	5					
CA_12B	-	5	5, 10				15	0
CA_23B	-	10	10				20	0
		5	15					
CA_27B	-	1.4, 3, 5	5				13	0
		1.4, 3	10					
CA_38C	CA_38C	15	15				40	0
		20	20					
CA_39C	CA_39C	5,10,15	20				35	0
		20	5, 10, 15					
CA_40C	CA_40C	10	20				40	0
		15	15					
		20	10, 20					
		10, 15	20				40	1
		15	15					
		20	10, 15, 20					

CA_40D	CA_40C	10, 15, 20	20	20			60	0
		20	10, 15	20				
		20	20	10, 15				
		3	5				8	1
		5	3					
CA_41C	CA_41C	10	20				40	0
		15	15, 20					
		20	10, 15, 20					
		5, 10	20				40	1
		15	15, 20					
		20	5, 10, 15, 20					
		10	15, 20				40	2
		15	10, 15, 20					
		20	10, 15, 20					
		10	20				40	3
		20	20					
CA_41D	CA_41C	10	20	15			60	0
		10	15, 20	20				
		15	20	10, 15				
		15	10, 15, 20	20				
		20	15, 20	10				
		20	10, 15, 20	15, 20				
CA_41E	CA_41C	15, 20	15, 20	15, 20	20		80	0
CA_42C	CA_42C	5, 10, 15, 20	20				40	0
		20	5, 10, 15					
		10, 15, 20	20				40	1
		20	10, 15					
CA_42D	CA_42C	5,10,15, 20	20	20			60	0
		20	20	5,10,15				
		10, 15, 20	20	20			60	1
		20	20	10, 15				
CA_42E	CA_42C	5,10,15, 20	20	20	20		80	0
		20	20	20	5,10,15			
CA_42F	CA_42C	5, 10, 15, 20	20	20	20	20	100	0
		20	20	20	20	5, 10, 15, 20		
CA_43C	-	5	20				40	0
		10	15, 20					
		15	10, 15, 20					
		20	5, 10, 15, 20					

CA_46C [4]	-	20	20				40	0
		20	10, 20				40	1
		10, 20	20					
CA_46D [4]	-	20	20	20			60	0
		20	20	10, 20			60	1
		10, 20	20	20				
CA_46E [4]	-	20	20	20	20		80	0
		20	20	20	10, 20		80	1
		10	20	20	20			
CA_48C	-	5, 10, 15, 20	20				40	0
		20	5, 10, 15					
CA_48D	-	5,10,15, 20	20	20			60	0
		20	20	5,10,15				
CA_48E	-	5,10,15, 20	20	20	20		80	0
		20	20	20	5,10,15			
CA_48F	-	5, 10, 15, 20	20	20	20	20	100	0
		20	20	20	20	5, 10, 15, 20		
CA_66B	-	5	5, 10, 15				20	0
		10	5, 10					
		15	5					
CA_66C	-	5	20				40	0
		10	15, 20					
		15	10, 15, 20					
		20	5, 10, 15, 20					
CA_66D	-	5	20	20			60	0
		20	5	20				
		20	20	5				
		10	20	15				
		15	20	10				
		10, 15, 20	15, 20	20				
		15, 20	10	20				
		15	15, 20	15				
		20	15, 20	10, 15				
		20	10	15				
CA_70C	-	5	20				25	0
		10	15					
		15	10					

NOTE 1: The CA configuration refers to an operating band and a CA bandwidth class specified in Table 5.4.2A -1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.
NOTE 2: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal.
NOTE 3: Uplink CA configurations are the configurations supported by the present release of specifications.
NOTE 4: Restricted to E-UTRA operation when inter-band carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Pcell.

Table 5.4.2A.1-2: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA (two bands)

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	**Uplink CA configurations (NOTE 4)**	**E-UTRA Bands**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Maximum aggregated bandwidth [MHz]**	**Bandwidth combination set**
CA_1A-3A	CA_1A-3A	1			Yes	Yes	Yes	Yes	40	0
		3			Yes	Yes	Yes	Yes		
		1			Yes	Yes	Yes	Yes	40	1
		3		Yes	Yes	Yes	Yes	Yes		
CA_1A-3A-3A	-	1			Yes	Yes	Yes	Yes	60	0
		3	See CA_3A-3A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_1A-3C	CA_1A-3A, CA_3C	1			Yes	Yes	Yes	Yes	60	0
		3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_1A-5A	CA_1A-5A	1				Yes			20	0
		5				Yes				
		1			Yes	Yes	Yes	Yes	30	1
		5			Yes	Yes				
CA_1A-7A	CA_1A-7A	1			Yes	Yes	Yes	Yes	40	0
		7				Yes	Yes	Yes		
CA_1A-7A-7A	CA_1A-7A	1			Yes	Yes	Yes	Yes	60	0
		7	See CA_7A-7A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
CA_1A-7C	-	1			Yes	Yes	Yes	Yes	60	0
		7	See CA_7C Bandwidth Combination Set 2 in Table 5.4.2A.1-1							
	-	1			Yes	Yes	Yes	Yes	60	1
		7	See CA_7C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_1A-8A	CA_1A-8A	1			Yes	Yes	Yes	Yes	30	0
		8			Yes	Yes				
		1			Yes	Yes			20	1
		8			Yes	Yes				
		1			Yes	Yes	Yes	Yes	30	2
		8		Yes	Yes	Yes				
CA_1A-11A	-	1			Yes	Yes	Yes	Yes	30	0
		11			Yes	Yes				
CA_1A-18A	CA_1A-18A	1			Yes	Yes	Yes	Yes	35	0
		18			Yes	Yes	Yes			
		1			Yes	Yes			20	1
		18			Yes	Yes				
CA_1A-19A	CA_1A-19A	1			Yes	Yes	Yes	Yes	35	0
		19			Yes	Yes	Yes			
CA_1A-20A	-	1			Yes	Yes	Yes	Yes	40	0
		20			Yes	Yes	Yes	Yes		
CA_1A-21A	CA_1A-21A	1			Yes	Yes	Yes	Yes	35	0
		21			Yes	Yes	Yes			
CA_1A-26A	CA_1A-26A	1			Yes	Yes	Yes	Yes	35	0
		26			Yes	Yes	Yes			
		1			Yes	Yes			20	1
		26			Yes	Yes				
CA_1A-28A	CA_1A-28A	1			Yes	Yes	Yes	Yes	40	0
		28			Yes	Yes	Yes	Yes		
		1			Yes	Yes			20	1
		28			Yes	Yes				
CA_1A-38A	-	1			Yes	Yes	Yes	Yes	40	0
		38			Yes	Yes	Yes	Yes		
CA_1A-40A	-	1			Yes	Yes	Yes	Yes	40	0
		40			Yes	Yes	Yes	Yes		
CA_1A-40C	-	1			Yes	Yes	Yes	Yes	60	0

		40	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_1A-41A[8]	-	1			Yes	Yes	Yes	Yes		40	0
		41			Yes	Yes	Yes	Yes			
CA_1A-41C[8]	-	1			Yes	Yes	Yes	Yes		60	0
		41	See CA_41C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_1A-42A	CA_1A-42A	1			Yes	Yes	Yes	Yes		40	0
		42			Yes	Yes	Yes	Yes			
CA_1A-42C	CA_1A-42A	1			Yes	Yes	Yes	Yes		60	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_1A-46A	-	1			Yes	Yes	Yes	Yes		40	0
		46						Yes			
		1			Yes	Yes	Yes	Yes		40	1
		46				Yes		Yes			
CA_1A-46C	-	1			Yes	Yes	Yes	Yes		60	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
	-	1			Yes	Yes	Yes	Yes		60	1
		46	See CA_46C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_1A-46D	-	1			Yes	Yes	Yes	Yes		80	0
		46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1								
		1			Yes	Yes	Yes	Yes		80	1
		46	See CA_46D Bandwidth combination set 1 in Table 5.4.2A.1-1								
CA_1A-46E	-	1			Yes	Yes	Yes	Yes		100	0
		46	See CA_46E Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
		1			Yes	Yes	Yes	Yes		100	1
		46	See CA_46E Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_1C-3A	-	1	See CA_1C Bandwidth combination set 1 in Table 5.4.2A.1-1							60	0
		3			Yes	Yes	Yes	Yes			
CA_2A-4A	CA_2A-4A	2	Yes	Yes	Yes	Yes	Yes	Yes		40	0
		4			Yes	Yes	Yes	Yes			
		2			Yes	Yes				20	1
		4			Yes	Yes					
		2			Yes	Yes	Yes	Yes		40	2
		4			Yes	Yes	Yes	Yes			
CA_2A-2A-4A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							60	0
		4			Yes	Yes	Yes	Yes			
CA_2A-4A-4A	-	2			Yes	Yes	Yes	Yes		60	0
		4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-2A-4A-4A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							80	0
		4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-5A	CA_2A-5A	2			Yes	Yes	Yes	Yes		30	0
		5			Yes	Yes					
		2			Yes	Yes				20	1
		5			Yes	Yes					
CA_2A-2A-5A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							50	0
		5			Yes	Yes					
CA_2C-5A	-	2	See CA_2C Bandwidth combination set 0 in Table 5.4.2A.1-1							50	0
		5			Yes	Yes					
CA_2A-5B	-	2			Yes	Yes	Yes	Yes		40	0

		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_2C-5B	-	2	See CA_2C Bandwidth combination set 0 in Table 5.4.2A.1-1							60	0
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_2A-7A	CA_2A-7A	2			Yes	Yes	Yes	Yes		40	0
		7			Yes	Yes	Yes	Yes			
CA_2A-7A-7A	-	2			Yes	Yes	Yes	Yes		60	0
		7	See the CA_7A-7A Bandwidth combination set 1 in Table 5.4.2A.1-3								
CA_2A-7C	-	2			Yes	Yes	Yes	Yes		60	0
		7	See the CA_7C Bandwidth combination set 1 in Table 5.4.2A.1-1								
CA_2A-12A	CA_2A-12A	2			Yes	Yes	Yes	Yes		30	0
		12			Yes	Yes					
		2			Yes	Yes	Yes	Yes		30	1
		12		Yes	Yes	Yes					
		2			Yes	Yes				20	2
		12			Yes	Yes					
CA_2A-2A-12A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							50	0
		12			Yes	Yes					
CA_2A-12A-12A	-	2			Yes	Yes	Yes	Yes		30	0
		12	See CA_12A-12A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-2A-12A-12A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							50	0
		12	See CA_12A-12A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-12B	CA_2A-12A	2			Yes	Yes	Yes	Yes		35	0
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_2A-2A-12B	-	2	See CA_2A-2A Bandwidth combination set 0 in Table 5.4.2A.1-3							55	0
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_2C-12A	-	2	See CA_2C Bandwidth combination set 0 in Table 5.4.2A.1-1							50	0
		12			Yes	Yes					
CA_2A-13A	CA_2A-13A	2			Yes	Yes	Yes	Yes		30	0
		13				Yes					
		2			Yes	Yes				20	1
		13				Yes					
CA_2A-2A-13A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							50	0
		13				Yes					
CA_2A-17A	-	2			Yes	Yes				20	0
		17			Yes	Yes					
CA_2A-28A	-	2			Yes	Yes	Yes	Yes		40	0
		28			Yes	Yes	Yes	Yes			
CA_2A-29A	-	2			Yes	Yes				20	0
		29		Yes	Yes	Yes					
		2			Yes	Yes				20	1
		29			Yes	Yes					
		2			Yes	Yes	Yes	Yes		30	2
		29			Yes	Yes					
CA_2C-29A	-	2	See CA_2C Bandwidth Combination Set 0 in table 5.4.2A.1-1							50	0
		29			Yes	Yes					
CA_2A-30A	CA_2A-30A	2			Yes	Yes	Yes	Yes		30	0
		30			Yes	Yes					
CA_2A-2A-30A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in table 5.4.2A.1-3							50	0

		30			Yes	Yes				
CA_2C-30A	-	2	See CA_2C Bandwidth combination set 0 in Table 5.4.2A.1-1						50	0
		30			Yes	Yes				
CA_2A-46A	CA_2A-46A	2			Yes	Yes	Yes	Yes	40	0
		46						Yes		
CA_2A-46A-46C	-	2			Yes	Yes	Yes	Yes	80	0
		46	See CA_46A-46C Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-46C	-	2			Yes	Yes	Yes	Yes	60	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_2A-46D	-	2			Yes	Yes	Yes	Yes	80	0
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_2A-46A-46A	-	2			Yes	Yes	Yes	Yes	60	0
		46	See CA_46A-46A Bandwidth combination set 0 in Table 5.4.2A.1-3							
CA_2A-46A-46D	-	2			Yes	Yes	Yes	Yes	100	0
		46	See CA_46A-46D Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-66A	CA_2A-66A	2	Yes	Yes	Yes	Yes	Yes	Yes	40	0
		66			Yes	Yes	Yes	Yes		
		2			Yes	Yes			20	1
		66			Yes	Yes				
		2			Yes	Yes	Yes	Yes	40	2
		66			Yes	Yes	Yes	Yes		
CA_2A-66B	-	2			Yes	Yes	Yes	Yes	40	0
		66	See CA_66B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_2A-66C	-	2			Yes	Yes	Yes	Yes	60	0
		66	See CA_66C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_2A-66D	-	2			Yes	Yes	Yes	Yes	60	0
		66	See CA_66D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_2A-2A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						60	0
		66			Yes	Yes	Yes	Yes		
CA_2A-2A-66A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						80	0
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-2A-66A-66B	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						80	0
		66	See CA_66A-66B Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-2A-66A-66C	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						100	0
		66	See CA_66A-66C Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-66A-66A	-	2			Yes	Yes	Yes	Yes	60	0
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-66A-66B	-	2			Yes	Yes	Yes	Yes	60	0
		66	See CA_66A-66B Bandwidth combination set 0 in Table 5.4.2A.1-3							
CA_2A-66A-66C		2			Yes	Yes	Yes	Yes	80	0
		66	See CA_66A-66C Bandwidth combination set 0 in Table 5.4.2A.1-3							
CA_2A-2A-66B	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						60	0
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1							

CA_2A-2A-66C	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							80	0
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_2A-2A-66D		2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							100	0
		66	See CA_66D Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_3A-5A	CA_3A-5A	3				Yes	Yes	Yes		30	0
		5			Yes	Yes					
		3				Yes				20	1
		5			Yes	Yes					
		3			Yes	Yes	Yes	Yes		30	2
		5			Yes	Yes					
		3			Yes	Yes	Yes	Yes		30	3
		5		Yes	Yes	Yes					
		3		Yes	Yes	Yes				20	4
		5		Yes	Yes	Yes					
CA_3C-5A	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							50	0
		5			Yes	Yes					
CA_3A-7A	CA_3A-7A	3			Yes	Yes	Yes	Yes		40	0
		7				Yes	Yes	Yes			
		3			Yes	Yes	Yes	Yes		40	1
		7			Yes	Yes	Yes	Yes			
CA_3A-3A-7A	-	3	See CA_3A-3A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							60	0
		7			Yes	Yes	Yes	Yes			
		3	See CA_3A-3A Bandwidth Combination Set 1 in Table 5.4.2A.1-3							50	1
		7			Yes	Yes	Yes	Yes			
CA_3A-3A-7A-7A	-	3	See CA_3A-3A Bandwidth Combination Set 0 in table 5.4.2A.1-3							80	0
		7	See CA_7A-7A Bandwidth Combination Set 1 in table 5.4.2A.1-3								
		3	See CA_3A-3A Bandwidth Combination Set 1 in table 5.4.2A.1-3							60	1
		7	See CA_7A-7A Bandwidth Combination Set 2 in table 5.4.2A.1-3								
CA_3A-7A-7A	CA_3A-7A	3			Yes	Yes	Yes	Yes		60	0
		7	See CA_7A-7A Bandwidth combination set 1 in table 5.4.2A.1-3								
		3			Yes	Yes	Yes	Yes		50	1
		7	See CA_7A-7A Bandwidth combination set 2 in table 5.4.2A.1-3								
CA_3A-7B	-	3			Yes	Yes	Yes	Yes		40	0
		7	See CA_7B bandwidth combination set 0 in table 5.4.2A.1-1								
CA_3A-7C	CA_3A-7A CA_7C	3			Yes	Yes	Yes	Yes		60	0
		7	See CA_7C Bandwidth combination set 1 in table 5.4.2A.1-1								
		3			Yes	Yes	Yes	Yes		60	1
		7	See CA_7C Bandwidth combination set 2 in table 5.4.2A.1-1								
CA_3C-7A	CA_3A-7A CA_3C	3	See CA_3C Bandwidth Combination Set 0 in table 5.4.2A.1-1							60	0
		7			Yes	Yes	Yes	Yes			
CA_3C-7C	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							80	0
		7	See CA_7C Bandwidth Combination Set 2 in Table 5.4.2A.1-1								
		3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							80	1
		7	See CA_7C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								

CA_3A-8A	CA_3A-8A	3				Yes	Yes	Yes	30	0
		8			Yes	Yes				
		3				Yes			20	1
		8			Yes	Yes				
		3			Yes	Yes	Yes	Yes	30	2
		8		Yes	Yes	Yes				
		3			Yes	Yes	Yes	Yes	30	3
		8			Yes	Yes				
CA_3A-3A-8A	CA_3A-8A	3	See CA_3A-3A Bandwidth Combination Set 0 in table 5.4.2A.1-3						50	0
		8			Yes	Yes				
		3	See CA_3A-3A Bandwidth Combination Set 1 in table 5.4.2A.1-3						40	1
		8			Yes	Yes				
CA_3C-8A	CA_3A-8A, CA_3C	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						50	0
		8		Yes	Yes	Yes				
CA_3A-11A	-	3			Yes	Yes	Yes	Yes	30	0
		11			Yes	Yes				
CA_3A-19A	CA_3A-19A	3			Yes	Yes	Yes	Yes	35	0
		19			Yes	Yes	Yes			
CA_3A-20A	CA_3A-20A	3			Yes	Yes	Yes	Yes	30	0
		20			Yes	Yes				
		3			Yes	Yes	Yes	Yes	40	1
		20			Yes	Yes	Yes	Yes		
CA_3A-3A-20A	-	3	See CA_3A-3A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						60	0
		20			Yes	Yes	Yes	Yes		
CA_3C-20A	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						60	0
		20			Yes	Yes	Yes	Yes		
CA_3A-21A	CA_3A-21A	3			Yes	Yes	Yes	Yes	35	0
		21			Yes	Yes	Yes			
CA_3A-26A	CA_3A-26A	3			Yes	Yes	Yes	Yes	35	0
		26			Yes	Yes	Yes			
		3			Yes	Yes			20	1
		26			Yes	Yes				
CA_3A-27A	-	3			Yes	Yes	Yes	Yes	30	0
		27			Yes	Yes				
CA_3A-28A	CA_3A-28A	3			Yes	Yes	Yes	Yes	40	0
		28			Yes	Yes	Yes	Yes		
		3		Yes	Yes	Yes	Yes	Yes	40	1
		28			Yes	Yes	Yes	Yes		
CA_3C-28A	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						60	0
		28			Yes	Yes	Yes	Yes		
CA_3A-31A	-	3			Yes	Yes	Yes	Yes	25	0
		31		Yes	Yes					
CA_3A-32A	-	3			Yes	Yes	Yes	Yes	40	0
		32			Yes	Yes	Yes	Yes		
CA_3A-38A	-	3			Yes	Yes	Yes	Yes	40	0
		38			Yes	Yes	Yes	Yes		
CA_3A-40A	-	3			Yes	Yes	Yes	Yes	40	0
		40			Yes	Yes	Yes	Yes		
		3	Yes	Yes	Yes	Yes	Yes	Yes	40	1
		40			Yes	Yes	Yes	Yes		
CA_3A-40A-40A	-	3			Yes	Yes			50	0
		40	See CA_40A-40A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_3A-40C	-	3			Yes	Yes	Yes	Yes	60	0
		40	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							

CA_3A-40D	-	3			Yes	Yes	Yes	Yes	80	0
		40	See CA_40D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_3A-40E	-	3			Yes	Yes	Yes	Yes	100	0
		40	See CA_40E Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_3C-40A	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						60	0
		40			Yes	Yes	Yes	Yes		
CA_3C-40C	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						80	0
		40	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_3A-41A	CA_3A-41A	3			Yes	Yes	Yes	Yes	40	0
		41			Yes	Yes	Yes	Yes		
		3		Yes	Yes	Yes	Yes	Yes	40	1
		41			Yes	Yes	Yes	Yes		
CA_3A-41C	-	3			Yes	Yes	Yes	Yes	60	0
		41	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_3A-41D	-	3			Yes	Yes	Yes	Yes	80	0
		41	See CA_41D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_3C-41A	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						60	0
		41			Yes	Yes	Yes	Yes		
CA_3C-41C	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						80	0
		41	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_3C-41D	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						100	0
		41	See CA_41D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_3A-42A	CA_3A-42A	3			Yes	Yes	Yes	Yes	40	0
		42			Yes	Yes	Yes	Yes		
CA_3A-42C	CA_3A-42A	3			Yes	Yes	Yes	Yes	60	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_3A-46A	-	3			Yes	Yes	Yes	Yes	40	0
		46						Yes		
		3		Yes	Yes	Yes	Yes	Yes	40	1
		46				Yes		Yes		
CA_3A-46C	-	3			Yes	Yes	Yes	Yes	60	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
	-	3		Yes	Yes	Yes	Yes	Yes	60	1
		46	See CA_46C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_3A-46D	-	3			Yes	Yes	Yes	Yes	80	0
		46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1							
		3		Yes	Yes	Yes	Yes	Yes	80	1
		46	See CA_46D Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_3A-46E	-	3			Yes	Yes	Yes	Yes	100	0
		46	See CA_46E Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		3			Yes	Yes	Yes	Yes	100	1
		46	See CA_46E Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_3A-69A	-	3			Yes	Yes	Yes	Yes	40	0
		69			Yes	Yes	Yes	Yes		
CA_4A-5A	CA_4A-5A	4			Yes	Yes			20	0

		5			Yes	Yes				
		4			Yes	Yes	Yes	Yes	30	1
		5			Yes	Yes				
CA_4A-4A-5A	-	4	See CA_4A-4A Bandwidth Combination Set 0 in table 5.4.2A.1-3						50	0
		5			Yes	Yes				
CA_4A-5B	-	4			Yes	Yes	Yes	Yes	40	0
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_4A-4A-5B	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						60	0
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_4A-7A	CA_4A-7A	4			Yes	Yes			30	0
		7			Yes	Yes	Yes	Yes		
		4			Yes	Yes	Yes	Yes	40	1
		7			Yes	Yes	Yes	Yes		
CA_4A-4A-7A	-	4			Yes	Yes			40	0
		4			Yes	Yes				
		7			Yes	Yes	Yes	Yes		
		4			Yes	Yes	Yes	Yes	60	1
		4			Yes	Yes	Yes	Yes		
		7			Yes	Yes	Yes	Yes		
CA_4A-7A-7A	-	4			Yes	Yes	Yes	Yes	60	0
		7	See the CA_7A-7A Bandwidth combination set 1 in Table 5.4.2A.1-3							
CA_4A-7C	-	4			Yes	Yes	Yes	Yes	60	0
		7	See CA_7C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_4A-12A	CA_4A-12A	4	Yes	Yes	Yes	Yes			20	0
		12			Yes	Yes				
		4	Yes	Yes	Yes	Yes	Yes	Yes	30	1
		12			Yes	Yes				
		4			Yes	Yes	Yes	Yes	30	2
		12		Yes	Yes	Yes				
		4			Yes	Yes			20	3
		12			Yes	Yes				
		4			Yes	Yes	Yes	Yes	30	4
		12			Yes	Yes				
		4			Yes	Yes	Yes		20	5
		12			Yes					
CA_4A-4A-12A	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						50	0
		12			Yes	Yes				
CA_4A-12A-12A	-	4			Yes	Yes	Yes	Yes	30	0
		12	See CA_12A-12A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_4A-4A-12A-12A	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						50	0
		12	See CA_12A-12A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_4A-4A-12B	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						55	0
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_4A-12B	CA_4A-12A	4			Yes	Yes	Yes	Yes	35	0
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_4A-13A	CA_4A-13A	4			Yes	Yes	Yes	Yes	30	0
		13				Yes				
		4			Yes	Yes			20	1
		13				Yes				

CA_4A-4A-13A	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						50	0
		13				Yes				
CA_4A-17A	CA_4A-17A	4			Yes	Yes			20	0
		17			Yes	Yes				
CA_4A-27A	-	4			Yes	Yes	Yes	Yes	30	0
		27		Yes	Yes	Yes				
CA_4A-28A	-	4			Yes	Yes	Yes	Yes	40	0
		28			Yes	Yes	Yes	Yes		
CA_4A-29A	-	4			Yes	Yes			20	0
		29		Yes	Yes	Yes				
		4			Yes	Yes			20	1
		29			Yes	Yes				
		4			Yes	Yes	Yes	Yes	30	2
		29			Yes	Yes				
CA_4A-4A-29A	-	4	See CA_4A-4A Bandwidth combination set 0 in Table 5.4.2A.1-3						50	0
		29			Yes	Yes				
CA_4A-30A	-	4			Yes	Yes	Yes	Yes	30	0
		30			Yes	Yes				
CA_4A-4A-30A	-	4	See CA_4A-4A Bandwidth combination set 0 in Table 5.4.2A.1-3						50	0
		30			Yes	Yes				
CA_4A-46A	-	4			Yes	Yes	Yes	Yes	40	0
		46						Yes		
CA_4A-46A-46A	-	4			Yes	Yes	Yes	Yes	60	0
		46	See CA_46A-46A Bandwidth combination set 0 in Table 5.4.2A.1-3							
CA_4A-46A-46C	-	4			Yes	Yes	Yes	Yes	80	0
		46	See CA_46A-46C Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_4A-46C	-	4			Yes	Yes	Yes	Yes	60	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_4A-46D	-	4			Yes	Yes	Yes	Yes	80	0
		46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_4A-46A-46D	-	4			Yes	Yes	Yes	Yes	100	0
		46	See CA_46A-46D Bandwidth combination set 0 in Table 5.4.2A.1-3							
CA_5A-7A	CA_5A-7A	5	Yes	Yes	Yes	Yes			30	0
		7				Yes	Yes	Yes		
		5			Yes	Yes			30	1
		7				Yes	Yes	Yes		
CA_5A-7A-7A	CA_5A-7A	5			Yes	Yes			50	0
		7	See CA_7A-7A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
CA_5A-7C	-	5			Yes	Yes			50	0
		7	See CA_7C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_5A-12A	CA_5A-12A	5			Yes	Yes			20	0
		12			Yes	Yes				
CA_5A-12A-12A	-	5			Yes	Yes			20	0
		12	See CA_12A-12A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_5A-12B	-	5			Yes	Yes			25	0
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_5A-13A	-	5			Yes	Yes			20	0
		13				Yes				
CA_5A-17A	CA_5A-17A	5			Yes	Yes			20	0
		17			Yes	Yes				
CA_5A-25A	-	5			Yes	Yes			30	0

		25			Yes	Yes	Yes	Yes		
CA_5A-29A	-	5			Yes	Yes			20	0
		29			Yes	Yes				
CA_5A-30A	CA_5A-30A	5			Yes	Yes			20	0
		30			Yes	Yes				
CA_5B-30A	-	5	See CA_5B Bandwidth combination set 0 in Table 5.4.2A.1-1						30	0
		30			Yes	Yes				
CA_5A-38A	-	5			Yes	Yes			30	0
		38			Yes	Yes	Yes	Yes		
CA_5A-40A	-	5			Yes	Yes			30	0
		40			Yes	Yes	Yes	Yes		
		5		Yes	Yes	Yes			30	1
		40			Yes	Yes	Yes	Yes		
CA_5A-40A-40A	-	5			Yes	Yes			50	0
		40	See CA_40A-40A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_5A-40C	-	5			Yes	Yes			50	0
		40	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
		5		Yes	Yes	Yes			50	1
		40	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_5A-41A	-	5			Yes	Yes			30	0
		41						Yes		
CA_5A-46A	-	5			Yes	Yes			30	0
		46						Yes		
		5		Yes	Yes	Yes			30	1
		46				Yes		Yes		
CA_5A-46C	-	5			Yes	Yes			50	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
	-	5			Yes	Yes			50	1
		46	See CA_46C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_5A-46D	-	5			Yes	Yes			70	0
		46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1							
		5			Yes	Yes			70	1
		46	See CA_46D Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_5A-46E	-	5			Yes	Yes			90	0
		46	See CA_46E of Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		5			Yes	Yes			90	1
		46	See CA_46E of Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_5A-66A	CA_5A-66A	5			Yes	Yes			30	0
		66			Yes	Yes	Yes	Yes		
CA_5A-5A-66A	-	5	See CA_5A-5A Bandwidth combination set 0 in Table 5.4.2A.1-3						40	0
		66			Yes	Yes	Yes	Yes		
CA_5A-5A-66A-66A	-	5	See CA_5A-5A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						60	0
		66	See CA_66A-66A Bandwidth combination set 0 in Table 5.4.2A.1-3							
CA_5A-5A-66A-66B	-	5	See CA_5A-5A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						60	0
		66	See CA_66A-66B Bandwidth combination set 0 in Table 5.4.2A.1-3							
CA_5A-5A-66A-66C	-	5	See CA_5A-5A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						80	0
		66	See CA_66A-66C Bandwidth Combination set 0 in Table 5.4.2A.1-3							

CA_5A-5A-66B	-	5	See CA_5A-5A Bandwidth Combination Set 0 in Table 5.4.2A.1-3									40	0
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1										
CA_5A-5A-66C	-	5	See CA_5A-5A Bandwidth Combination Set 0 in Table 5.4.2A.1-3									60	0
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1										
CA_5A-5A-66D	-	5	See CA_5A-5A Bandwidth Combination Set 0 in Table 5.4.2A.1-3									80	0
		66	See CA_66D Bandwidth combination set 0 in Table 5.4.2A.1-1										
CA_5A-66A-66A	-	5			Yes	Yes						50	0
		66	See CA_66A-66A Bandwidth combination set 0 in Table 5.4.2A.1-3										
CA_5A-66A-66C	-	5			Yes	Yes						70	0
		66	See CA_66A-66C Bandwidth combination set 0 in Table 5.4.2A.1-3										
CA_5A-66B	-	5			Yes	Yes						30	0
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1										
CA_5A-66C	-	5			Yes	Yes						50	0
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1										
CA_5A-66D		5			Yes	Yes						70	0
		66	See CA_66D Bandwidth combination set 0 in Table 5.4.2A.1-1										
CA_5B-66A	-	5	See CA_5B Bandwidth combination set 0 in Table 5.4.2A.1-1									40	0
		66			Yes	Yes	Yes	Yes					
CA_5B-66A-66A		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1									60	0
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3										
CA_5A-66A-66B		5			Yes	Yes						50	0
		66	See CA_66A-66B Bandwidth combination set 0 in Table 5.4.2A.1-3										
CA_5B-66A-66B	-	5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1									60	0
		66	See CA_66A-66B Bandwidth Combination Set 0 in Table 5.4.2A.1-3										
CA_5B-66A-66C	-	5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1									80	0
		66	See CA_66A-66C Bandwidth Combination Set 0 in Table 5.4.2A.1-3										
CA_5B-66B		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1									40	0
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1										
CA_5B-66C		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1									60	0
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1										
CA_7A-8A	CA_7A-8A	7					Yes	Yes	Yes			30	0
		8		Yes	Yes	Yes							
		7				Yes	Yes	Yes				30	1
		8			Yes	Yes							
		7			Yes	Yes	Yes	Yes				30	2
		8			Yes	Yes							
CA_7A-7A-8A	-	7	See CA_7A-7A Bandwidth Combination Set 1 in Table 5.4.2A.1-3									50	0
		8			Yes	Yes							
		7	See CA_7A-7A Bandwidth Combination Set 2 in Table 5.4.2A.1-3									40	1
		8			Yes	Yes							

CA_7A-12A	-	7			Yes	Yes	Yes	Yes	30	0
		12			Yes	Yes				
CA_7A-20A	CA_7A-20A	7				Yes	Yes	Yes	30	0
		20			Yes	Yes				
		7				Yes	Yes	Yes	40	1
		20			Yes	Yes	Yes	Yes		
CA_7A-22A	-	7				Yes	Yes	Yes	40	0
		22			Yes	Yes	Yes	Yes		
CA_7A-26A	-	7			Yes	Yes	Yes	Yes	35	0
		26			Yes	Yes	Yes			
CA_7A-7A-26A	-	7	See CA_7A-7A bandwidth combination set 3 in table 5.4.2A.1-3						55	0
		26			Yes	Yes	Yes	Yes		
CA_7A-28A	CA_7A-28A	7			Yes	Yes	Yes	Yes	35	0
		28			Yes	Yes	Yes			
		7			Yes	Yes	Yes	Yes	40	1
		28			Yes	Yes	Yes	Yes		
CA_7B-28A	-	7	See CA_7B bandwidth combination set 0 in table 5.4.2A.1-1						40	0
		28			Yes	Yes	Yes	Yes		
CA_7C-28A	CA_7A-28A CA_7C	7	See CA_7C bandwidth combination set 2 in table 5.4.2A.1-1						60	0
		28			Yes	Yes	Yes	Yes		
CA_7A-32A	-	7				Yes	Yes	Yes	40	0
		32			Yes	Yes	Yes	Yes		
CA_7A-40A	-	7			Yes	Yes	Yes	Yes	40	0
		40			Yes	Yes	Yes	Yes		
CA_7A-40C	-	7			Yes	Yes	Yes	Yes	60	0
		40	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_7A-42A	-	7			Yes	Yes	Yes	Yes	40	0
		42			Yes	Yes	Yes	Yes		
CA_7A-42A-42A	-	7			Yes	Yes	Yes	Yes	60	0
		42	See CA_42A-42A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_7A-46A	-	7			Yes	Yes	Yes	Yes	40	0
		46						Yes		
		7			Yes	Yes	Yes	Yes	40	1
		46				Yes		Yes		
CA_7A-46C	-	7			Yes	Yes	Yes	Yes	60	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
	-	7			Yes	Yes	Yes	Yes	60	1
		46	See CA_46C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_7A-46D	-	7			Yes	Yes	Yes	Yes	80	0
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		7			Yes	Yes	Yes	Yes	80	1
		46	See CA_46D Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_7A-46E	-	7			Yes	Yes	Yes	Yes	100	0
		46	See CA_46E Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_7A-66A	-	7			Yes	Yes	Yes	Yes	40	0
		66			Yes	Yes	Yes	Yes		
CA_8A-11A	-	8			Yes	Yes			20	0
		11			Yes	Yes				
CA_8A-20A	-	8			Yes	Yes			20	0
		20			Yes	Yes				
		8		Yes	Yes	Yes			20	1
		20			Yes	Yes				
CA_8A-28A	-	8		Yes	Yes	Yes			30	0

		28			Yes	Yes	Yes	Yes		
CA_8A-39A	CA_8A-39A	8	Yes	Yes	Yes	Yes			30	0
		39			Yes	Yes	Yes	Yes		
CA_8A-39C	-	8	Yes	Yes	Yes	Yes			45	0
		39	See CA_39C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_8B-39A	-	8	See CA_8B Bandwidth Combination Set 0 in Table 5.4.2A.1-1						40	0
		39			Yes	Yes	Yes	Yes		
CA_8B-39C	-	8	See CA_8B Bandwidth Combination Set 0 in Table 5.4.2A.1-1						55	0
		39	See CA_39C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_8A-40A	-	8			Yes	Yes			30	0
		40			Yes	Yes	Yes	Yes		
	-	8		Yes	Yes	Yes			30	1
		40			Yes	Yes	Yes	Yes		
CA_8A-41A	CA_8A-41A	8	Yes	Yes	Yes	Yes			30	0
		41				Yes		Yes		
		8			Yes	Yes			30	1
		41			Yes	Yes	Yes	Yes		
CA_8A-41C	-	8	Yes	Yes	Yes	Yes			50	0
		41	See CA_41C bandwidth combination set 3 in table 5.4.2A.1-1							
CA_8A-41D	-	8	Yes	Yes	Yes	Yes			70	0
		41	See CA_41D bandwidth combination set 0 in table 5.4.2A.1-1							
CA_8B-41A	-	8	See CA_8B Bandwidth combination set 0 in Table 5.4.2A.1-1						40	0
		41						Yes		
CA_8B-41C	-	8	See CA_8B bandwidth combination set 0 in table 5.4.2A.1-1						60	0
		41	See CA_41C bandwidth combination set 3 in table 5.4.2A.1-1							
CA_8B-41D	-	8	See CA_8B bandwidth combination set 0 in table 5.4.2A.1-1						80	0
		41	See CA_41D bandwidth combination set 0 in table 5.4.2A.1-1							
CA_8A-42A	-	8	Yes	Yes	Yes	Yes			30	0
		42			Yes	Yes	Yes	Yes		
CA_8A-42C	-	8	Yes	Yes	Yes	Yes			50	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_8A-46A	-	8	Yes	Yes	Yes	Yes			30	0
		46						Yes		
CA_8A-46C	-	8	Yes	Yes	Yes	Yes			50	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_8A-46D	-	8	Yes	Yes	Yes	Yes			70	0
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_8A-46E	-	8	Yes	Yes	Yes	Yes			90	0
		46	See CA_46E Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_8B-46A	-	8	See CA_8B Bandwidth Combination Set 0 in Table 5.4.2A.1-1						40	0
		46						Yes		
CA_8B-46C	-	8	See CA_8B bandwidth combination set 0 in table 5.4.2A.1-1						60	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_8B-46D	-	8	See CA_8B Bandwidth Combination Set 0 in Table 5.4.2A.1-1						80	0

		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_11A-18A	-	11			Yes	Yes			25	0	
		18			Yes	Yes	Yes				
CA_11A-28A	-	11			Yes	Yes			30	0	
		28			Yes	Yes	Yes	Yes			
CA_11A-41A	-	11			Yes	Yes			30	0	
		41			Yes	Yes	Yes	Yes			
CA_11A-41C	-	11			Yes	Yes			50	0	
		41	See CA_41C bandwidth combination set 0 in table 5.4.2A.1-1								
CA_11A-42A	-	11			Yes	Yes			30	0	
		42			Yes	Yes	Yes	Yes			
CA_11A-42C	-	11			Yes	Yes			50	0	
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_11A-46A	-	11			Yes	Yes			30	0	
		46						Yes			
CA_11A-46C	-	11			Yes	Yes			50	0	
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_11A-46D	-	11			Yes	Yes			70	0	
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_11A-46E	-	11			Yes	Yes			90	0	
		46	See CA_46E Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_12A-25A	-	12			Yes	Yes			30	0	
		25			Yes	Yes	Yes	Yes			
CA_12A-30A	CA_12A-30A	12			Yes	Yes			20	0	
		30			Yes	Yes					
CA_12A-66A	CA_12A-66A	12			Yes	Yes			20	0	
		66	Yes	Yes	Yes	Yes					
		12			Yes	Yes			30	1	
		66	Yes	Yes	Yes	Yes	Yes	Yes			
		12		Yes	Yes	Yes			30	2	
		66			Yes	Yes	Yes	Yes			
		12			Yes	Yes			20	3	
		66			Yes	Yes					
		12			Yes	Yes			30	4	
		66			Yes	Yes	Yes	Yes			
		12			Yes				20	5	
		66			Yes	Yes	Yes				
CA_12A-66A-66A	-	12			Yes	Yes			50	0	
		66	See CA_66A-66A Bandwidth combination set 0 in Table 5.4.2A.1-3								
CA_12A-66C	-	12			Yes	Yes			50	0	
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_12B-66A	-	12	See CA_12B bandwidth combination set 0 in table 5.4.2A.1-1						35	0	
		66			Yes	Yes	Yes	Yes			
CA_12B-66A-66A	-	12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1						55	0	
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_13A-46A	-	13			Yes	Yes			30	0	
		46						Yes			
CA_13A-46C	-	13			Yes	Yes			50	0	
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_13A-46D	-	13			Yes	Yes			70	0	

		46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_13A-46E	-	13			Yes	Yes			90	0
		46	See CA_46E Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_13A-66A	-	13			Yes	Yes			30	0
		66			Yes	Yes	Yes	Yes		
CA_13A-66A-66A	-	13			Yes	Yes			50	0
		66	See CA_66A-66A Bandwidth combination set 0 in Table 5.4.2A.1-3								
CA_13A-66A-66B	-	13			Yes	Yes			50	0
		66	See CA_66A-66B Bandwidth combination set 0 in Table 5.4.2A.1-3								
CA_13A-66A-66C	-	13			Yes	Yes			70	0
		66	See CA_66A-66C Bandwidth combination set 0 in Table 5.4.2A.1-3								
CA_13A-66B	-	13			Yes	Yes			30	0
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_13A-66C	-	13			Yes	Yes			50	0
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_13A-66D	-	13			Yes	Yes			70	0
		66	See CA_66D Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_18A-28A	CA_18A-28A	18			Yes	Yes	Yes		25	0
		28			Yes	Yes				
CA_19A-21A	CA_19A-21A	19			Yes	Yes	Yes		30	0
		21			Yes	Yes	Yes			
CA_19A-28A	-	19			Yes	Yes	Yes		25	0
		28			Yes	Yes				
CA_19A-42A	CA_19A-42A	19			Yes	Yes	Yes		35	0
		42			Yes	Yes	Yes	Yes		
CA_19A-42C	CA_19A-42A	19			Yes	Yes	Yes		55	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_19A-46A	-	19			Yes	Yes	Yes		35	0
		46						Yes			
CA_19A-46C	-	19			Yes	Yes	Yes		55	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_19A-46D	-	19			Yes	Yes	Yes		75	0
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_19A-46E	-	19			Yes	Yes	Yes		95	0
		46	See CA_42E Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_20A-28A[7]	-	20				Yes	Yes	Yes	40	0
		28			Yes	Yes	Yes	Yes		
CA_20A-31A	-	20			Yes	Yes	Yes	Yes	25	0
		31		Yes	Yes					
CA_20A-32A	-	20			Yes	Yes			30	0
		32			Yes	Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes	40	1
		32			Yes	Yes	Yes	Yes		
CA_20A-38A	-	20			Yes	Yes	Yes	Yes	40	0
		38			Yes	Yes	Yes	Yes		
CA_20A-40A	-	20				Yes	Yes	Yes	40	0
		40				Yes	Yes	Yes		
CA_20A-42A	-	20			Yes	Yes	Yes	Yes	40	0
		42			Yes	Yes	Yes	Yes		
	-	20			Yes	Yes	Yes	Yes	60	0

CA_20A-42A-42A		42	See CA_42A-42A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_20A-67A	-	20			Yes	Yes	Yes	Yes		40	0
		67			Yes	Yes	Yes	Yes			
CA_21A-28A	CA_21A-28A	21			Yes	Yes	Yes			25	0
		28			Yes	Yes					
CA_21A-42A	CA_21A-42A	21			Yes	Yes	Yes			35	0
		42			Yes	Yes	Yes	Yes			
CA_21A-42C	CA_21A-42A	21			Yes	Yes	Yes			55	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_21A-46A	-	21			Yes	Yes	Yes			35	0
		46						Yes			
CA_21A-46C	-	21			Yes	Yes	Yes			55	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_21A-46D	-	21			Yes	Yes	Yes			75	0
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_21A-46E	-	21			Yes	Yes	Yes			95	0
		46	See CA_42E Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_23A-29A	-	23			Yes	Yes	Yes	Yes		30	0
		29		Yes	Yes	Yes					
		23			Yes	Yes				20	1
		29		Yes	Yes	Yes					
CA_25A-26A	-	25		Yes	Yes	Yes	Yes	Yes		35	0
		26	Yes	Yes	Yes	Yes	Yes				
		25		Yes	Yes	Yes				20	1
		26		Yes	Yes	Yes					
		25			Yes	Yes				20	2
		26			Yes	Yes					
CA_25A-41A[8]	-	25			Yes	Yes	Yes	Yes		40	0
		41			Yes	Yes	Yes	Yes			
CA_25A-41C[8]	CA_41C	25			Yes	Yes	Yes	Yes		60	0
		41	See CA_41C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_25A-41D[8]	-	25			Yes	Yes	Yes	Yes		80	0
		41	See CA_41D Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_26A-41A	-	26			Yes	Yes	Yes			35	0
		41			Yes	Yes	Yes	Yes			
CA_26A-41C	-	26			Yes	Yes	Yes			55	0
		41	See CA_41C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_26A-46A	-	26		Yes	Yes	Yes				30	0
		46						Yes			
CA_28A-40A	-	28			Yes	Yes	Yes	Yes		40	0
		40			Yes	Yes	Yes	Yes			
CA_28A-40C	-	28			Yes	Yes	Yes	Yes		60	0
		40	See CA_40C Bandwidth Combination set 1 in Table 5.4.2A.1-1								
CA_28A-40D	-	28			Yes	Yes	Yes	Yes		80	0
		40	See CA_40D Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_28A-41A	-	28			Yes	Yes				30	0
		41			Yes	Yes	Yes	Yes			
		28			Yes	Yes	Yes	Yes		40	1
		41			Yes	Yes	Yes	Yes			
CA_28A-41C		28			Yes	Yes				50	0
		41	See CA_41C Bandwidth Combination set 0 in Table 5.4.2A.1-1								
CA_28A-42A	CA_28A-42A	28			Yes	Yes	Yes	Yes		40	0

		42			Yes	Yes	Yes	Yes		
CA_28A-42C	CA_28A-42A	28			Yes	Yes	Yes	Yes	60	0
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_28A-46A	-	28			Yes	Yes	Yes	Yes	40	0
		46				Yes		Yes		
CA_28A-46C	-	28			Yes	Yes	Yes	Yes	60	0
		46	See CA_46C Bandwidth Combination set 1 in Table 5.4.2A.1-1							
CA_28A-46D	-	28			Yes	Yes	Yes	Yes	80	0
		46	See CA_46D Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_28A-46E	-	28			Yes	Yes	Yes	Yes	100	0
		46	See CA_46E Bandwidth Combination set 1 in Table 5.4.2A.1-1							
CA_29A-30A	-	29			Yes	Yes			20	0
		30			Yes	Yes				
CA_29A-66A	-	29			Yes	Yes			30	0
		66			Yes	Yes	Yes	Yes		
CA_29A-66C		29			Yes	Yes			50	0
		66	See CA_66C Bandwidth Combination set 0 in Table 5.4.2A.1-1							
CA_29A-66A-66A		29			Yes	Yes			50	0
		66	See CA_66A-66A Bandwidth Combination set 0 in Table 5.4.2A.1-3							
CA_29A-70A	-	29			Yes	Yes			25	0
		70			Yes	Yes	Yes			
CA_30A-66A	CA_30A-66A	30			Yes	Yes			30	0
		66			Yes	Yes	Yes	Yes		
CA_30A-66A-66A		30			Yes	Yes			50	0
		66	See CA_66A-66A Bandwidth Combination set 0 in Table 5.4.2A.1-3							
CA_38A-40A	-	38				Yes		Yes	40	0
		40				Yes		Yes		
CA_38A-40A-40A	-	38				Yes		Yes	60	0
		40	See CA_40A-40A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_38A-40C	-	38				Yes		Yes	60	0
		40	See CA_40C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_39A-41A	CA_39A-41A	39				Yes	Yes	Yes	40	0
		41						Yes		
CA_39A-41C	CA_41C CA_39A-41A CA_39A-41C	39				Yes	Yes	Yes	60	0
		41						Yes		
		41						Yes		
CA_39A-41D	CA_41C CA_39A-41A	39				Yes	Yes	Yes	80	0
		41						Yes		
		41						Yes		
		41						Yes		
CA_39C-41A	CA_39C CA_39A-41A CA_39C-41A	39	See CA_39C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						55	0
		41						Yes		
CA_39C-41C	CA_39C CA_41C CA_39A-41A	39	See CA_39C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						75	0
		41						Yes		
		41						Yes		
CA_39C-41D	-	39	See CA_39C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						95	0
		41	See CA_41D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							

CA_39A-46A	-	39			Yes	Yes	Yes	Yes	40	0
		46						Yes		
CA_39A-46C	-	39			Yes	Yes	Yes	Yes	60	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_39A-46D	-	39			Yes	Yes	Yes	Yes	80	0
		46	See the CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_39A-46E	-	39			Yes	Yes	Yes	Yes	100	0
		46	See CA_46E Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_39C-46A	-	39	See CA_39C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						55	0
		46						Yes		
CA_39C-46C	-	39	See CA_39C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						75	0
		46	See the CA_46C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_39C-46D	-	39	See CA_39C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						95	0
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_40A-41A	-	40			Yes	Yes	Yes	Yes	40	0
		41			Yes	Yes	Yes	Yes		
CA_40A-42A	-	40				Yes	Yes	Yes	40	0
		42				Yes	Yes	Yes		
CA_40A-42C	-	40				Yes	Yes	Yes	60	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_40C-42C	-	40	See CA_40C Bandwidth combination set 1 in Table 5.4.2A.1-1						80	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_40A-46A	-	40			Yes	Yes	Yes	Yes	40	0
		46						Yes		
		40			Yes	Yes	Yes	Yes	40	1
		46				Yes		Yes		
CA_40A-46C	-	40			Yes	Yes	Yes	Yes	60	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		40			Yes	Yes	Yes	Yes	60	1
		46	See CA_46C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_40A-46D	-	40			Yes	Yes	Yes	Yes	80	0
		46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1							
		40			Yes	Yes	Yes	Yes	80	1
		46	See CA_46D Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_40A-46E	-	40			Yes	Yes	Yes	Yes	100	0
		46	See CA_46E Bandwidth combination set 0 in Table 5.4.2A.1-1							
		40			Yes	Yes	Yes	Yes	100	1
		46	See CA_46E Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_40C-42A	-	40	See CA_40C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						60	0
		42				Yes	Yes	Yes		

CA_40C-46A	-	40	See CA_40C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							60	0
		46							Yes		
CA_40C-46C	-	40	See CA_40C Bandwidth combination set 0 in Table 5.4.2A.1-1							80	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_40C-46D	-	40	See CA_40C Bandwidth combination set 0 in Table 5.4.2A.1-1							100	0
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_40D-46A	-	40	See CA_40D Bandwidth combination set 0 in Table 5.4.2A.1-1							80	0
		46							Yes		
CA_40D-46C	-	40	See CA_40D Bandwidth combination set 0 in Table 5.4.2A.1-1							100	0
		46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_41A-42A	CA_41A-42A	41				Yes	Yes	Yes		40	0
		42				Yes	Yes	Yes			
CA_41A-42C	CA_41A-42A, CA_42C	41				Yes	Yes	Yes		60	0
		42	See CA_42C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_41A-42D	-	41				Yes	Yes	Yes		80	0
		42	See CA_42D Bandwidth combination set 1 in Table 5.4.2A.1-1								
CA_41C-42A	CA_41A-42A, CA_41C	41	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							60	0
		42				Yes	Yes	Yes			
CA_41C-42C	CA_41A-42A, CA_41C, CA_42C	41	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							80	0
		42	See CA_42C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_41C-42D	-	41	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							100	0
		42	See CA_42D Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_41D-42A	-	41	See CA_41D Bandwidth combination set 0 in Table 5.4.2A.1-1							80	0
		42				Yes	Yes	Yes			
CA_41D-42C	-	41	See CA_41D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							100	0
		42	See CA_42C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_41A-46A	-	41			Yes	Yes	Yes	Yes		40	0
		46						Yes			
CA_41A-46C	-	41			Yes	Yes	Yes	Yes		60	0
		46	See CA_46C Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_41C-46A	-	41	See CA_41C Bandwidth Combination Set 2 in Table 5.4.2A.1-1							60	0
		46							Yes		
CA_42A-46A	-	42			Yes	Yes	Yes	Yes		40	0
		46						Yes			
CA_46A-46A-66A	-	46	See CA_46A-46A Bandwidth combination set 0 in Table 5.4.2A.1-3							60	0
		66			Yes	Yes	Yes	Yes			
CA_46A-46C-66A	-	46	See CA_46A-46C Bandwidth Combination Set 0 in Table 5.4.2A.1-3							80	0
		66			Yes	Yes	Yes	Yes			
CA_46A-46D-66A	-	46	See CA_46A-46D Bandwidth Combination Set 0 in Table 5.4.2A.1-3							100	0

		66			Yes	Yes	Yes	Yes		
CA_46C-66A	-	46	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						60	0
		66			Yes	Yes	Yes	Yes		
CA_46A-66A	-	46						Yes	40	0
		66			Yes	Yes	Yes	Yes		
CA_46A-66A-66A	-	46						Yes	60	0
		66	See the CA_66A-66A Bandwidth combination set 0 in the Table 5.4.2A.1-3 from 36.101							
CA_46A-66C	-	46						Yes	80	0
		66	See the CA_66C Bandwidth combination set 0 in the Table 5.4.2A.1-1							
CA_46D-66A	-	46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1						80	0
		66			Yes	Yes	Yes	Yes		
CA_46E-66A	-	46	See CA_46E Bandwidth combination set 0 in Table 5.4.2A.1-1						100	0
		66			Yes	Yes	Yes	Yes		
CA_46A-70A	-	46						Yes	35	0
		70			Yes	Yes	Yes			

NOTE 1: The CA Configuration refers to a combination of an operating band and a CA bandwidth class specified in Table 5.4.2A-1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.
NOTE 2: For each band combination, all combinations of indicated bandwidths belong to the set.
NOTE 3: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal.
NOTE 4: Uplink CA configurations are the configurations supported by the present release of specifications.
NOTE 5: For TDD inter-band Carrier Aggregtion only non-simultaneous Rx/Tx uplink CA configurations can be supported by UE supporting corresponding DL CA configuration without simultaneous Rx/Tx.
NOTE 6: Void
NOTE 7: Power imbalance between downlink carriers on Band 20 and Band 28 is assumed to be within [6dB].
NOTE 8: For the corresponding CA configuration, UE may not support Pcell transmissions in this E-UTRA band

Table 5.4.2A.1-2a: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA (three bands)

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	**Uplink CA configurations (NOTE 5)**	**E-UTRA Bands**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Maximum aggregated bandwidth [MHz]**	**Bandwidth combination set**
CA_1A-3A-5A	CA_1A-3A CA_1A-5A[6] CA_3A-5A	1			Yes	Yes	Yes	Yes	50	0
		3			Yes	Yes	Yes	Yes		
		5			Yes	Yes				
		1			Yes	Yes			40	1
		3			Yes	Yes	Yes	Yes		
		5			Yes	Yes				
CA_1A-3C-5A	-	1			Yes	Yes	Yes	Yes	70	0
		3	See CA_3C Bandwidth combination set 0 in 36.101 Table 5.4.2A.1-1							
		5			Yes	Yes				
CA_1A-3A-7A	CA_1A-3A CA_1A-7A CA_3A-7A	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		7				Yes	Yes	Yes		
CA_1A-3A-7A-7A	CA_1A-3A CA_1A-7A CA_3A-7A	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		7	See CA_7A-7A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
CA_1A-3A-7C	-	1			Yes	Yes	Yes	Yes	80	0
		3				Yes	Yes	Yes		
		7	See CA_7C Bandwidth Combination Set 2 in Table 5.4.2A.1-1							
		1			Yes	Yes	Yes	Yes	80	1
		3			Yes	Yes	Yes	Yes		
		7	See CA_7C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_1A-3C-7A	-	1			Yes	Yes	Yes	Yes	80	0
		3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		7				Yes	Yes	Yes		
CA_1A-3C-7C	-	1			Yes	Yes	Yes	Yes	100	0
		3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		7	See CA_7C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_1A-3A-8A	CA_1A-3A CA_1A-8A CA_3A-8A	1			Yes	Yes	Yes	Yes	50	0
		3			Yes	Yes	Yes	Yes		
		8		Yes	Yes	Yes				
		1			Yes	Yes			40	1
		3			Yes	Yes	Yes	Yes		
		8		Yes	Yes	Yes				
		1			Yes	Yes	Yes		40	2
		3			Yes	Yes	Yes			
		8		Yes	Yes	Yes				
		1			Yes	Yes	Yes	Yes	50	3
		3			Yes	Yes	Yes	Yes		
		8			Yes	Yes				
CA_1A-3A-3A-8A	-	1			Yes	Yes	Yes	Yes	70	0
		3	See CA_3A-3A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
		8		Yes	Yes	Yes				
CA_1A-3C-8A	CA_1A-3A CA_1A-8A CA_3A-8A CA_3C	1			Yes	Yes	Yes	Yes	70	0
		3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		8		Yes	Yes	Yes				
CA_1A-3A-11A	-	1			Yes	Yes	Yes	Yes	50	0
		3			Yes	Yes	Yes	Yes		
		11			Yes	Yes				
CA_1A-3A-19A	CA_1A-3A CA_1A-19A[6] CA_3A-19A	1			Yes	Yes	Yes	Yes	55	0
		3			Yes	Yes	Yes	Yes		
		19			Yes	Yes	Yes			
CA_1A-3A-26A	-	1			Yes	Yes	Yes	Yes	50	0

		3			Yes	Yes	Yes	Yes		
		26			Yes	Yes				
CA_1A-3A-20A	-	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
CA_1A-3A-21A	CA_1A-3A, CA_1A-21A, CA_3A-21A	1			Yes	Yes	Yes	Yes	55	0
		3			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
CA_1A-3A-28A	CA_1A-3A, CA_1A-28A, CA_3A-28A[6]	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		28			Yes	Yes	Yes	Yes		
CA_1A-3C-28A	-	1			Yes	Yes	Yes	Yes	80	0
		3	See CA_3C Bandwidth combination set 0 in 36.101 Table 5.4.2A.1-1							
		28			Yes	Yes	Yes	Yes		
CA_1A-3A-38A	-	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		38			Yes	Yes	Yes	Yes		
CA_1A-3A-40A	CA_1A-3A	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		40			Yes	Yes	Yes	Yes		
CA_1A-3A-40C	-	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		40	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_1A-3C-40A	-	1			Yes	Yes	Yes	Yes	80	0
		3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		40			Yes	Yes	Yes	Yes		
CA_1A-3C-40C	-	1			Yes	Yes	Yes	Yes	100	0
		3	See CA_3C Bandwidth combination set 0 in Table 5.4.2A.1-1							
		40	See CA_40C Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_1A-3A-41A[9]	-	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		41			Yes	Yes	Yes	Yes		
CA_1A-3A-42A	CA_1A-3A, CA_1A-42A, CA_3A-42A	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-42C	CA_1A-3A, CA_1A-42A, CA_3A-42A	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-5A-40A	CA_1A-5A[6]	1			Yes	Yes	Yes	Yes	50	0
		5			Yes	Yes				
		40				Yes	Yes	Yes		
CA_1A-5A-46A	CA_1A-5A[6]	1			Yes	Yes	Yes	Yes	50	0
		5			Yes	Yes				
		46						Yes		
CA_1A-5A-7A	CA_1A-5A[6] CA_1A-7A CA_5A-7A	1			Yes	Yes			40	0
		5			Yes	Yes				
		7				Yes	Yes	Yes		
		1			Yes	Yes	Yes	Yes	50	1
		5			Yes	Yes				
		7				Yes	Yes	Yes		
CA_1A-5A-7A-7A	CA_1A-5A[6] CA_1A-7A CA_5A-7A	1			Yes	Yes	Yes	Yes	70	0
		5			Yes	Yes				
		7	See CA_7A-7A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
CA_1A-5A-46C	CA_1A-5A[6]	1			Yes	Yes	Yes	Yes	70	0
		5			Yes	Yes				
		46	See CA_46C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-5A-46D	-	1			Yes	Yes	Yes	Yes	90	0
		5			Yes	Yes				

		46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-7A-8A	CA_1A-7A, CA_1A-8A	1			Yes	Yes	Yes	Yes	50	0
		7				Yes	Yes	Yes		
		8			Yes	Yes				
CA_1A-7A-20A	-	1			Yes	Yes	Yes	Yes	50	0
		7				Yes	Yes	Yes		
		20			Yes	Yes				
		1			Yes	Yes	Yes	Yes	60	1
		7				Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
CA_1A-7A-26A	-	1			Yes	Yes	Yes	Yes	55	0
		7			Yes	Yes	Yes	Yes		
		26			Yes	Yes	Yes			
CA_1A-7A-7A-26A	-	1			Yes	Yes	Yes	Yes	75	0
		7	See CA_7A-7A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
		26			Yes	Yes	Yes			
CA_1A-7A-28A	-	1			Yes	Yes	Yes	Yes	55	0
		7				Yes	Yes	Yes		
		28			Yes	Yes	Yes			
		1			Yes	Yes	Yes	Yes	60	1
		7				Yes	Yes	Yes		
		28				Yes	Yes	Yes		
CA_1A-7C-28A	-	1			Yes	Yes	Yes	Yes	80	0
		7	See CA_7C Bandwidth Combination Set 2 in Table 5.4.2A.1-1							
		28				Yes	Yes	Yes		
CA_1A-7A-40A	-	1			Yes	Yes	Yes	Yes	60	0
		7				Yes	Yes	Yes		
		40			Yes	Yes	Yes	Yes		
CA_1A-7A-42A	-	1			Yes	Yes	Yes	Yes	60	0
		7				Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-7A-46A	CA_1A-7A	1			Yes	Yes	Yes	Yes	60	0
		7				Yes	Yes	Yes		
		46						Yes		
CA_1A-7A-46C	CA_1A-7A	1			Yes	Yes	Yes	Yes	80	0
		7				Yes	Yes	Yes		
		46	See CA_46C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-7A-46D	-	1			Yes	Yes	Yes	Yes	100	0
		7				Yes	Yes	Yes		
		46	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_1A-8A-11A	-	1			Yes	Yes	Yes	Yes	40	0
		8			Yes	Yes				
		11			Yes	Yes				
CA_1A-8A-28A	-	1			Yes	Yes	Yes	Yes	50	0
		8		Yes	Yes	Yes				
		28			Yes	Yes	Yes	Yes		
CA_1A-8A-40A	CA_1A-8A	1			Yes	Yes	Yes	Yes	50	0
		8		Yes	Yes	Yes				
		40			Yes	Yes	Yes	Yes		
CA_1A-11A-18A	-	1			Yes	Yes	Yes	Yes	45	0
		11			Yes	Yes				
		18			Yes	Yes	Yes			
		1			Yes	Yes	Yes	Yes	40	1
		11			Yes	Yes				
		18			Yes	Yes				
CA_1A-11A-28A	-	1			Yes	Yes	Yes	Yes	50	0
		11			Yes	Yes				
		28			Yes	Yes	Yes	Yes		
CA_1A-18A-28A		1			Yes	Yes	Yes	Yes	45	0
		18			Yes	Yes	Yes			

	CA_1A-18A[6] CA_1A-28A CA_18A-28A	28			Yes	Yes				
		1			Yes	Yes	Yes	Yes	40	1
		18			Yes	Yes				
		28			Yes	Yes				
CA_1A-19A-21A	CA_1A-19A[6] CA_1A-21A CA_19A-21A	1			Yes	Yes	Yes	Yes	50	0
		19			Yes	Yes	Yes			
		21			Yes	Yes	Yes			
CA_1A-19A-28A	-	1			Yes	Yes	Yes	Yes	45	0
		19			Yes	Yes	Yes			
		28			Yes	Yes				
CA_1A-19A-42A	CA_1A-19A[6], CA_1A-42A, CA_19A-42A[6]	1			Yes	Yes	Yes	Yes	55	0
		19			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_1A-19A-42C	CA_1A-19A[6] CA_1A-42A CA_19A-42A[6]	1			Yes	Yes	Yes	Yes	75	0
		19			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-20A-42A	-	1			Yes	Yes	Yes	Yes	60	0
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-21A-28A	CA_1A-21A, CA_1A-28A, CA_21A-28A	1			Yes	Yes	Yes	Yes	45	0
		21			Yes	Yes	Yes			
		28			Yes	Yes				
CA_1A-21A-42A	CA_1A-21A, CA_1A-42A, CA_21A-42A	1			Yes	Yes	Yes	Yes	55	0
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_1A-21A-42C	CA_1A-21A CA_1A-42A CA_21A-42A	1			Yes	Yes	Yes	Yes	75	0
		21			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-28A-42A	CA_1A-28A, CA_1A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	50	0
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_1A-28A-42C	CA_1A-28A, CA_1A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	70	0
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-41A-42A[10]	-	1			Yes	Yes	Yes	Yes	60	0
		41				Yes	Yes	Yes		
		42				Yes	Yes	Yes		
CA_1A-41A-42C[10]	-	1			Yes	Yes	Yes	Yes	80	0
		41				Yes	Yes	Yes		
		42	See CA_42C Bandwidth combination Set 1 in Table 5.4.2A.1-1							
CA_1A-41C-42A[10]	-	1			Yes	Yes	Yes	Yes	80	0
		41	See CA_41C Bandwidth combination Set 0 in Table 5.4.2A.1-1							
		42				Yes	Yes	Yes		
CA_1A-41C-42C[10]	-	1			Yes	Yes	Yes	Yes	100	0
		41	See CA_41C Bandwidth combination set 0 in Table 5.4.2A.1-1							
		42	See CA_42C Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_2A-4A-5A	CA_2A-4A	2			Yes	Yes	Yes	Yes	50	0
		4			Yes	Yes	Yes	Yes		
		5			Yes	Yes				
CA_2A-2A-4A-5A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						70	0
		4			Yes	Yes	Yes	Yes		
		5			Yes	Yes				
CA_2A-4A-5B	-	2			Yes	Yes	Yes	Yes	60	0
		4			Yes	Yes	Yes	Yes		

		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_2A-4A-7A	CA_2A-4A	2			Yes	Yes	Yes	Yes		60	0
		4			Yes	Yes	Yes	Yes			
		7			Yes	Yes	Yes	Yes			
CA_2A-4A-7A-7A	CA_2A-4A	2			Yes	Yes	Yes	Yes		80	0
		4			Yes	Yes	Yes	Yes			
		7	See the CA_7A-7A Bandwidth combination set 1 in Table 5.4.2A.1-3								
CA_2A-4A-7C	.	2			Yes	Yes	Yes	Yes		80	0
		4			Yes	Yes	Yes	Yes			
		7	See CA_7C Bandwidth Combination Set 1 in Table 5.4.2A.1-1								
CA_2A-4A-4A-5A	-	2			Yes	Yes	Yes	Yes		70	0
		4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
		5			Yes	Yes					
CA_2A-4A-12A	CA_2A-4A CA_4A-12A	2			Yes	Yes	Yes	Yes		50	0
		4			Yes	Yes	Yes	Yes			
		12			Yes	Yes					
CA_2A-4A-12A-12A	-	2			Yes	Yes	Yes	Yes		50	0
		4			Yes	Yes	Yes	Yes			
		12	See CA_12A-12A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-4A-12B	-	2			Yes	Yes	Yes	Yes		55	0
		4			Yes	Yes	Yes	Yes			
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_2A-2A-4A-12A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							70	0
		4			Yes	Yes	Yes	Yes			
		12			Yes	Yes					
CA_2A-4A-4A-12A	-	2			Yes	Yes	Yes	Yes		70	0
		4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
		12			Yes	Yes					
CA_2A-4A-13A	-	2			Yes	Yes	Yes	Yes		50	0
		4			Yes	Yes	Yes	Yes			
		13				Yes					
CA_2A-4A-29A	CA_2A-4A	2			Yes	Yes	Yes	Yes		50	0
		4			Yes	Yes	Yes	Yes			
		29			Yes	Yes					
CA_2A-4A-30A	-	2			Yes	Yes	Yes	Yes		50	0
		4			Yes	Yes	Yes	Yes			
		30			Yes	Yes					
CA_2A-5A-12A	-	2			Yes	Yes	Yes	Yes		40	0
		5			Yes	Yes					
		12			Yes	Yes					
CA_2A-2A-5A-12A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							60	0
		5			Yes	Yes					
		12			Yes	Yes					
CA_2A-5A-12A-12A	-	2			Yes	Yes	Yes	Yes		40	0
		5			Yes	Yes					
		12	See CA_12A-12A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-2A-5A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							70	0
		5			Yes	Yes					
		66			Yes	Yes	Yes	Yes			
CA_2A-2A-5A-66A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							90	0
		5			Yes	Yes					

		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-2A-5A-66B	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							70	0
		5			Yes	Yes					
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_2A-2A-5A-66C	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							90	0
		5			Yes	Yes					
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_2A-2A-12B-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							75	0
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
		66			Yes	Yes	Yes	Yes			
CA_2A-2A-13A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							70	0
		13			Yes	Yes					
		66			Yes	Yes	Yes	Yes			
CA_2A-5A-12B	-	2			Yes	Yes	Yes	Yes		45	0
		5			Yes	Yes					
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_2A-5A-13A	CA_2A-13A[6]	2			Yes	Yes	Yes	Yes		40	0
		5			Yes	Yes					
		13				Yes					
CA_2A-5A-29A	-	2			Yes	Yes	Yes	Yes		40	0
		5			Yes	Yes					
		29			Yes	Yes					
CA_2A-5A-30A	-	2			Yes	Yes	Yes	Yes		40	0
		5			Yes	Yes					
		30			Yes	Yes					
CA_2A-2A-5A-30A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							60	0
		5			Yes	Yes					
		30			Yes	Yes					
CA_2C-5A-30A	-	2	See CA_2C Bandwidth combination set 0 in Table 5.4.2A.1-1							60	0
		5			Yes	Yes					
		30			Yes	Yes					
CA_2A-5B-30A	-	2			Yes	Yes	Yes	Yes		50	0
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
		30			Yes	Yes					
CA_2C-5B-30A	-	2	See CA_2C Bandwidth combination set 0 in Table 5.4.2A.1-1							70	0
		5	See CA_5B Bandwidth combination set 0 in Table 5.4.2A.1-1								
		30			Yes			Yes			
CA_2A-5A-66A	-	2			Yes	Yes	Yes	Yes		50	0
		5			Yes	Yes					
		66			Yes	Yes	Yes	Yes			
CA_2A-5A-66A-66A	-	2			Yes	Yes	Yes	Yes		70	0
		5			Yes	Yes					
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-5A-66B		2			Yes	Yes	Yes	Yes		50	0
		5			Yes	Yes					
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_2A-5A-66C		2			Yes	Yes	Yes	Yes		70	0
		5			Yes	Yes					

		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_2A-5A-66D	-	2			Yes	Yes	Yes	Yes		90	0
		5			Yes	Yes					
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_2A-5B-66A		2			Yes	Yes	Yes	Yes		60	0
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
		66			Yes	Yes	Yes	Yes			
CA_2A-5B-66B	-	2			Yes	Yes	Yes	Yes		60	0
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_2A-5B-66C	-	2			Yes	Yes	Yes	Yes		80	0
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1								
CA_2A-7A-12A	-	2			Yes	Yes	Yes	Yes		50	0
		7			Yes	Yes	Yes	Yes			
		12			Yes	Yes					
CA_2A-7A-66A	-	2			Yes	Yes	Yes	Yes		60	0
		7			Yes	Yes	Yes	Yes			
		66			Yes	Yes	Yes	Yes			
CA_2A-12A-30A	CA_2A-12A[6]	2			Yes	Yes	Yes	Yes		40	0
		12			Yes	Yes					
		30			Yes	Yes					
CA_2A-2A-12A-30A	-	2	See CA_2A-2A Bandwidth combination set 0 in Table 5.4.2A.1-3								
		12			Yes	Yes				60	0
		30			Yes	Yes					
CA_2C-12A-30A	-	2	See CA_2C Bandwidth combination set 0 in Table 5.4.2A.1-1								
		12			Yes	Yes				60	0
		30			Yes	Yes					
CA_2A-12A-66A	-	2			Yes	Yes	Yes	Yes		50	0
		12			Yes	Yes					
		66			Yes	Yes	Yes	Yes			
		2			Yes	Yes				40	1
		12			Yes	Yes					
		66			Yes	Yes	Yes	Yes			
CA_2A-2A-12A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
		12			Yes	Yes				70	0
		66			Yes	Yes	Yes	Yes			
CA_2A-12A-66A-66A	-	2			Yes	Yes	Yes	Yes		70	0
		12			Yes	Yes					
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
CA_2A-12A-66C	-	2			Yes	Yes	Yes	Yes		70	0
		12			Yes	Yes					
		66	See CA_66C Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
CA_2A-12B-66A	-	2			Yes	Yes	Yes	Yes		55	0
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
		66			Yes	Yes	Yes	Yes			
CA_2A-12B-66A-66A	-	2			**Yes**	**Yes**	**Yes**	**Yes**		75	0
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1								
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3								
	-	2			Yes	Yes	Yes	Yes		50	0

CA_2A-13A-66A		13			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_2A-13A-66D	-	2			Yes	Yes	Yes	Yes	90	0
		13			Yes	Yes				
		66	See CA_66D Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_2A-13A-66A-66A	-	2			Yes	Yes	Yes	Yes	70	0
		13			Yes	Yes				
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-13A-66A-66B	-	2			Yes	Yes	Yes	Yes	70	0
		13			Yes	Yes				
		66	See CA_66A-66B Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-13A-66A-66C	-	2			Yes	Yes	Yes	Yes	90	0
		13			Yes	Yes				
		66	See CA_66A-66C Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-13A-66B	-	2			Yes	Yes	Yes	Yes	50	0
		13			Yes	Yes				
		66	See CA_66B Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_2A-13A-66C	-	2			Yes	Yes	Yes	Yes	70	0
		13			Yes	Yes				
		66	See CA_66C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_2A-29A-30A	-	2			Yes	Yes	Yes	Yes	40	0
		29			Yes	Yes				
		30			Yes	Yes				
CA_2C-29A-30A	-	2	See CA_2C Bandwidth Combination set 0 in Table 5.4.2A.1-1						60	0
		29			Yes	Yes				
		30			Yes	Yes				
CA_2A-2A-30A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						70	0
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_2A-30A-66A-66A	-	2			Yes	Yes	Yes	Yes	70	0
		30			Yes	Yes				
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_2A-30A-66A	-	**2**			Yes	Yes	Yes	Yes	50	0
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_2A-46A-66A	-	**2**			Yes	Yes	Yes	Yes	60	0
		46						Yes		
		66			Yes	Yes	Yes	Yes		
CA_2A-46A-46A-66A	-	2			Yes	Yes	Yes	Yes	80	0
		46	See CA_46A-46A Bandwidth combination set 0 in Table 5.4.2A.1-3							
		66			Yes	Yes	Yes	Yes		
CA_2A-46C-66A	-	2			Yes	Yes	Yes	Yes	80	0
		46	See CA_46C Bandwidth combination set 0 in Table 5.4.2A.1-1							
		66			Yes	Yes	Yes	Yes		
CA_2A-46A-46C-66A	-	**2**			Yes	Yes	Yes	Yes	100	0
		46	See CA_46A-46C Bandwidth Combination Set 0 in the Table 5.4.2A.1-3							
		66			Yes	Yes	Yes	Yes		
CA_2A-46D-66A	-	2			Yes	Yes	Yes	Yes	100	0
		46	See CA_46D Bandwidth Combination Set 0 in the Table 5.4.2A.1-1							
		66			Yes	Yes	Yes	Yes		
CA_3A-5A-7A		3				Yes	Yes	Yes	50	0
		5			Yes	Yes				

	CA_3A-5A, CA_3A-7A, CA_5A-7A	7				Yes	Yes	Yes		
CA_3A-5A-7A-7A	CA_3A-5A, CA_3A-7A, CA_5A-7A	3				Yes	Yes	Yes	70	0
		5			Yes	Yes				
		7	See CA_7A-7A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
CA_3A-5A-40A	CA_3A-5A	3			Yes	Yes	Yes	Yes	50	0
		5			Yes	Yes				
		40				Yes	Yes	Yes		
		3		Yes	Yes	Yes			40	1
		5		Yes	Yes	Yes				
		40						Yes		
CA_3A-3A-7A-8A	-	3	See CA_3A-3A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						70	0
		7			Yes	Yes	Yes	Yes		
		8			Yes	Yes				
		3	See CA_3A-3A Bandwidth Combination Set 1 in Table 5.4.2A.1-3						60	1
		7			Yes	Yes	Yes	Yes		
		8			Yes	Yes				
CA_3A-3A-7A-7A-8A	-	3	See CA_3A-3A Bandwidth Combination Set 0 in table 5.4.2A.1-3						90	0
		7	See CA_7A-7A Bandwidth Combination Set 1 in table 5.4.2A.1-3							
		8			Yes	Yes				
		3	See CA_3A-3A Bandwidth Combination Set 1 in table 5.4.2A.1-3						70	1
		7	See CA_7A-7A Bandwidth Combination Set 2 in table 5.4.2A.1-3							
		8			Yes	Yes				
CA_3A-7A-7A-8A	-	3			Yes	Yes	Yes	Yes	70	0
		7	See CA_7A-7A Bandwidth Combination Set 1 in Table 5.4.2A.1-3							
		8			Yes	Yes				
		3			Yes	Yes	Yes	Yes	60	1
		7	See CA_7A-7A Bandwidth Combination Set 2 in Table 5.4.2A.1-3							
		8			Yes	Yes				
CA_3A-7A-8A	-	3			Yes	Yes	Yes		40	0
		7				Yes	Yes			
		8			Yes	Yes				
		3			Yes	Yes	Yes	Yes	50	1
		7				Yes	Yes	Yes		
		8			Yes	Yes				
		3			Yes	Yes	Yes	Yes	50	2
		7			Yes	Yes	Yes	Yes		
		8			Yes	Yes				
CA_3A-7A-20A	CA_3A-7A CA_3A-20A CA_7A-20A	3			Yes	Yes	Yes	Yes	60	0
		7				Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
CA_3A-7A-26A	-	3			Yes	Yes	Yes	Yes	55	0
		7			Yes	Yes	Yes	Yes		
		26			Yes	Yes	Yes			
CA_3A-7A-7A-26A	-	3			Yes	Yes	Yes	Yes	75	0
		7	See CA_7A-7A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
		26			Yes	Yes	Yes			
CA_3A-7A-28A	CA_3A-7A CA_7A-28A	3			Yes	Yes	Yes	Yes	60	0
		7			Yes	Yes	Yes	Yes		
		28			Yes	Yes	Yes	Yes		
CA_3A-7C-28A	CA_3A-7A, CA_7C, CA_7A-28A	3				Yes	Yes	Yes	80	0
		7	See CA_7C Bandwidth Combination Set 2 in Table 5.4.2A.1-1							

		28				Yes	Yes	Yes		
CA_3C-7A-28A	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						80	0
		7				Yes	Yes	Yes		
		28				Yes	Yes	Yes		
CA_3C-7C-28A	-	3	See CA_3C Bandwidth Combination Set 0 in Table 5.4.2A.1-1						100	0
		7	See CA_7C Bandwidth Combination Set 2 in Table 5.4.2A.1-1							
		28				Yes	Yes	Yes		
CA_3A-7A-32A	-	3			Yes	Yes	Yes	Yes	60	0
		7				Yes	Yes	Yes		
		32			Yes	Yes	Yes	Yes		
CA_3A-7A-38A[7]	-	3			Yes	Yes	Yes	Yes	60	0
		7				Yes	Yes	Yes		
		38			Yes	Yes	Yes	Yes		
CA_3A-7A-40A	-	3			Yes	Yes	Yes	Yes	60	0
		7			Yes	Yes	Yes	Yes		
		40			Yes	Yes	Yes	Yes		
CA_3A-7A-40C	-	3			Yes	Yes	Yes	Yes	80	0
		7			Yes	Yes	Yes	Yes		
		40	See CA_40C Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_3A-7A-42A	-	3			Yes	Yes	Yes	Yes	60	0
		7				Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_3A-8A-11A	-	3			Yes	Yes	Yes	Yes	40	0
		8			Yes	Yes				
		11			Yes	Yes				
CA_3A-8A-28A	-	3			Yes	Yes	Yes	Yes	50	0
		8		Yes	Yes	Yes				
		28			Yes	Yes	Yes	Yes		
CA_3A-8A-40A	CA_3A-8A	3			Yes	Yes	Yes	Yes	50	0
		8		Yes	Yes	Yes				
		40			Yes	Yes	Yes	Yes		
CA_3A-11A-28A	-	3			Yes	Yes	Yes	Yes	50	0
		11			Yes	Yes				
		28			Yes	Yes	Yes	Yes		
CA_3A-19A-21A	CA_3A-19A, CA_3A-21A, CA_19A-21A	3			Yes	Yes	Yes	Yes	50	0
		19			Yes	Yes	Yes			
		21			Yes	Yes	Yes			
CA_3A-19A-42A	CA_3A-19A, CA_3A-42A, CA_19A-42A[6]	3			Yes	Yes	Yes	Yes	55	0
		19			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_3A-19A-42C	CA_3A-19A CA_3A-42A CA_19A-42A[6]	3			Yes	Yes	Yes	Yes	75	0
		19			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_3A-20A-32A	-	3			Yes	Yes	Yes	Yes	60	0
		20			Yes	Yes	Yes	Yes		
		32			Yes	Yes	Yes	Yes		
CA_3A-20A-42A	-	3			Yes	Yes	Yes	Yes	60	0
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_3A-21A-28A	CA_3A-21A, CA_3A-28A[6], CA_21A-28A	3			Yes	Yes	Yes	Yes	55	0
		21			Yes	Yes	Yes			
		28			Yes	Yes				
CA_3A-21A-42A	CA_3A-21A, CA_3A-42A, CA_21A-42A	3			Yes	Yes	Yes	Yes	55	0
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_3A-21A-42C		3			Yes	Yes	Yes	Yes	75	0
		21			Yes	Yes	Yes			

	CA_3A-21A, CA_3A-42A, CA_21A-42A	42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_3A-28A-40A	-	3			Yes	Yes	Yes	Yes	60	0
		28			Yes	Yes	Yes	Yes		
		40			Yes	Yes	Yes	Yes		
CA_3A-28A-40C	-	3			Yes	Yes	Yes	Yes	80	0
		28			Yes	Yes	Yes	Yes		
		40	See CA_40C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_3A-28A-40D	-	3			Yes	Yes	Yes	Yes	100	0
		28			Yes	Yes	Yes	Yes		
		40	See CA_40D Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_3A-28A-41A	-	3			Yes	Yes	Yes	Yes	60	0
		28			Yes	Yes	Yes	Yes		
		41			Yes	Yes	Yes	Yes		
CA_3A-28A-41C	-	3			Yes	Yes	Yes	Yes	80	0
		28			Yes	Yes	Yes	Yes		
		41	See CA_41C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_3A-28A-42A	CA_3A-28A[6], CA_3A-42A, CA_28A-42A	3			Yes	Yes	Yes	Yes	50	0
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_3A-28A-42C	CA_3A-28A[6], CA_3A-42A, CA_28A-42A	3			Yes	Yes	Yes	Yes	70	0
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_3A-41A-42A	-	3			Yes	Yes	Yes	Yes	60	0
		41				Yes	Yes	Yes		
		42				Yes	Yes	Yes		
CA_3A-41A-42C	-	3			Yes	Yes	Yes	Yes	80	0
		41				Yes	Yes	Yes		
		42	See CA_42C Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_3A-41C-42A	-	3			Yes	Yes	Yes	Yes	80	0
		41	See CA_41C Bandwidth combination set 0 in Table 5.4.2A.1-1							
		42				Yes	Yes	Yes		
CA_3A-41C-42C	-	3			Yes	Yes	Yes	Yes	100	0
		41	See CA_41C Bandwidth combination set 0 in Table 5.4.2A.1-1							
		42	See CA_42C Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_4A-5A-12A	-	4			Yes	Yes	Yes	Yes	40	0
		5			Yes	Yes				
		12			Yes	Yes				
CA_4A-5A-12A-12A	-	4			Yes	Yes	Yes	Yes	40	0
		5			Yes	Yes				
		12	See CA_12A-12A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_4A-5A-12B	-	4			Yes	Yes	Yes	Yes	45	0
		5			Yes	Yes				
		12	See CA_12B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_4A-4A-5A-12A	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						60	0
		5			Yes	Yes				
		12			Yes	Yes				
CA_4A-5A-13A	CA_4A-13A[6]	4			Yes	Yes	Yes	Yes	40	0
		5			Yes	Yes				
		13				Yes				
CA_4A-5A-29A	-	4			Yes	Yes	Yes	Yes	40	0

		5			Yes	Yes				
		29			Yes	Yes				
CA_4A-5A-30A	-	4			Yes	Yes	Yes	Yes		
		5			Yes	Yes			40	0
		30			Yes	Yes				
CA_4A-4A-5A-30A	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
		5			Yes	Yes			60	0
		30			Yes	Yes				
CA_4A-4A-5B-30A	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1						70	0
		30			Yes			Yes		
CA_4A-5B-30A	-	4			Yes	Yes	Yes	Yes		
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1						50	0
		30			Yes	Yes				
CA_4A-7A-12A	-	4			Yes	Yes				
		7			Yes	Yes	Yes	Yes	40	0
		12			Yes	Yes				
		4			Yes	Yes	Yes	Yes		
		7			Yes	Yes	Yes	Yes	50	1
		12			Yes	Yes				
CA_4A-12A-30A	CA_4A-12A	4			Yes	Yes	Yes	Yes		
		12			Yes	Yes			40	0
		30			Yes	Yes				
CA_4A-4A-12A-30A	-	4	See CA_4A-4A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
		12			Yes	Yes			60	0
		30			Yes	Yes				
CA_4A-29A-30A	-	4			Yes	Yes	Yes	Yes		
		29			Yes	Yes			40	0
		30			Yes	Yes				
CA_4A-4A-29A-30A	-	4	See CA_4A-4A Bandwidth combination set 0 in Table 5.4.2A.1-3							
		29			Yes	Yes			60	0
		30			Yes	Yes				
CA_5A-7A-46A	CA_5A-7A	5			Yes	Yes				
		7				Yes	Yes	Yes	50	0
		46						Yes		
CA_5A-7A-46C	CA_5A-7A	5			Yes	Yes				
		7				Yes	Yes	Yes	70	0
		46	See CA_46C Bandwidth combination set 0 in the Table 5.4.2A.1-1							
CA_5A-7A-46D	-	5			Yes	Yes				
		7				Yes	Yes	Yes	90	0
		46	See CA_46D Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_5A-30A-66A	-	5			Yes	Yes				
		30			Yes	Yes			40	0
		66			Yes	Yes	Yes	Yes		
CA_5A-30A-66A-66A	-	5			Yes	Yes				
		30			Yes	Yes			60	0
		66	See CA_66A-66A Bandwidth Combination Set 0 in Table 5.4.2A.1-3							
CA_5B-30A-66A	-	5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		30			Yes	Yes			50	0
		66			Yes	Yes	Yes	Yes		
CA_7A-8A-20A	-	7				Yes	Yes	Yes		
		8		Yes	Yes	Yes			40	0
		20			Yes	Yes				

CA_5A-12A-66A	-	5			Yes	Yes			40	0
		12			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_5A-40A-41A	-	5			Yes	Yes			50	0
		40				Yes		Yes		
		41						Yes		
CA_7A-20A-38A[8]	-	7				Yes	Yes	Yes	60	0
		20			Yes	Yes	Yes	Yes		
		38			Yes	Yes	Yes	Yes		
CA_7A-20A-42A	-	7				Yes	Yes	Yes	60	0
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_8A-11A-28A	-	8			Yes	Yes			40	0
		11			Yes	Yes				
		28			Yes	Yes	Yes	Yes		
CA_8A-28A-41A	-	8			Yes	Yes			50	0
		28			Yes	Yes	Yes	Yes		
		41			Yes	Yes	Yes	Yes		
CA_12A-30A-66A	-	12			Yes	Yes			40	0
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_19A-21A-42A	CA_19A-21A, CA_19A-42A[6], CA_21A-42A	19			Yes	Yes	Yes		50	0
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_19A-21A-42C	CA_19A-21A, CA_19A-42A[6], CA_21A-42A	19			Yes	Yes	Yes		70	0
		21			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_21A-28A-42A	CA_21A-28A, CA_21A-42A, CA_28A-42A	21			Yes	Yes	Yes		45	0
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_21A-28A-42C	CA_21A-28A, CA_21A-42A, CA_28A-42A	21			Yes	Yes	Yes		65	0
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_28A-41A-42A		28			Yes	Yes			50	0
		41				Yes	Yes	Yes		
		42				Yes	Yes	Yes		
CA_28A-41A-42C	-	28			Yes	Yes			70	0
		41				Yes	Yes	Yes		
		42	See CA_42C Bandwidth Combination Set 1 in Table 5.4.2A.1-1							
CA_28A-41C-42A	-	28			Yes	Yes			70	0
		41	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		42				Yes	Yes	Yes		
CA_28A-41C-42C	-	28			Yes	Yes			90	0
		41	See CA_41C Bandwidth combination set 0 in Table 5.4.2A.1-1							
		42	See CA_42C Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_29A-46A-66A	-	29			Yes	Yes			50	0
		46						Yes		
		66			Yes	Yes	Yes	Yes		

NOTE 1: The CA Configuration refers to a combination of an operating band and a CA bandwidth class specified in Table 5.4.2A-1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.
NOTE 2: For each band combination, all combinations of indicated bandwidths belong to the set.
NOTE 3: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal.
NOTE 4: A terminal which supports a DL CA configuration shall support all the lower order fallback DL CA combinations and it shall support at least one bandwidth combination set for each of the constituent lower order DL combinations containing all the bandwidths specified within each specific combination set of the upper order DL combination.
NOTE 5: Uplink CA configurations are the configurations supported by the present release of specifications.
NOTE 6: If the UE supports any uplink CA configuration for corresponding downlink CA configuration it shall support this uplink CA configuration.
NOTE 7: UL carrier shall be supported in Band 3 only. Power imbalance between downlink carriers on Band 7 and Band 38 is assumed to be within [6dB].
NOTE 8: UL carrier shall be supported in Band 20 only. Power imbalance between downlink carriers on Band 7 and Band 38 is assumed to be within [6dB]
NOTE 9: UL carrier is only supported on Band 1 or Band 3 not Band 41 because the fall back mode 1UL/2DL CA_1A-41A has the limitation that UL carrier is only supported on Band 1.
NOTE 10: UL carrier is only supported on Band 1 or Band 42 not Band 41 because the fall back mode 1UL/2DL CA_1A-41A has the limitation that UL carrier is only supported on Band 1.

Table 5.4.2A.1-2b: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA (four bands)

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	**Uplink CA configurations (NOTE 5)**	**E-UTRA Bands**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Maximum aggregated bandwidth [MHz]**	**Bandwidth combination set**
CA_1A-3A-5A-7A	CA_1A-3A, CA_1A-5A[6], CA_1A-7A, CA_3A-5A, CA_3A-7A, CA_5A-7A	1			Yes	Yes	Yes	Yes	70	0
		3				Yes	Yes	Yes		
		5			Yes	Yes				
		7				Yes	Yes	Yes		
CA_1A-3A-5A-7A-7A	CA_1A-3A, CA_1A-5A[6], CA_1A-7A, CA_3A-5A, CA_3A-7A, CA_5A-7A	1			Yes	Yes	Yes	Yes	90	0
		3				Yes	Yes	Yes		
		5			Yes	Yes				
		7	See CA_7A-7A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
CA_1A-3A-5A-40A	CA_1A-3A, CA_1A-5A[6], CA_3A-5A	1			Yes	Yes	Yes	Yes	70	0
		3			Yes	Yes	Yes	Yes		
		5			Yes	Yes				
		40				Yes	Yes	Yes		
CA_1A-3A-7A-8A	CA_1A-3A, CA_1A-7A, CA_3A-7A, CA_3A-8A	1			Yes	Yes	Yes	Yes	70	0
		3			Yes	Yes	Yes	Yes		
		7				Yes	Yes	Yes		
		8			Yes	Yes				
CA_1A-3A-7A-20A	-	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		7				Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
CA_1A-3A-7A-28A	-	1			Yes	Yes	Yes	Yes	80	0
		3				Yes	Yes	Yes		
		7				Yes	Yes	Yes		
		28				Yes	Yes	Yes		
CA_1A-3A-7C-28A	-	1			Yes	Yes	Yes	Yes	100	0
		3				Yes	Yes	Yes		
		7	See CA_7C Bandwidth Combination Set 2 in Table 5.4.2A.1-1							
		28				Yes	Yes	Yes		
CA_1A-3A-7A-40A	-	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		7				Yes	Yes	Yes		
		40			Yes	Yes	Yes	Yes		
CA_1A-3A-7A-42A	-	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		7				Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-8A-40A	CA_1A-3A, CA_1A-8A, CA_3A-8A	1			Yes	Yes	Yes	Yes	70	0
		3			Yes	Yes	Yes	Yes		
		8		Yes	Yes	Yes				
		40			Yes	Yes	Yes	Yes		
CA_1A-3A-8A-11A	-	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		8			Yes	Yes				
		11			Yes	Yes				
CA_1A-3A-19A-21A	CA_1A-3A, CA_1A-19A[6], CA_1A-21A, CA_3A-19A, CA_3A-21A, CA_19A-21A	1			Yes	Yes	Yes	Yes	70	0
		3			Yes	Yes	Yes	Yes		
		19			Yes	Yes	Yes			
		21			Yes	Yes	Yes			
CA_1A-3A-19A-42A	CA_1A-3A, CA_1A-19A[6], CA_1A-42A, CA_3A-19A, CA_3A-42A, CA_19A-42A[6]	1			Yes	Yes	Yes	Yes	75	0
		3			Yes	Yes	Yes	Yes		
		19			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		

CA_1A-3A-19A-42C	CA_1A-3A, CA_1A-19A[6], CA_1A-42A, CA_3A-19A, CA_3A-42A, CA_19A-42A[6]	1			Yes	Yes	Yes	Yes	95	0
		3			Yes	Yes	Yes	Yes		
		19			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-3A-20A-42A	-	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-21A-28A	CA_1A-3A, CA_1A-21A, CA_1A-28A, CA_3A-21A, CA_3A-28A[6], CA_21A-28A	1			Yes	Yes	Yes	Yes	65	0
		3			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
		28			Yes	Yes				
CA_1A-3A-21A-42A	CA_1A-3A, CA_1A-21A, CA_1A-42A, CA_3A-21A, CA_3A-42A, CA_21A-42A	1			Yes	Yes	Yes	Yes	75	0
		3			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-21A-42C	CA_1A-3A, CA_1A-21A, CA_1A-42A, CA_3A-21A, CA_3A-42A, CA_21A-42A	1			Yes	Yes	Yes	Yes	95	0
		3			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-3A-28A-42A	CA_1A-3A, CA_1A-28A, CA_1A-42A, CA_3A-28A[6], CA_3A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	70	0
		3			Yes	Yes	Yes	Yes		
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-28A-42C	CA_1A-3A, CA_1A-28A, CA_1A-42A, CA_3A-28A[6], CA_3A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	90	0
		3			Yes	Yes	Yes	Yes		
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-21A-28A-42A	CA_1A-21A, CA_1A-28A, CA_1A-42A, CA_21A-28A, CA_21A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	65	0
		21			Yes	Yes	Yes			
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_1A-21A-28A-42C	CA_1A-21A, CA_1A-28A, CA_1A-42A, CA_21A-28A, CA_21A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	85	0
		21			Yes	Yes	Yes			
		28			Yes	Yes				
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
CA_1A-5A-7A-46A	CA_1A-5A[6], CA_1A-7A, CA_5A-7A	1			Yes	Yes	Yes	Yes	70	0
		5			Yes	Yes				
		7				Yes	Yes	Yes		
		46						Yes		
CA_1A-5A-7A-46C	-	1			Yes	Yes	Yes	Yes	90	0
		5			Yes	Yes				
		7				Yes	Yes	Yes		
		46	See CA_46C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-7A-20A-42A	-	1			Yes	Yes	Yes	Yes	80	0
		7				Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-19A-21A-42A		1			Yes	Yes	Yes	Yes	70	0
		19			Yes	Yes	Yes			

	CA_1A-19A[6], CA_1A-21A, CA_1A-42A, CA_19A-21A, CA_19A-42A[6], CA_21A-42A	21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_1A-19A-21A-42C	CA_1A-19A[6], CA_1A-21A, CA_1A-42A, CA_19A-21A, CA_19A-42A[6], CA_21A-42A	1			Yes	Yes	Yes	Yes	90	0
		19			Yes	Yes	Yes			
		21			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_1A-21A-28A-42C	-	1			Yes	Yes	Yes	Yes	85	0
		21			Yes	Yes	Yes			
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.4.2A.1-1							
CA_2A-2A-5A-12A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						80	0
		5			Yes	Yes				
		12			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_2A-2A-5A-30A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						80	0
		5			Yes	Yes				
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_2A-2A-12A-30A-66A	-	2	See CA_2A-2A Bandwidth Combination Set 0 in Table 5.4.2A.1-3						80	0
		12			Yes	Yes				
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_2A-4A-5A-12A	-	2			Yes	Yes	Yes	Yes	60	0
		4			Yes	Yes	Yes	Yes		
		5			Yes	Yes				
		12			Yes	Yes				
CA_2A-4A-5A-29A	CA_2A-4A	2			Yes	Yes	Yes	Yes	60	0
		4			Yes	Yes	Yes	Yes		
		5			Yes	Yes				
		29			Yes	Yes				
CA_2A-4A-5A-30A	-	2			Yes	Yes	Yes	Yes	60	0
		4			Yes	Yes	Yes	Yes		
		5			Yes	Yes				
		30			Yes	Yes				
CA_2A-4A-5B-30A	-	2			Yes	Yes	Yes	Yes	70	0
		4			Yes	Yes	Yes	Yes		
		5	See CA_5B Bandwidth combination set 0 in Table 5.4.2A.1-1							
		30			Yes	Yes				
CA_2A-4A-7A-12A	-	2			Yes	Yes	Yes	Yes	70	0
		4			Yes	Yes	Yes	Yes		
		7			Yes	Yes	Yes	Yes		
		12			Yes	Yes				
CA_2A-4A-12A-30A	-	2			Yes	Yes	Yes	Yes	60	0
		4			Yes	Yes	Yes	Yes		
		12			Yes	Yes				
		30			Yes	Yes				
CA_2A-4A-29A-30A	-	2			Yes	Yes	Yes	Yes	60	0
		4			Yes	Yes	Yes	Yes		
		29			Yes	Yes				
		30			Yes	Yes				
CA_2A-5A-12A-66A	-	2			Yes	Yes	Yes	Yes	60	0
		5			Yes	Yes				
		12			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
	-	2			Yes	Yes	Yes	Yes	60	0

CA_2A-5A-30A-66A		5			Yes	Yes				
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_2A-5A-30A-66A-66A	-	2			Yes	Yes	Yes	Yes	80	0
		5			Yes	Yes				
		30			Yes	Yes				
		66	See CA_66A-66A Bandwidth Combination Set 3 in Table 5.4.2A.1-3							
CA_2A-5B-30A-66A	-	2			Yes	Yes	Yes	Yes	70	0
		5	See CA_5B Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_2A-12A-30A-66A	-	2			Yes	Yes	Yes	Yes	60	0
		12			Yes	Yes				
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_3A-7A-20A-42A	-	3			Yes	Yes	Yes	Yes	80	0
		7				Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_3A-19A-21A-42A	-	3			Yes	Yes	Yes	Yes	70	0
		19			Yes	Yes	Yes			
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_3A-28A-41A-42A	-	3			Yes	Yes	Yes	Yes	70	0
		28			Yes	Yes				
		41				Yes	Yes	Yes		
		42				Yes	Yes	Yes		
CA_3A-28A-41A-42C	-	3			Yes	Yes	Yes	Yes	90	0
		28			Yes	Yes				
		41				Yes	Yes	Yes		
		42	See CA_42C Bandwidth combination set 1 in Table 5.4.2A.1-1							
CA_3A-28A-41C-42A	-	3			Yes	Yes	Yes	Yes	90	0
		28			Yes	Yes				
		41	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1							
		42				Yes	Yes	Yes		

NOTE 1: The CA Configuration refers to a combination of an operating band and a CA bandwidth class specified in Table 5.4.2A -1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.
NOTE 2: For each band combination, all combinations of indicated bandwidths belong to the set.
NOTE 3: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal.
NOTE 4: A terminal which supports a DL CA configuration shall support all the lower order fallback DL CA combinations and it shall support at least one bandwidth combination set for each of the constituent lower order DL combinations containing all the bandwidths specified within each specific combination set of the upper order DL combination.
NOTE 5: Uplink CA configurations are the configurations supported by the present release of specifications.
NOTE 6: If the UE supports any uplink CA configuration for corresponding downlink CA configuration it shall support this uplink CA configuration.

Table 5.4.2A.1-2c: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA (five bands)

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	**Uplink CA configurations (NOTE 5)**	**E-UTRA Bands**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Maximum aggregated bandwidth [MHz]**	**Bandwidth combination set**
CA_1A-3A-7A-20A-42A	-	1			Yes	Yes	Yes	Yes	100	0
		3			Yes	Yes	Yes	Yes		
		7				Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		

NOTE 1: The CA Configuration refers to a combination of an operating band and a CA bandwidth class specified in Table 5.4.2A-1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.
NOTE 2: For each band combination, all combinations of indicated bandwidths belong to the set.
NOTE 3: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal.
NOTE 4: A terminal which supports a DL CA configuration shall support all the lower order fallback DL CA combinations and it shall support at least one bandwidth combination set for each of the constituent lower order DL combinations containing all the bandwidths specified within each specific combination set of the upper order DL combination.
NOTE 5: Uplink CA configurations are the configurations supported by the present release of specifications.
NOTE 6: If the UE supports uplink CA for corresponding downlink CA it shall support this uplink CA configuration.

Table 5.4.2A.1-3: E-UTRA CA configurations and bandwidth combination sets defined for non-contiguous intra-band CA (with two sub-blocks)

E-UTRA CA configuration / Bandwidth combination set								
E-UTRACA configuration	Uplink CA configurations (NOTE 1)	Component carriers in order of increasing carrier frequency					Maximum aggregated bandwidth [MHz]	Bandwidth combination set
		Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]		
CA_2A-2A	-	5, 10, 15, 20	5, 10, 15, 20				40	0
CA_3A-3A	-	5, 10, 15, 20	5, 10, 15, 20				40	0
		5, 10	5, 10, 15, 20				30	1
		5	3				10	2
		3, 5	5					
CA_4A-4A	CA_4A-4A	5, 10, 15, 20	5, 10, 15, 20				40	0
		5, 10	5, 10				20	1
CA_5A-5A	-	5,10	5,10				20	0
		3	5				8	1
CA_7A-7A	-	5	15				40	0
		10	10, 15					
		15	15, 20					
		20	20					
		5, 10, 15, 20	5, 10, 15, 20				40	1
		5, 10, 15, 20	5, 10				30	2
		10, 15, 20	10, 15, 20				40	3
CA_12A-12A	-	5	5				10	0
CA_23A-23A	-	5	10				15	0
CA_25A-25A	-	5, 10	5, 10				20	0
		5, 10, 15, 20	5, 10, 15, 20				40	1
CA_40A-40A	-	10, 20	10, 20				40	0
		10,15,20	10,15,20				40	1
CA_40A-40C	-	20	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1				60	0
		See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1		20				
CA_40C-40C	-	See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1		See CA_40C Bandwidth Combination Set 1 in Table 5.4.2A.1-1			80	0
CA_41A-41A	-	10, 15, 20	10, 15, 20				40	0
		5, 10, 15, 20	5, 10, 15, 20				40	1
CA_41A-41C	CA_41C	5, 10, 15, 20	See CA_41C Bandwidth Combination Set 1 in Table 5.4.2A.1-1				60	0
		See CA_41C Bandwidth Combination Set 1 in Table 5.4.2A.1-1		5, 10, 15, 20				
CA_41A-41D	CA_41C	5, 10, 15, 20	See CA_41D Bandwidth Combination Set 0 in Table 5.4.2A.1-1				80	0

		See CA_41D Bandwidth Combination Set 0 in Table 5.4.2A.1-1			5, 10, 15, 20			
CA_41C-41C	CA_41C	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1		See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1			80	0
CA_41C-41D	CA_41C	See CA_41C Bandwidth Combination Set 0 in Table 5.4.2A.1-1		See CA_41D Bandwidth Combination Set 0 in Table 5.4.2A.1-1			100	0
CA_42A-42A	-	5, 10, 15, 20	5, 10, 15, 20				40	0
CA_42A-42C	-	5, 10, 15, 20	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1				60	0
		See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1		5, 10, 15, 20				
CA_42A-42D	-	5, 10, 15, 20	See CA_42D Bandwidth Combination Set 0 in Table 5.4.2A.1-1				80	0
		See CA_42D Bandwidth Combination Set 0 in Table 5.4.2A.1-1			5, 10, 15, 20			
CA_42C-42C	-	See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1		See CA_42C Bandwidth Combination Set 0 in Table 5.4.2A.1-1			80	0
CA_46A-46A[2]	-	20	20				40	0
CA_46A-46C[2]	-	20	See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1				60	0
		See CA_46C Bandwidth Combination Set 0 in Table 5.4.2A.1-1		20				
CA_46A-46D[2]	-	20	See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1				80	0
		See CA_46D Bandwidth Combination Set 0 in Table 5.4.2A.1-1			20			
CA_48A-48A	-	5, 10, 15, 20	5, 10, 15, 20				40	0
CA_48A-48C	-	5, 10, 15, 20	See CA_48C Bandwidth Combination Set 0 in Table 5.4.2A.1-1				60	0
		See CA_48C Bandwidth Combination Set 0 in Table 5.4.2A.1-1		5, 10, 15, 20				
CA_48A-48D	-	5, 10, 15, 20	See CA_48D Bandwidth Combination Set 0 in Table 5.4.2A.1-1				80	0
		See CA_48D Bandwidth Combination Set 0 in Table 5.4.2A.1-1			5, 10, 15, 20			
CA_48C-48C	-	See CA_48C Bandwidth Combination Set 0 in Table 5.4.2A.1-1		See CA_48C Bandwidth Combination Set 0 in Table 5.4.2A.1-1			80	0
CA_48C-48D	-	See CA_48C Bandwidth Combination Set 0 in Table 5.4.2A.1-1		See CA_48D Bandwidth Combination Set 0 in Table 5.4.2A.1-1			100	0
		See CA_48D Bandwidth Combination Set 0 in Table 5.4.2A.1-1			See CA_48C Bandwidth Combination Set 0 in Table 5.4.2A.1-1			
CA_66A-66A	-	5, 10, 15, 20	5, 10, 15, 20				40	0
CA_66A-66B	-	5, 10, 15, 20	See CA_66B Bandwidth Combination Set 0 in Table 5.4.2A.1-1				40	0
		See CA_66B Bandwidth Combination Set 0 in Table 5.4.2A.1-1		5, 10, 15, 20				
CA_66A-66C	-	5, 10, 15, 20	See CA_66C Bandwidth Combination Set 0 in Table 5.4.2A.1-1				60	0

		See CA_66C Bandwidth Combination Set 0 in Table 5.4.2A.1-1	5, 10, 15, 20				

NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.
NOTE 2: Restricted to E-UTRA operation when inter-band carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Pcell.

5.4.2B Channel bandwidth for UL-MIMO

5.4.2B.1 Channel bandwidths per operating band for UL- MIMO

For UL-MIMO, the channel bandwidths specified in Table 5.4.2.1-1 in present document apply for the UL-MIMO operating bands.

5.4.2C Channel bandwidth for Dual Connectivity

For E-UTRA DC bands specified in 5.2C, the corresponding E-UTRA CA configurations in 5.4.A2.1, i.e., dual uplink inter-band carrier aggregation with uplink assigned to two E-UTRA bands, are applicable to Dual Connectivity.

NOTE 1: Requirements for the dual connectivity configurations are defined in the section corresponding E-UTRA uplink CA configurations, unless otherwise specified.

NOTE 2: For TDD inter-band dual connectivity configurations, requirements are applicable only for synchronous operation.

5.4.2D Channel bandwidth for ProSe

5.4.2D.1 Channel bandwidths per operating band for ProSe

The ProSe combination of channel bandwidths and operating bands is shown in Table 5.4.2D.1-1 and Table 5.4.2D.1-2. The transmission bandwidth configuration in Table 5.4.2D.1-1 and Table 5.4.2D.1-2 shall be supported for each of the specified channel bandwidths. The same (symmetrical) channel bandwidth is specified for both the TX and RX path.

Table 5.4.2D.1-1: ProSe Direct Discovery channel bandwidth

E-UTRA ProSe band / ProSe channel bandwidth						
E-UTRA ProSe Band	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
2			Yes	Yes	Yes	Yes
3			Yes	Yes	Yes	Yes
4			Yes	Yes	Yes	Yes
7			Yes	Yes	Yes	Yes
14			Yes	Yes		
20			Yes	Yes	Yes	Yes
26			Yes	Yes	Yes	
28			Yes	Yes	Yes	Yes
31			Yes			
41			Yes	Yes	Yes	Yes
68			Yes	Yes	Yes	

Table 5.4.2D.1-2: ProSe Direct Communication channel bandwidth

E-UTRA ProSe band / ProSe channel bandwidth						
E-UTRA ProSe Band	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
3				Yes		
7				Yes		
14				Yes		
20				Yes		
26				Yes		
28				Yes		
31			Yes			
68			Yes	Yes		

5.4.2F Channel bandwidth for category NB1

Channel bandwidth for category NB1is 200 kHz.

For category NB1, requirements in present document are specified for the channel bandwidth listed in Table 5.4.2F-1.

Table 5.4.2F-1: Transmission bandwidth configuration N_{RB}, $N_{tone\ 15kHz}$ and $N_{tone\ 3.75kHz}$ in NB1 channel bandwidth

Channel bandwidth $BW_{Channel}$ [kHz]	**200**
Transmission bandwidth configuration N_{RB}	1
Transmission bandwidth configuration $N_{tone\ 15kHz}$	12
Transmission bandwidth configuration $N_{tone\ 3.75kHz}$	48

Figure 5.4.2F-1 shows the relation between the NB-IoT channel bandwidth ($BW_{Channel}$) and the NB-IoT transmission bandwidth configuration (N_{tone}). The channel edges are defined as the lowest and highest frequencies of the carrier separated by the channel bandwidth, i.e. at F_C +/- $BW_{Channel}$ /2.

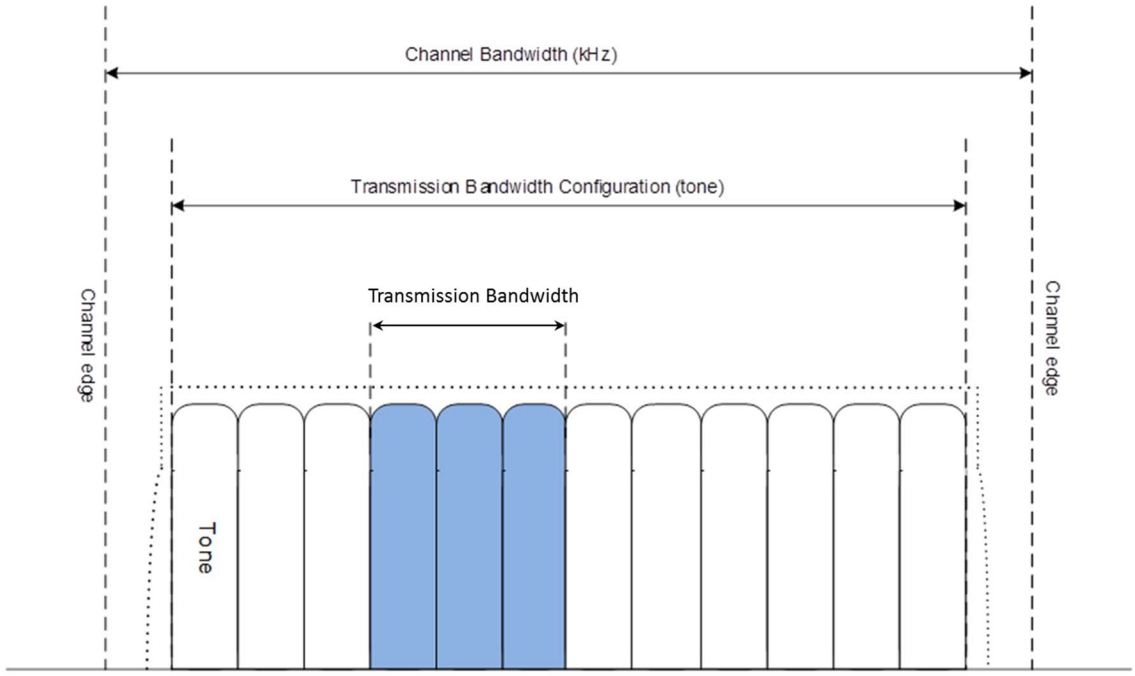


Figure 5.4.2F-1: Definition of Channel Bandwidth and Transmission Bandwidth configuration

5.4.2G Channel bandwidth for V2X Communication

5.4.2G.1 Channel bandwidths per operating band for V2X Communication

E-UTRA V2X Communication channel bandwidths and operating band is shown in Table 5.4.2G.1-1. The same (symmetrical) channel bandwidth is specified for both the TX and RX path.

Table 5.4.2G.1-1: V2X Communication channel bandwidth

E-UTRA V2X band / V2X channel bandwidth						
E-UTRA V2X Operating Band	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
47				Yes		Yes

For V2X inter-band con-current operation, the V2X Communication channel bandwidths for each operating band is specified in Table 5.4.2G.1-2.

Table 5.4.2G.1-2: Inter-band con-current V2X configurations and bandwidth combination sets

V2X con-current band Configuration	E-UTRA or V2X operating Bands	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Maximum bandwidth [MHz]	Bandwidth combination set
V2X_3A-47A	3	Yes	Yes	Yes	Yes	Yes	Yes	40	0
	47				Yes		Yes		
V2X_7A_47A	7			Yes	Yes	Yes	Yes	40	0
	47				Yes		Yes		
V2X_8A-47A	8	Yes	Yes	Yes	Yes			30	0
	47				Yes		Yes		
V2X_39A-47A	39			Yes	Yes	Yes	Yes	40	0
	47				Yes		Yes		
V2X_41A-47A	41			Yes	Yes	Yes	Yes	40	0
	47				Yes		Yes		

V2X Bandwidth Class is specified in Table 5.4.2G.1-3 for V2X intra-band contiguous multi-carrier operation.

Table 5.4.2G.1-3: V2X bandwidth classes and corresponding nominal guard bands

V2X Bandwidth Class	Aggregated Transmission Bandwidth Configuration	Number of contiguous CC	Nominal Guard Band BW_{GB}
A	$N_{RB,agg} \le 100$	1	$0.05\ BW_{Channel(1)} - 0.5\Delta f_1$
B	$25 < N_{RB,agg} \le 100$	2	$[0.05\ max(BW_{Channel(1)}, BW_{Channel(2)}) - 0.5\Delta f_1]$
C	$100 < N_{RB,agg} \le 200$	2	NOTE 3
D	$200 < N_{RB,agg} \le 300$	3	NOTE 3
E	$300 < N_{RB,agg} \le 400$	4	NOTE 3
F	$400 < N_{RB,agg} \le 500$	5	NOTE 3
I	$700 < N_{RB,agg} \le 800$	8	NOTE 3

NOTE 1: $BW_{Channel(j)}$, j = 1, 2, 3, 4 is the channel bandwidth of an E-UTRA component carrier according to Table 5.4.2.1-1 and $\Delta f_1 = \Delta f$ for the downlink with Δf the subcarrier spacing while $\Delta f_1 = 0$ for the uplink.
NOTE 2: Void
NOTE 3: Applicable for later releases.

For V2X intra-band multi-carrier operation, the V2X communication channel bandwidths for each operating band is specified in Table 5.4.2G.1-4.

Table 5.4.2G.1-4: V2X intra-band multi-carrier configurations

V2X multi-carrier band Configuration	V2X multi-carrier configuration / Bandwidth combination set						
	Component carriers in order of increasing carrier frequency					Maximum aggregated bandwidth [MHz]	Bandwidth combination set
	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]		
V2X_47B	10	10				20	0

5.4.3 Channel raster

The channel raster is 100 kHz for all bands, which means that the carrier centre frequency must be an integer multiple of 100 kHz.

5.4.3A Channel raster for CA

For carrier aggregation the channel raster is 100 kHz for all bands, which means that the carrier centre frequency must be an integer multiple of 100 kHz.

5.4.3F Channel raster for UE category NB1

Channel raster for NB-IoT in-band, guard-band and standalone operation is 100 kHz.

5.4.4 Carrier frequency and EARFCN

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 - 65535. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where F_{DL_low} and $N_{Offs-DL}$ are given in Table 5.4.4-1 and N_{DL} is the downlink EARFCN.

$$F_{DL} = F_{DL_low} + 0.1(N_{DL} - N_{Offs-DL})$$

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where F_{UL_low} and $N_{Offs-UL}$ are given in Table 5.4.4-1 and N_{UL} is the uplink EARFCN.

$$F_{UL} = F_{UL_low} + 0.1(N_{UL} - N_{Offs-UL})$$

Table 5.4.4-1: E-UTRA channel numbers

Band	Downlink			Uplink		
	F_{DL_low} (MHz)	$N_{Offs-DL}$	Range of N_{DL}	F_{UL_low} (MHz)	$N_{Offs-UL}$	Range of N_{UL}

1	2110	0	0 – 599	1920	18000	18000 – 18599
2	1930	600	600 – 1199	1850	18600	18600 – 19199
3	1805	1200	1200 – 1949	1710	19200	19200 – 19949
4	2110	1950	1950 – 2399	1710	19950	19950 – 20399
5	869	2400	2400 – 2649	824	20400	20400 – 20649
6	875	2650	2650 – 2749	830	20650	20650 – 20749
7	2620	2750	2750 – 3449	2500	20750	20750 – 21449
8	925	3450	3450 – 3799	880	21450	21450 – 21799
9	1844.9	3800	3800 – 4149	1749.9	21800	21800 – 22149
10	2110	4150	4150 – 4749	1710	22150	22150 – 22749
11	1475.9	4750	4750 – 4949	1427.9	22750	22750 – 22949
12	729	5010	5010 – 5179	699	23010	23010 – 23179
13	746	5180	5180 – 5279	777	23180	23180 – 23279
14	758	5280	5280 – 5379	788	23280	23280 – 23379
…						
17	734	5730	5730 – 5849	704	23730	23730 – 23849
18	860	5850	5850 – 5999	815	23850	23850 – 23999
19	875	6000	6000 – 6149	830	24000	24000 – 24149
20	791	6150	6150 – 6449	832	24150	24150 – 24449
21	1495.9	6450	6450 – 6599	1447.9	24450	24450 – 24599
22	3510	6600	6600 – 7399	3410	24600	24600 – 25399
23	2180	7500	7500 – 7699	2000	25500	25500 – 25699
24	1525	7700	7700 - 8039	1626.5	25700	25700 – 26039
25	1930	8040	8040 - 8689	1850	26040	26040 - 26689
26	859	8690	8690 - 9039	814	26690	26690 - 27039
27	852	9040	9040 – 9209	807	27040	27040 – 27209
28	758	9210	9210 – 9659	703	27210	27210 – 27659
29[2]	717	9660	9660 – 9769	N/A		
30	2350	9770	9770 – 9869	2305	27660	27660 – 27759
31	462.5	9870	9870 – 9919	452.5	27760	27760 – 27809
32[2]	1452	9920	9920 – 10359	N/A		
33	1900	36000	36000 –36199	1900	36000	36000 – 36199
34	2010	36200	36200 –36349	2010	36200	36200 – 36349
35	1850	36350	36350 –36949	1850	36350	36350 – 36949
36	1930	36950	36950 –37549	1930	36950	36950 – 37549
37	1910	37550	37550 –37749	1910	37550	37550 – 37749
38	2570	37750	37750 –38249	2570	37750	37750 – 38249
39	1880	38250	38250 –38649	1880	38250	38250 – 38649
40	2300	38650	38650 –39649	2300	38650	38650 – 39649
41	2496	39650	39650 - 41589	2496	39650	39650 - 41589
42	3400	41590	41590 – 43589	3400	41590	41590 – 43589
43	3600	43590	43590 – 45589	3600	43590	43590 – 45589
44	703	45590	45590 – 46589	703	45590	45590 – 46589
45	1447	46590	46590 – 46789	1447	46590	46590 – 46789
46[4]	5150	46790	46790 – 54539	5150	46790	46790 – 54539
47	5855	54540	54540 - 55239	5855	54540	54540 – 55239
…						
65	2110	65536	65536 – 66435	1920	131072	131072 – 131971
66[5]	2110	66436	66436 – 67335	1710	131972	131972 – 132671
67[2]	738	67336	67336 – 67535	N/A		
…						
69[2]	2570	67836	67836 - 68335	N/A		
70[6]	1995	68336	68336-68585	1695	132972	132972-133121

Note 1:	The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. This implies that the first 7, 15, 25, 50, 75 and 100 channel numbers at the lower operating band edge and the last 6, 14, 24, 49, 74 and 99 channel numbers at the upper operating band edge shall not be used for channel bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz respectively.
Note 2:	Restricted to E-UTRA operation when carrier aggregation is configured.
Note 3:	For ProSe and V2X the corresponding UL channel number are also specified for the DL for the associated ProSe/V2X operating bands i.e. ProSe_F_{UL} = F_{UL} and ProSe_F_{DL} = F_{UL}; V2X_F_{UL} = F_{DL} and V2X_F_{DL} = F_{UL}.
Note 4:	Requirements for uplink operations are not specified in this version of the specification.
Note 5:	The range 2180-2200 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured.
Note 6:	The range 2010-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 300 MHz The range 2005-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 295 MHz.

5.4.4F Carrier frequency and EARFCN for category NB1

The carrier frequency of category NB1 in the downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 – 262143 and the Offset of category NB1 Channel Number to EARFCN in the range {-10,-9,-8,-7,-6,-5,-4,-3,-2,-1,-0.5,0,1,2,3,4,5,6,7,8,9}. The relation between EARFCN, Offset of category NB1 Channel Number to EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where F_{DL} is the downlink carrier frequency of category NB1, F_{DL_low} and $N_{Offs\text{-}DL}$ are given in table 5.2-1, N_{DL} is the downlink EARFCN, M_{DL} is the Offset of category NB1 Channel Number to downlink EARFCN.

$$F_{DL} = F_{DL_low} + 0.1(N_{DL} - N_{Offs\text{-}DL}) + 0.0025*(2M_{DL}+1)$$

The carrier frequency of category NB1 in the uplink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 –262143 and the Offset of category NB1 Channel Number to EARFCN in the range {-10,-9,-8,-7,-6,-5,-4,-3,-2,-1,0,1,2,3,4,5,6,7,8,9}. The relation between EARFCN, Offset of category NB1 Channel Number to EARFCN and the carrier frequency in MHz for the uplink is given by the following equation, where F_{UL} is the uplink carrier frequency of category NB1, F_{UL_low} and $N_{Offs\text{-}UL}$ are given in table 5.2-1, N_{UL} is the uplink EARFCN, M_{UL} is the Offset of category NB1 Channel Number to uplink EARFCN.

$$F_{UL} = F_{UL_low} + 0.1(N_{UL} - N_{Offs\text{-}UL}) + 0.0025*(2M_{UL})$$

NOTE 1: For category NB1, N_{DL} or N_{UL} is different than the value of EARFCN that corresponds to E-UTRA downlink or uplink carrier frequency for in-band and guard band operation.

NOTE 2: For stand-alone operation, only M_{DL} = -0.5 and M_{UL}= 0 are applicable. M_{DL} = -0.5 is not applicable for in-band and guard band operation.

NOTE 3: For the carrier including NPSS/NSSS for in-band and guard band operation, MDL is selected from {-2,-1,0,1}.

6 Transmitter Characteristics

6.1 General

Unless otherwise stated, the transmitter characteristics are specified at the antenna connector of the UE with a single transmit antenna. For UE with integral antenna only, a reference antenna with a gain of 0 dBi is assumed.

The transient periods due to power steps, OFF/ON and ON/OFF transitions could occur at slot or symbol boundary with transients, on one or both sides of the boundary. The measurement period and whether to exclude the transient periods are specified in the respective sections below.

Unless otherwise stated, the Test Equipment shall be synchronised to the Uplink signal for measurement of TDD transmitter characteristics.

For CA tests, Cell ID = 0 applies to P-Cell, and Cell ID = 1 is used for S-Cell.

Parameters given in table 6.1-1 are used throughout this section for CA, unless otherwise stated by the test case.

Table 6.1-1: Common Test Parameters

Parameter	Value	Comments
Cross carrier scheduling	Not configured	

For CA testing, unless otherwise stated, the logical carriers PCC / SCCs are mapped to physical frequencies as defined in Table 6.1-2.

Table 6.1-2: PCC/SCCs frequency mapping

CA Configuration	PCC-SCC mapping	Notes
Intra-band contiguous CA	CC1-CC2 (Note 4) or CC2-CC1 (Note 5)	1
Inter-band CA (CA_x-y)	Bx-By and By-Bx	2, 3
Intra-band non-contiguous CA	CC2-CC1 (Note 4) or CC1-CC2 (Note 5)	1
Note 1: Notation CCi-CCj means PCC on component carrier CCi and SCC on component carrier CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous CA band in TS36.508 [7].		
Note 2: Notation Bi–Bj means PCC on component Band i and SCC on component Band j, with single Band i/j frequencies defined in TS36.508 [7].		
Note 3: Applicable for UE declared capability of UL support (within CA operation) in the individual bands. If UE does not support both PCC-SCC mappings, only the supported mapping is applicable.		
Note 4: Applicable for TDD CA and FDD CA bands with UL frequency < DL frequency.		
Note 5: Applicable for FDD CA bands with UL frequency > DL frequency.		

For testing of category 0 HD-FDD UE in FDD operating bands, the SS shall ensure downlink transmission is only configured in downlink subframes and that UL grants are given to ensure UE is transmitting only in uplink subframes throughout the test. The subframes reserved for uplink and downlink respectively are specified in the RMC definition in Annex A.2 for uplink and Annex A.3 for downlink.

For testing of category NB1 in all operation bands, standalone is used as default operation mode unless otherwise stated by the test case.

6.2 Transmit power

6.2.1 Void

Editor's note: This "void" section was introduced because TS 36.101 v8.1.0 also contains a "void" sub-clause within the transmit power clause 6.2, and there is a strong desire in RAN5 to keep the test cases clauses numbering matching their specific core requirements as much as possible.

6.2.2 UE Maximum Output Power

Editor’s notes: The test applicability of Maximum Output Power for Band 47 is need to be checked.

6.2.2.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.2.2 Test applicability

This test case applies to all types of E-UTRA Power Class 3 UE release 8 and forward.

6.2.2.3 Minimum conformance requirements

The following UE Power Classes defines the maximum output power for any transmission bandwidth within the channel bandwidth. The period of measurement shall be at least one sub frame (1ms).

Table 6.2.2.3-1: UE Power Class

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
1					23	±2		
2					23	±2[2]		
3					23	±2[2]		
4					23	±2		
5					23	±2		
6					23	±2		
7					23	±2[2]		
8					23	±2[2]		
9					23	±2		
10					23	±2		
11					23	±2		
12					23	±2[2]		
13					23	±2		
14					23	±2		
…								
17					23	±2		
18					23	±2[6]		
19					23	±2		
20					23	±2[2]		
21					23	±2		
22					23	+2/-3.5[2]		
23					23[5]	±2[5]		
24					23	±2		
25					23	±2[2]		
26					23	±2[2]		
27					23	±2		
28					23	+2/-2.5		
30					23	±2		
31					23	±2		
...								
33					23	±2		
34					23	±2		
35					23	±2		
36					23	±2		
37					23	±2		
38					23	±2		
39					23	±2		
40					23	±2		
41					23	±2[2]		
42					23	+2/-3		
43					23	+2/-3		
44					23	+2/[-3]		
45					23	±2		
47					23	±2		
48					23	+2/-3		
…								
65					23	±2		
66					23	±2		
…								
70					23	±2		

Note 1: Void
Note 2: For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB
Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance
Note 4: For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS.
Note 5: When NS_20 is signalled, the total output power within 2000-2005 MHz shall be limited to 7 dBm.
Note 6: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5dB for transmission bandwidths confined within 815 MHz and 818 MHz

The normative reference for this requirement is TS 36.101 clause 6.2.2.

6.2.2.4 Test description

6.2.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Max UE output power testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
1.4MHz		QPSK	5	5
3MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	1	1
5MHz		QPSK	8	8
10MHz		QPSK	1	1
10MHz		QPSK	12	12
15MHz		QPSK	1	1
15MHz		QPSK	16	16
20MHz		QPSK	1	1
20MHz		QPSK	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: For E-UTRA bands not applied with Note 2 in Table 6.2.2.3-1:
- The 1 RB allocation shall be tested at RB#0 for low and mid range, RB #max for high range test frequency.
- The RBstart of non-1RB allocation shall be RB #0 for low and mid range, RB# (max +1 - RB allocation) for high range test frequency.

Note 3: For E-UTRA bands applied with Note 2 in Table 6.2.2.3-1:
- If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max.
- If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0.
- If the test channel bandwidth = (FUL_high - FUL_low) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB #$\left\lceil N_{\mathrm{RB}}^{\mathrm{UL}} / 2 \right\rceil$ and RB #max.
- For non-1RB allocation, test frequency is middle range, and the RBstart shall be RB #0.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.2.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RFaccording to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.2.4.3.

6.2.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.2.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2.5-1.

Table 6.2.2.5-1: UE Power Class test requirements

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
1					23	±2.7		
2					23	±2.7[2]		
3					23	±2.7[2]		
4					23	±2.7		
5					23	±2.7		
6					23	±2.7		
7					23	±2.7[2]		
8					23	±2.7[2]		
9					23	±2.7		
10					23	±2.7		
11					23	±2.7		
12					23	±2.7[2]		
13					23	±2.7		
14					23	±2.7		
…								
17					23	±2.7		
18					23	±2.7[6]		
19					23	±2.7		
20					23	±2.7[2]		
21					23	±2.7		
22					23	+3.0/-4.5[2]		
23					23[5]	±2.7[5]		
24					23	±2.7		
25					23	±2.7[2]		
26					23	±2.7[2]		
27					23	±2.7		
28					23	+2.7/-3.2		
30					23	±2.7		
31					23	±2.7		
...								
33					23	±2.7		
34					23	±2.7		
35					23	±2.7		
36					23	±2.7		
37					23	±2.7		
38					23	±2.7		
39					23	±2.7		
40					23	±2.7		
41					23	±2.7[2]		
42					23	+3.0/-4.0		
43					23	+3.0/-4.0		
44					23	+2.7/[-3.7]		
45					23	±2.7		
47					23	±2.7		
…								
65					23	+2.7/-2.7		
66					23	+2.7/-2.7		
…								
70					23	+2.7/-2.7		

Note 1: Void
Note 2: For transmission bandwidths (Figure 5.4.2-1, Table 5.4.4-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB
Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance.
Note 4: For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS.
Note 5: When NS_20 is signalled, the total output power within 2000-2005 MHz shall be limited to 7 dBm.
Note 6: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5dB for transmission bandwidths confined within 815 MHz and 818 MHz.

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

6.2.2_1 Maximum Output Power for HPUE

6.2.2_1.1 Test purpose

Same test purpose as in clause 6.2.2.1.

6.2.2_1.2 Test applicability

This test case applies to all types of E-UTRA UE Power Class 1 or Power Class 2 release 10 and forward.

6.2.2_1.3 Minimum conformance requirements

The following defines the maximum output power for any transmission bandwidth within the channel bandwidth for Power Class 1 and Power Class 2 UE. The period of measurement shall be at least one sub frame (1ms).

Table 6.2.2_1.3-1: HPUE Power Class

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
14	31	+2/-3[1]	N/A	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	26	±2[2]	N/A	N/A	N/A	N/A
Note 1: The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS Note 2: For transmission bandwidths (Figure 5.4.2-1, Table 5.4.4-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB Note 3: N/A Note 4: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance Note 5-6: N/A								

For a power class 2 capable UE operating on Band 41, when an IE *P-max* as defined in [5] of 23 dBm or lower is indicated in the cell or if the TDD frame configuration is 0 or 6, the requirements for power class 2 are not applicable, and the corresponding requirements for a power class 3 UE shall apply.

The normative reference for this requirement is TS 36.101 clause 6.2.2.

6.2.2_1.4 Test description

Same test description as in clause 6.2.2.4 with the following exceptions:

- Instead of Table 6.2.2.4.1-1→ use Table 6.2.2_1.4-1

Table 6.2.2_1.4-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Max UE output power testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
1.4MHz		QPSK	5	5
3MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	1	1
5MHz		QPSK	8	8
10MHz		QPSK	1	1
10MHz		QPSK	12	12
15MHz		QPSK	1	1
15MHz		QPSK	16	16
20MHz		QPSK	1	1
20MHz		QPSK	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: For E-UTRA bands not applied with Note 2 in Table 6.2.2_1.3-1:
The 1 RB allocation shall be tested at RB#0 for low and mid range, RB #max for high range test frequency.
The RBstart of non-1RB allocation shall be RB #0 for low and mid range, RB# (max +1 - RB allocation) for high range test frequency.

Note 3: For E-UTRA bands applied with Note 2 in Table 6.2.2_1.3-1:
- If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max.
- If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0.
- If the test channel bandwidth = (FUL_high - FUL_low) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB #$\left\lceil N_{\mathrm{RB}}^{\mathrm{UL}} / 2 \right\rceil$ and RB #max.
- For non-1RB allocation, test frequency is middle range, and the RBstart shall be RB #0.

- Message contents are according to TS 36.508 [7] subclause 4.4.3.2 with the following exceptions:

Table 6.2.2_1.4-2: SystemInformationBlockType1: Test point 1

Derivation Path: 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-1 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	31 dBm 26 dBm	for Power Class 1 for Power Class 2 See Table 6.2.2_1.3-1	

6.2.2_1.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2_1.5-1

Table 6.2.2_1.5-1: HPUE Power Class test requirements

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
14	31	+2.7/-3.7[1]	N/A	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	26	±2.7[2]	N/A	N/A	N/A	N/A
Note 1: The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS Note 2: For transmission bandwidths (Figure 5.4.2-1, Table 5.4.4-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.								

6.2.2A UE Maximum Output Power for CA

6.2.2A.0 Minimum conformance requirements

The following UE Power Classes define the maximum output power for any transmission bandwidth within the aggregated channel bandwidth.

The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1ms).

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the requirements in subclause 6.2.2 apply.

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, UE maximum output power shall be measured over all component carriers from different bands. If each band has separate antenna connectors, maximum output power is measured as the sum of maximum output power at each UE antenna connector. The maximum output power is specified in Table 6.2.2A.0-1.

Table 6.2.2A.0-1: UE Power Class for uplink interband CA (two bands)

E-UTRA CA Configuration	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
CA_1A-3A					23	+2/-3[2]		
CA_1A-5A					23	+2/-3		
CA_1A-7A					23	+2/-3[2]		
CA_1A-8A					23	+2/-3[2]		
CA_1A-18A					23	+2/-3[5]		
CA_1A-19A					23	+2/-3		
CA_1A-21A					23	+2/-3		
CA_1A-26A					23	+2/-3[2]		
CA_1A-28A					23	+2/-3		
CA_1A-42A					23	+2/-3		
CA_2A-4A					23	+2/-3[2]		
CA_2A-5A					23	+2/-3[2]		
CA_2A-7A					23	+2/-3[2]		
CA_2A-12A					23	+2/-3[2]		
CA_2A-13A					23	+2/-3[2]		
CA_2A-46A					23	+2/-3		
CA_2A-30A					23	+2/-3[2]		
CA_2A-66A					23	+2/-3[2]		
CA_3A-5A					23	+2/-3[2]		
CA_3A-7A					23	+2/-3[2]		
CA_3A-8A					23	+2/-3[2]		
CA_3A-19A					23	+2/-3[2]		
CA_3A-20A					23	+2/-3[2]		
CA_3A-26A					23	+2/-3[2]		
CA_4A-5A					23	+2/-3		
CA_4A-7A					23	+2/-3[2]		
CA_4A-12A					23	+2/-3[2]		
CA_4A-13A					23	+2/-3		
CA_4A-17A					23	+2/-3		
CA_5A-7A					23	+2/-3[2]		
CA_5A-12A					23	+2/-3[2]		
CA_5A-17A					23	+2/-3		
CA_5A-30A					23	+2/-3[2]		
CA_5A-66A					23	+2/-3[2]		
CA_7A-20A					23	+2/-3[2]		
CA_7A-28A					23	+2/-3[2]		
CA_12A-30A					23	+2/-3		
CA_18A-28A					23	+2/-3		
CA_19A-21A					23	+2/-3		
CA 39A-41A					23	+2/-3[2]		
CA_39A-41C					23	+2/-3[2]		
CA_39C-41A					23	+2/-3[2]		
CA_41A-42A					23	+2/-3[2]		

NOTE 1: Void.
NOTE 2: [2] refers to the transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.
NOTE 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance.
NOTE 4: For inter-band carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).
NOTE 5: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB for transmission bandwidths confined within 815 MHz and 818 MHz.

For intra-band contiguous carrier aggregation the maximum output power is specified in Table 6.2.2A.0-2.

Table 6.2.2A.0-2: CA UE Power Class for intraband contiguous CA

E-UTRA CA Configuration	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
CA_1C					23	+2/-2		
CA_3C					23	+2/-2[2]		
CA_7C					23	+2/-2[2]		
CA_8B					23	+2/-2[2]		
CA_38C					23	+2/-2		
CA_39C					23	+2/-2		
CA_40C					23	+2/-2		
CA_40D					23	+2/-2		
CA_41C					23	+2/-2[2]		
CA_42C					23	+2/-3		

Note 1: Void
Note 2: For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB
Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance
Note 4: For intra-band contiguous carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).

For intra-band non-contiguous carrier aggregation with one uplink carrier on the PCC, the requirements in subclause 6.2.2 apply.

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.2A.

6.2.2A.1 UE Maximum Output Power for CA (intra-band contiguous DL CA and UL CA)

6.2.2A.1.1 Test purpose

To verify that the error of UE maximum output power in intra-band contiguous carrier aggregation does not exceed the range prescribed by the specified CA Power Class and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.2A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.2.2A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2.2A.0.

6.2.2A.1.4 Test description

6.2.2A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.2.2A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.2A.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low and High range					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50	N/Afor this test	QPSK	1	P_1@0	S_0@0	-	-
25	50		QPSK	8	P_8@0	S_0@0	-	-
50	50		QPSK	1	P_1@0	S_0@0	-	-
50	50		QPSK	12	P_12@0	S_0@0	-	-
100	25		QPSK	1	P_1@0	S_0@0		
100	25		QPSK	8	P_8@0	S_0@0		
75	75		QPSK	1	P_1@0	S_0@0	-	-
75	75		QPSK	16	P_16@0	S_0@0	-	-
100	50		QPSK	1	P_1@0	S_0@0	-	-
100	50		QPSK	12	P_12@0	S_0@0	-	-
100	75		QPSK	1	P_1@0	S_0@0		
100	75		QPSK	16	P_16@0	S_0@0		
100	100		QPSK	1	P_1@0	S_0@0	-	-
100	100		QPSK	18	P_18@0	S_0@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.2A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.2A.1.4.3.

6.2.2A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.2A.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.2A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.

6. Measure the mean transmitted power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.2A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.2.2A.1.5 Test Requirements

The maximum output power for the CA configuration, derived in step 6 shall be within the range prescribed by the CA UE Power Class and tolerance in Table 6.2.2A.1.5-1.

Table 6.2.2A.1.5-1: CA UE Power Class test requirements

CA Conf	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
CA_1C					23	±2.7		
CA_3C					23	±2.7[2]		
CA_7C					23	±2.7[2]		
CA_8B					23	±2.7[2]		
CA_38C					23	±2.7		
CA_39C					23	±2.7		
CA_40C					23	±2.7		
CA_41C					23	±2.7[2]		
CA_42C					23	+3.0/-4.0		

Note 1: Void
Note 2: For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB
Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance
Note 4: For intra-band contiguous carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).
Note 5: Lower limit is assuming $\Delta T_{C,c}$ and $\Delta T_{IB,c}$ are zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is $\leq$ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

6.2.2A.2 UE Maximum Output Power for CA (inter-band DL CA and UL CA)

6.2.2A.2.1 Test purpose

Same as in clause 6.2.2A.1.1, but for the inter-band carrier aggregation case.

6.2.2A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

This test case also applies to all types of E-UTRA UE release 14 and forward that support eLAA.

6.2.2A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2.2A.0.

6.2.2A.2.4 Test description

6.2.2A.2.4.1 Initial conditions

Same as in clause 6.2.2A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.2.2A.1.4.1-1→ use Table 6.2.2A.2.4.1-1.
- Instead of clause 6.2.2A.1.4.3 use clause 6.2.2A.2.4.3.

Table 6.2.2A.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Low range for PCC and SCC High range for PCC and SCC (Note 3)						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/Afor this test	QPSK	2	P_1@0	S_1@0	-	-
6	25		QPSK	2	P_1@5	S_1@24	-	-
6	25		QPSK	13	P_5@0	S_8@0	-	-
6	25		QPSK	13	P_5@1	S_8@17	-	-
6	50		QPSK	2	P_1@0	S_1@0	-	-
6	50		QPSK	2	P_1@5	S_1@49	-	-
6	50		QPSK	17	P_5@0	S_12@0	-	-
6	50		QPSK	17	P_5@1	S_12@38	-	-
25	15		QPSK	2	P_1@0	S_1@0	-	-
25	15		QPSK	2	P_1@24	S_1@14	-	-
25	15		QPSK	12	P_8@0	S_5@0	-	-
25	15		QPSK	12	P_8@17	S_5@10	-	-
25	25		QPSK	2	P_1@0	S_1@0	-	-
25	25		QPSK	2	P_1@24	S_1@24	-	-
25	25		QPSK	16	P_8@0	S_8@0	-	-
25	25		QPSK	16	P_8@17	S_8@17	-	-
25	50		QPSK	2	P_1@0	S_1@0	-	-
25	50		QPSK	2	P_1@24	S_1@49	-	-
25	50		QPSK	20	P_8@0	S_12@0	-	-
25	50		QPSK	20	P_8@17	S_12@38	-	-
50	25		QPSK	2	P_1@0	S_1@0	-	-
50	25		QPSK	2	P_1@49	S_1@24	-	-
50	25		QPSK	8	P_12@0	S_8@0	-	-
50	25		QPSK	8	P_12@38	S_8@17	-	-
50	50		QPSK	2	P_1@0	S_1@0	-	-
50	50		QPSK	2	P_1@49	S_1@49	-	-
50	50		QPSK	24	P_12@0	S_12@0	-	-
50	50		QPSK	24	P_12@38	S_12@38	-	-
50	100		QPSK	2	P_1@0	S_1@0	-	-
50	100		QPSK	2	P_1@49	S_1@99	-	-
50	100		QPSK	30	P_12@0	S_18@0	-	-

50	100		QPSK	30	P_12@38	S_18@82	-	-
75	75		QPSK	2	P_1@0	S_1@0	-	-
75	75		QPSK	2	P_1@74	S_1@74	-	-
75	75		QPSK	32	P_16@0	S_16@0	-	-
75	75		QPSK	32	P_16@59	S_16@59	-	-
100	50		QPSK	2	P_1@0	S_1@0	-	-
100	50		QPSK	2	P_1@99	S_1@49	-	-
100	50		QPSK	30	P_18@0	S_12@0	-	-
100	50		QPSK	30	P_18@82	S_12@38	-	-
100	75		QPSK	2	P_1@0	S_1@0	-	-
100	75		QPSK	2	P_1@99	S_1@74	-	-
100	75		QPSK	34	P_18@0	S_16@0	-	-
100	75		QPSK	34	P_18@82	S_16@59	-	-
100	100		QPSK	2	P_1@0	S_1@0	-	-
100	100		QPSK	2	P_1@99	S_1@99	-	-
100	100		QPSK	36	P_18@0	S_18@0	-	-
100	100		QPSK	36	P_18@82	S_18@82	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.								
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								
Note 3: For Low range use only test points with RBstart=0. For High range use only test points with RBstart=RBmax-LCRB+1.								
Note 4: No additional test points need to be tested for LAA Scell configured in Band 46 since all the test configurations require MPR.								

6.2.2A.2.4.2 Test procedure

Same as in clause 6.2.2A.1.4.2 with the following exceptions:

- Instead of Table 6.2.2A.1.4.1-1→ use Table 6.2.2A.2.4.1-1.
- Instead of clause 6.2.2A.1.4.3 use clause 6.2.2A.2.4.3.

6.2.2A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.2.2A.2.5 Test Requirements

The maximum output power for the CA configuration, derived in step 6 shall be within the range prescribed by the CA UE Power Class and tolerance in Table 6.2.2A.2.5-1.

Table 6.2.2A.2.5-1: UE Power Class for dual uplink interband CA test requirements

E-UTRA CA Configuration	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
CA_1A-3A					23	+2.7/-3.7[2]		
CA_1A-5A					23	+2.7/-3.7		
CA_1A-7A					23	+2.7/-3.7[2]		
CA_1A-8A					23	+2.7/-3.7[2]		
CA_1A-18A					23	+2.7/-3.7[5]		
CA_1A-19A					23	+2.7/-3.7		
CA_1A-21A					23	+2.7/-3.7		
CA_1A-26A					23	+2.7/-3.7[2]		
CA_1A-28A					23	+2.7/-3.7		
CA_1A-42A					23	+3.0/-4.0		
CA_2A-4A					23	+2.7/-3.7[2]		
CA_2A-5A					23	+2.7/-3.7[2]		
CA_2A-7A					23	+2.7/-3.7[2]		
CA_2A-12A					23	+2.7/-3.7[2]		
CA_2A-13A					23	+2.7/-3.7[2]		
CA_2A-46A					23	+2.7/-3.7[2]		
CA_2A-30A					23	+2.7/-3.7[2]		
CA_2A-66A					23	+2.7/-3.7[2]		
CA_3A-5A					23	+2.7/-3.7[2]		
CA_3A-7A					23	+2.7/-3.7[2]		
CA_3A-8A					23	+2.7/-3.7[2]		
CA_3A-19A					23	+2.7/-3.7[2]		
CA_3A-20A					23	+2.7/-3.7[2]		
CA_3A-26A					23	+2.7/-3.7[2]		
CA_4A-5A					23	+2.7/-3.7		
CA_4A-7A					23	+2.7/-3.7[2]		
CA_4A-12A					23	+2.7/-3.7[2]		
CA_4A-13A					23	+2.7/-3.7		
CA_4A-17A					23	+2/.7-3.7		
CA_5A-7A					23	+2.7/-3.7[2]		
CA_5A-12A					23	+2.7/-3.7[2]		
CA_5A-17A					23	+2.7/-3.7		
CA_5A-30A					23	+2.7/-3.7[2]		
CA_5A-66A					23	+2.7/-3.7[2]		
CA_7A-20A					23	+2.7/-3.7[2]		
CA_7A-28A					23	+2.7/-3.7[2]		
CA_12A-30A					23	+2.7/-3.7		
CA_18A-28A					23	+2.7/-3.7		
CA_19A-21A					23	+2.7/-3.7		
CA 39A-41A					23	+2.7/-3.7[2]		
CA_41A-42A					23	+3.0/-4.0[2]		

NOTE 1: Void.
NOTE 2: [2] refers to the transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.
NOTE 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance.
NOTE 4: For inter-band carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).
NOTE 5: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB for transmission bandwidths confined within 815 MHz and 818 MHz.

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Table 6.2.5.3-2 shall be applied for applicable bands. For the UE which supports an inter-band carrier aggregation configuration from Table 6.2.5.3-3 the $\Delta T_{IB,c}$ in Table 6.2.5.3-3 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is $\leq$ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the

supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

In case the UE supports more than one of the inter-band carrier aggregation configurations from Table 6.2.5.3-3 and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 3DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 3DL carrier aggregation configurations involving such band shall be applied.

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 3DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 3DL CA configurations.

6.2.2A.3 UE Maximum Output Power for CA (intra-band non-contiguous DL CA and UL CA)

NOTE: No test case details specified as the UE power class requirements (MPR=0dB) cannot be verified for the intra-band non-contiguous UL CA case due to the MPR is always bigger than 0 dB in current non-contiguous Uplink CA configurations according to Table 5.4.2A.1-3.

6.2.2A.4 UE Maximum Output Power for CA (3UL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

-Test Configuration Table is incomplete

-The test applicability is incomplete

-The test applicability needs to be added to TS36.521-2

6.2.2A.4.1 Test purpose

To verify that the error of UE maximum output power in three uplink carrier aggregation does not exceed the range prescribed by the specified CA Power Class and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.2A.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support intra-band contiguous or inter-band and 3UL CA.

6.2.2A.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2.2A.0.

6.2.2A.4.4 Test description

6.2.2A.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be set up and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test

parameters for each CA Configuration, and are shown in table 6.2.2A.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.2A.4.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low and High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}			**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**		**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
TBD	TBD	TBD	N/Afor this test	TBD	TBD	TBD	TBD	TBD	-
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 and 5.4.2A.1-2 Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list. Note 3: For Low range use only test points with RBstart=0. For High range use only test points with RBstart=RBmax-LCRB+1.									

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.55 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.2A.4.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.2A.4.4.3.

6.2.2A.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.2A.4.4.3.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.2A.4.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.

6. Measure the mean transmitted power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.2A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

6.2.2A.4.5 Test Requirements

The maximum output power for the CA configuration, derived in step 6 shall be within the range prescribed by the CA UE Power Class and tolerance in Table 6.2.2A.4.5-1 for Intra band 3UL CA configuration and Table 6.2.2A.4.5-2 for inter band 3 UL CA configuration.

Table 6.2.2A.4.5-1: CA UE Power Class test for intra band 3UL CA test requirements

E-UTRA CA Conf	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
CA_40D					23	±2.7		
Note 1: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance Note 2: For intra-band contiguous carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE). Note 3: Lower limit is assuming $\Delta T_{C,c}$ and $\Delta T_{IB,c}$ are zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.								

Table 6.2.2A.4.5-2: UE Power Class for inter band 3UL CA test requirements

E-UTRA CA Configuration	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
CA_39A-41C					23	+2.7/-3.7[1]		
CA_39C-41A					23	+2.7/-3.7[1]		
NOTE 1: Refers to the transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB. NOTE 2: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance. NOTE 3: For inter-band carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).								

For the UE which supports intra-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above intra band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Table 6.2.5.3-2 shall be applied for applicable bands. For the UE which supports an inter-band carrier aggregation configuration from Table 6.2.5.3-3 the $\Delta T_{IB,c}$ in Table 6.2.5.3-3 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

In case the UE supports more than one of the inter-band carrier aggregation configurations from Table 6.2.5.3-3 and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 3DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 3DL carrier aggregation configurations involving such band shall be applied.

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 3DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 3DL CA configurations.

6.2.2A.4.1 Void

6.2.2A.4.2 Void

6.2.2B UE Maximum Output Power for UL-MIMO

6.2.2B.1 Test purpose

To verify that the error of UE maximum output power in UL MIMO does not exceed the range prescribed by the specified UL MIMO Power Class and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.2B.2 Test applicability

This test case applies to all types of E-UTRA Power Class 3 UE release 10 and forward that support UL MIMO.

6.2.2B.3 Minimum conformance requirements

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power for any transmission bandwidth within the channel bandwidth is specified in Table 6.2.2B.3-1 with the UL-MIMO configurations specified in Table 6.2.2B.3-2. The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1ms).

Table 6.2.2B.3-1: UE Power Class for UL-MIMO in closed loop spatial multiplexing scheme

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
1					23	+2/-3		
2					23	+2/-3[2]		
3					23	+2/-3[2]		
4					23	+2/-3		
5					23	+2/-3		
6					23	+2/-3		
7					23	+2/-3[2]		
8					23	+2/-3[2]		
9					23	+2/-3		
10					23	+2/-3		
11					23	+2/-3		
12					23	+2/-3[2]		
13					23	+2/-3		
14					23	+2/-3		
…								
17					23	+2/-3		
18					23	+2/-3		
19					23	+2/-3		
20					23	+2/-3[2]		
21					23	+2/-3		
22					23	+2/-4.5[2]		
23					23	+2/-3		
24					23	+2/-3		
25					23	+2/-3[2]		
26					23	+2/-3[2]		
27					23	+2/-3		
28					23	+2/[-3]		
30					23	+2/-3		
31					23	+2/-3		
…								
33					23	+2/-3		
34					23	+2/-3		
35					23	+2/-3		
36					23	+2/-3		
37					23	+2/-3		
38					23	+2/-3		
39					23	+2/-3		
40					23	+2/-3		
41					23	+2/-3[2]		
42					23	+2/-4		
43					23	+2/-4		
44					23	+2/[-3]		
45					23	+2/-3		
…								
48					23	+2/-3		
…								
65					23	+2/-3		
66					23	+2/-3		
…								
70					23	+2/-3		

Note 1: Void
Note 2: For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB
Note 3: For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS.
Note 4: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance

Table 6.2.2B.3-2: UL-MIMO configuration in closed-loop spatial multiplexing scheme

Transmission mode	DCI format	Codebook Index
Mode 2	DCI format 4	Codebook index 0

The normative reference for this requirement is TS 36.101 clause 6.2.2B.

6.2.2B.4 Test description

6.2.2B.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.2B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.2B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Max UE output power testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
1.4MHz		QPSK	5	5
3MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	1	1
5MHz		QPSK	8	8
10MHz		QPSK	1	1
10MHz		QPSK	12	12
15MHz		QPSK	1	1
15MHz		QPSK	16	16
20MHz		QPSK	1	1
20MHz		QPSK	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: For E-UTRA bands not applied with Note 2 in Table 6.2.2B.3-1:
- The 1 RB allocation shall be tested at RB#0 for low and mid range, RB #max for high range test frequency.
- The starting resource block of non-1RB allocation shall be RB #0 for low and mid range, RB# (max +1 - RB allocation) for high range test frequency.

Note 3: For E-UTRA bands applied with Note 2 in Table 6.2.2B.3-1:
- If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max.
- If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0.
- If the test channel bandwidth = (F_{UL_high} - F_{UL_low}) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB #$\left\lceil N_{RB}^{UL}/2 \right\rceil$ and RB #max.
- For non-1RB allocation, test frequency is middle range, and the starting resource block shall be RB #0.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.2B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RFaccording to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.2B.4.3.

6.2.2B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.2.2B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.
3. Measure the mean sum power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.2B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

6.2.2B.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2B.5-1.

Table 6.2.2B.5-1: UE Power Class for UL-MIMO in closed loop spatial multiplexing scheme

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
1					23	+2.7/-3.7		
2					23	+2.7/-3.7[2]		
3					23	+2.7/-3.7[2]		
4					23	+2.7/-3.7		
5					23	+2.7/-3.7		
6					23	+2.7/-3.7		
7					23	+2.7/-3.7[2]		
8					23	+2.7/-3.7[2]		
9					23	+2.7/-3.7		
10					23	+2.7/-3.7		
11					23	+2.7/-3.7		
12					23	+2.7/-3.7[2]		
13					23	+2.7/-3.7		
14					23	+2.7/-3.7		
…								
17					23	+2.7/-3.7		
18					23	+2.7/-3.7		
19					23	+2.7/-3.7		
20					23	+2.7/-3.7[2]		
21					23	+2.7/-3.7		
22					23	+3/-5.5[2]		
23					23	+2.7/-3.7		
24					23	+2.7/-3.7		
25					23	+2.7/-3.7[2]		
26					23	+2.7/-3.7		
27					23	+2.7/-3.7		
28					23	+2.7/[-3.7]		
30					23	+2.7/-3.7		
31					23	+2.7/-3.7		
…								
33					23	+2.7/-3.7		
34					23	+2.7/-3.7		
35					23	+2.7/-3.7		
36					23	+2.7/-3.7		
37					23	+2.7/-3.7		
38					23	+2.7/-3.7		
39					23	+2.7/-3.7		
40					23	+2.7/-3.7		
41					23	+2.7/-3.7[2]		
42					23	+3/-5		
43					23	+3/-5		
44					23	+2.7/[-3.7]		
45					23	+2.7/-3.7		
…								
65					23	+2.7/-3.7		
66					23	+2/-3		
…								
70					23	+2.7/-3.7		

Note 1: Void
Note 2: For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB
Note 3: For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS.
Note 4: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

6.2.2B_1HPUE Maximum Output Power for UL-MIMO

6.2.2B_1.1 Test purpose

Same test purpose as in clause 6.2.2B.1.

6.2.2B_1.2 Test applicability

This test case applies to all types of E-UTRA Power Class 2 UE release 10 and forward that support UL MIMO.

6.2.2B_1.3 Minimum conformance requirements

For Power Class 2 UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power for any transmission bandwidth within the channel bandwidth is specified in Table 6.2.2B_1.3-1 with the UL-MIMO configurations specified in Table 6.2.2B.3-2. The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1ms).

Table 6.2.2B_1.3-1: Power Class for UL-MIMO in closed loop spatial multiplexing scheme for Power Class 2

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
41			26	+2/-3[2]				
Note 1: Void Note 2: For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance								

For a power class 2 capable UE operating on Band 41, when an IE *P-max* as defined in [5] of 23 dBm or lower is indicated in the cell or if the TDD frame configuration is 0 or 6, the requirements for power class 2 are not applicable and the corresponding requirements for a power class 3 UE shall apply.

The normative reference for this requirement is TS 36.101 clause 6.2.2B.

6.2.2B_1.4 Test description

Same test description as in clause 6.2.2B.4 with the following exception:

- Instead of Table 6.2.2B.4.1-1→ use Table 6.2.2B_1.4.1-1

Table 6.2.2B_1.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest				
Test Parameters for Channel Bandwidths					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for Max UE output power testing	Mod'n	RB allocation		
			FDD	TDD	
1.4MHz		QPSK	1	1	
1.4MHz		QPSK	5	5	
3MHz		QPSK	1	1	
3MHz		QPSK	4	4	
5MHz		QPSK	1	1	
5MHz		QPSK	8	8	
10MHz		QPSK	1	1	
10MHz		QPSK	12	12	
15MHz		QPSK	1	1	
15MHz		QPSK	16	16	
20MHz		QPSK	1	1	
20MHz		QPSK	18	18	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max. - If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0. - If the test channel bandwidth = (FUL_high - FUL_low) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB # $\lceil N_{\mathrm{RB}}^{\mathrm{UL}} / 2 \rceil$ and RB #max. - For non-1RB allocation, test frequency is middle range, and the RBstart shall be RB #0.					

6.2.2B_1.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2B_1.5-1.

Table 6.2.2B_1.5-1: Power Class for UL-MIMO in closed loop spatial multiplexing scheme for Power Class 2

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
41			26	+2.7/-3.7[2]				
Note 1: Void Note 2: For transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance								

6.2.2C

6.2.2D UE Maximum Output Power for ProSe

6.2.2D.0 Minimum conformance requirements

When UE is configured for simultaneous E-UTRA ProSe sidelink and E-UTRA uplink transmissions for inter-band E-UTRA ProSe / E-UTRA bands specified in Table 5.5D-2, the UE maximum output power shall be as specified in Table 6.2.2A-0 in subclause 6.2.2A for the corresponding inter-band aggregation with uplink assigned to two bands.

The normative reference for this requirement is TS 36.101 [2] clause 6.2.2D.

6.2.2D.1 UE Maximum Output Power for ProSe Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Message exceptions content needs further investigation (some values still TBD).
- Test system uncertainties and test tolerances.
- Test procedure for concurrent operation with E-UTRA uplink transmissions is not defined.

6.2.2D.1.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specific maximum output power and tolerance when operating in ProSe Discovery mode non-concurrent with E-UTRA uplink transmissions.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.2D.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which supports ProSe Direct Discovery.

6.2.2D.1.3 Minimum Conformance requirements

The minimum conformance requirements are defined in clause 6.2.2D.0.

6.2.2D.1.4 Test description

6.2.2D.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.2D.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.2D.1.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, Highest		
	Downlink Configuration	**Uplink Configuration**	**Sidelink Configuration (PSDCH transmission)**
Ch BW	RB allocation	RB allocation	RB allocation
5MHz	8	8	2
10MHz	16	16	2
15MHz	25	25	2
20MHz	30	30	2

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.67.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 6.2.2D.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 6.2.2D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message content exceptions are defined in clause 6.2.2D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is closed and UE is set to announce discovery.

6.2.2D.1.4.2 Test procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 6.2.2D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms).

6.2.2D.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 6.2.2D.1.4.3-1: ACTIVATE TEST MODE: Maximum Output Power for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 6.2.2D.1.4.3-2: CLOSE UE TEST LOOP: Maximum Output Power for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 6.2.2D.1.4.3-3: *MAC-MainConfig-RBC*: Maximum Output Power for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

6.2.2D.1.5 Test requirements

FFS

6.2.2D.2 UE Maximum Output Power for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Many clauses are TBD

6.2.2D.2.1 Test purpose

TBD

6.2.2D.2.2 Test applicability

TBD

6.2.2D.2.3 Minimum conformance requirements

TBD

6.2.2D.2.4 Test description

TBD

6.2.2DD.2.4.1 Initial conditions

TBD

6.2.2D.2.4.2 Test procedure

TBD

6.2.2D.2.4.3 Message contents

TBD

6.2.2D.2.5 Test requirements

TBD

6.2.2E UE Maximum Output Power for UE category 0

6.2.2E.1 Test purpose

Same test purpose as in clause 6.2.2.1.

6.2.2E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.2.2E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.2.3

6.2.2E.4 Test description

6.2.2E.4.1 Initial condition

Same initial conditions as in clause 6.2.2.4.1 with the following exceptions:

- Instead of Table 6.2.2.4.1-1 → use Table 6.2.2E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.2.2E.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Max UE output power testing	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	1	1
1.4MHz		QPSK	5	5
3MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	1	1
5MHz		QPSK	8	8
10MHz		QPSK	1	1
10MHz		QPSK	12	12
15MHz		QPSK	1	1
15MHz		QPSK	16	16
20MHz		QPSK	1	1
20MHz		QPSK	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: For E-UTRA bands not applied with Note 2 in Table 6.2.2.3-1:
- The 1 RB allocation shall be tested at RB#0 for low and mid range, RB #max for high range test frequency.
- The RBstart of non-1RB allocation shall be RB #0 for low and mid range, RB# (max +1 - RB allocation) for high range test frequency.

Note 3: For E-UTRA bands applied with Note 2 in Table 6.2.2.3-1:
- If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max.
- If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0.
- If the test channel bandwidth = (FUL_high - FUL_low) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB #$\left\lceil N_{\mathrm{RB}}^{\mathrm{UL}} / 2 \right\rceil$ and RB #max.
- For non-1RB allocation, test frequency is middle range, and the RBstart shall be RB #0.

6.2.2E.4.2 Test procedure

Same test procedure as in clause 6.2.2.4.2 with the following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframes are not under test.

6.2.2E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.2E.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2E.5-1.

Table 6.2.2E.5-1: UE Power Class test requirements

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
1					23	±2.7		
2					23	±2.7[2]		
3					23	±2.7[2]		
4					23	±2.7		
5					23	±2.7		
6					23	±2.7		
7					23	±2.7[2]		
8					23	±2.7[2]		
9					23	±2.7		
10					23	±2.7		
11					23	±2.7		
12					23	±2.7[2]		
13					23	±2.7		
14					23	±2.7		
…								
17					23	±2.7		
18					23	±2.7[6]		
19					23	±2.7		
20					23	±2.7[2]		
21					23	±2.7		
22					23	+3.0/-4.5		
23					23[5]	±2.7[5]		
24					23	±2.7		
25					23	±2.7[2]		
26					23	±2.7[2]		
27					23	±2.7		
28					23	+2.7/-3.2		
30					23	±2.7		
31					23	±2.7		
...								
33					23	±2.7		
34					23	±2.7		
35					23	±2.7		
36					23	±2.7		
37					23	±2.7		
38					23	±2.7		
39					23	±2.7		
40					23	±2.7		
41					23	±2.7[2]		
42					23	+3.0/-4.0		
43					23	+3.0/-4.0		
44					23	+2.7/[-3.7]		
45					23	±2.7		
…								

Note 1: The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS

Note 2: For transmission bandwidths (Figure 5.4.2-1, Table 5.4.4-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance.

Note 4: For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS.

Note 5: When NS_20 is signalled, the total output power within 2000-2005 MHz shall be limited to 7 dBm.

Note 6: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5dB for transmission bandwidths confined within 815 MHz and 818 MHz.

6.2.2EA UE Maximum Output Power for UE category M1

6.2.2EA.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.2EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.2.2EA.3 Minimum conformance requirements

The following UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth for non CA configuration and UL-MIMO unless otherwise stated. The period of measurement shall be at least one sub frame (1ms).

Table 6.2.2EA-1: UE Power Class

EUTRA band	Class 3 (dBm)	Tolerance (dB)	Class 5 (dBm)	Tolerance (dB)
1	23	±2	20	±2
2	23	±2[2]	20	±2[2]
3	23	±2[2]	20	±2[2]
4	23	±2	20	±2
5	23	±2	20	±2
7	23	±2[2]	20	±2[2]
8	23	±2[2]	20	±2[2]
11	23	±2	20	±2
12	23	±2[2]	20	±2[2]
13	23	±2	20	±2
18	23	±2[5]	20	±2[5]
19	23	±2	20	±2
20	23	±2[2]	20	±2[2]
21	23	±2	20	±2
26	23	±2[2]	20	±2[2]
27	23	±2	20	±2
28	23	+2/-2.5	20	+2/-2.5
31	23	±2	20	±2
…				
39	23	±2	20	±2
41	23	±2[2]	20	±2[2]

NOTE 1: Void

NOTE 2: [2] refers to the transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

NOTE 3: For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS.

NOTE 4: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance.

NOTE 5: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB for transmission bandwidths confined within 815 MHz and 818 MHz.

NOTE 6: Void

The normative reference for this requirement is TS 36.101 [2] clause 6.2.2E.

6.2.2EA.4 Test description

6.2.2EA.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.2EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.2.2EA.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Max UE output power testing	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
5MHz		QPSK	1	1
5MHz		QPSK	3(Note 5)	3(Note 5)
10MHz		QPSK	1	1
10MHz		QPSK	4(Note 4), 5 (Note 5)	4(Note 4), 5(Note 5)
15MHz		QPSK	1	1
15MHz		QPSK	6	6
20MHz		QPSK	1	1
20MHz		QPSK	6	6
Note 1: Test Channel Bandwidth is checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: The 1 RB allocation shall be tested at RB#0 with narrowband index 0 for low and mid range, RB #5 with max narrowband index for high range test frequency. For E-UTRA bands applied with Note 2 in Table 6.2.2 EA -1 and when channel bandwidth is larger than 4 MHz, the 1 RB allocation shall additionally be tested at RB#0 with narrowband index [3] for low range, RB #5 with max narrowband index –[3] for high range test frequency.				
Note 3: The RBstart of non-1RB allocation shall be RB #0 with narrowband index 0 for low and mid range, RB# (6 - RB allocation) with max narrowband index for high range test frequency.				
Note 4: Only applicable for Power class 3				
Note 5: Only applicable for Power class 5				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.2EA.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.2.2EA.4.3.

6.2.2EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.2.2EA.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.

6.2.2EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.2EA.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2EA.5-1.

Table 6.2.2EA.5-1: UE Power Class test requirements

EUTRA band	Class 3 (dBm)	Tolerance (dB)	Class 5 (dBm)	Tolerance (dB)
1	23	±2.7	20	±2.7
2	23	±2.7[2]	20	±2.7[2]
3	23	±2.7[2]	20	±2.7[2]
4	23	±2.7	20	±2.7
5	23	±2.7	20	±2.7
7	23	±2.7[2]	20	±2.7[2]
8	23	±2.7[2]	20	±2.7[2]
11	23	±2.7	20	±2.7
12	23	±2.7	20	±2.7[2]
13	23	±2.7	20	±2.7
18	23	±2.7[5]	20	±2.7[5]
19	23	±2.7	20	±2.7
20	23	±2.7[2]	20	±2.7[2]
21	23	±2.7	20	±2.7
26	23	±2.7[2]	20	±2.7[2]
27	23	±2.7	20	±2.7
28	23	+2.7/-3.2	20	+2.7/-3.2
31	23	±2.7	20	±2.7
…				
39	23	±2.7	20	±2.7
41	23	±2.7[2]	20	±2.7[2]

NOTE 1: Void
NOTE 2: [2] refers to the transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.
NOTE 3: For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS.
NOTE 4: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance.
NOTE 5: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB for transmission bandwidths confined within 815 MHz and 818 MHz.
NOTE 6: Void

6.2.2EC UE Maximum Output Power for UE category M2

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- TBD in Note 2 in Table 6.2.2EC.4.1-1
- Annex F not updated

6.2.2EC.1 Test purpose

Same as in clause 6.2.2EA.1

6.2.2EC.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward of UE category M2.

6.2.2EC.3 Minimum conformance requirements

Same as in clause 6.2.2EA.3

6.2.2EC.4 Test description

6.2.2EC.4.1 Initial condition

Same as in clause 6.2.2EA.4.1 with the following exceptions:

- Instead of Table 6.2.2EA.4.1-1 → use Table 6.2.2EC.4.1-1

Table 6.2.2EC.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Max UE output power testing	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
5MHz		QPSK	1	1
5MHz		QPSK	3(Note 5)	3(Note 5)
10MHz		QPSK	1	1
10MHz		QPSK	4(Note 4), 5 (Note 5)	4(Note 4), 5(Note 5)
15MHz		QPSK	1	1
15MHz		QPSK	24	24
20MHz		QPSK	1	1
20MHz		QPSK	24	24
Note 1: Test Channel Bandwidth is checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: The 1 RB allocation shall be tested at RB#0 with wideband index 0 for low and mid range, max RB index with max wideband index for high range test frequency. For E-UTRA bands applied with Note 2 in Table 6.2.2 EA -1 and when channel bandwidth is larger than 4 MHz, the 1 RB allocation shall additionally be tested at [TBD] with wideband index [TBD] for low range, RB [TBD] with max narrowband index –[TBD] for high range test frequency.				
Note 3: The RBstart of non-1RB allocation shall be RB #0 with wideband index 0 for low and mid range, RB# (25 - RB allocation) with max wideband index for high range test frequency.				
Note 4: Only applicable for Power class 3				
Note 5: Only applicable for Power class 5				

6.2.2EC.4.2 Test procedure

Same as in clause 6.2.2EA.4.1 with the following exceptions:

- Instead of Table 6.2.2EA.4.1-1→ use Table 6.2.2EC.4.1-1

6.2.2EC.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.2EC.5 Test requirements

Same as in clause 6.2.2EA.5

6.2.2F UE Maximum Output Power for category NB1

6.2.2F.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.2F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.2.2F.3 Minimum conformance requirements

Category NB1 UE Power Classes are specified in Table 6.2.2F-1 and define the maximum output power for any transmission bandwidth within the category NB1 channel bandwidth. For 3.75kHz sub-carrier spacing the maximum output power is defined as mean power of measurement which period is at least one slot (2ms) excluding the 2304Ts gap when UE is not transmitting. For 15kHz sub-carrier spacing the maximum output power is defined as mean power of measurement which period is at least one sub-frame (1ms).

Table 6.2.2F.3-1: UE Power Class

EUTRA band	Class 3 (dBm)	Tolerance (dB)	Class 5 (dBm)	Tolerance (dB)
1	23	±2	20	±2
2	23	±2	20	±2
3	23	±2	20	±2
5	23	±2	20	±2
8	23	±2	20	±2
11	23	±2	20	±2
12	23	±2	20	±2
13	23	±2	20	±2
17	23	±2	20	±2
18	23	±2	20	±2
19	23	±2	20	±2
20	23	±2	20	±2
21	23	±2	20	±2
25	23	±2	20	±2
26	23	±2	20	±2
28	23	±2	20	±2
31	23	±2	20	±2
66	23	±2	20	±2
70	23	±2	20	±2
70	23	±2	20	±2

The normative reference for this requirement is TS 36.101 clause 6.2.2F.

6.2.2F.4 Test description

6.2.2F.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 6.2.2F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.2.2F.4.1-1: Test ConfigurationInitial Conditions

Test Environment as specified in TS 36.508 [7] subclause 8.1.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.2		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1 (Note 2)		BPSK	1@0	3.75
2 (Note 3)		BPSK	1@47	3.75
3 (Note 2)		QPSK	1@0	15
4 (Note 3)		QPSK	1@11	15
5 (Note 1)		QPSK	3@3	15
Note 1: Applicable to UE supporting UL multi-tone transmissions Note 2: only applicable for low range Note 3: only applicable for high range				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1.1 and H.4.0.
4. The UL Reference Measurement channel is set according to Table 6.2.2F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.2.2F.4.3.

6.2.2F.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via NPDCCH with DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.2.2F.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC (UE should be already transmitting P_{UMAX} after Initial Conditions setting).
2. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms) for sub-carrier spacing of 15 kHz or one slot (2ms) excluding the 2304Ts gap when UE is not transmitting for sub-carrier spacing of 3.75 kHz. Half-Duplex guard subframes are not under test.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.2.2F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.2.2F.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2F.5-1.

Table 6.2.2F.5-1: UE Power Class test requirement

EUTRA band	Class 3 (dBm)	Tolerance (dB)	Class 5 (dBm)	Tolerance (dB)
1	23	±2.7	20	±2.7
2	23	±2.7	20	±2.7
3	23	±2.7	20	±2.7
5	23	±2.7	20	±2.7
8	23	±2.7	20	±2.7
11	23	±2.7	20	±2.7
12	23	±2.7	20	±2.7
13	23	±2.7	20	±2.7
17	23	±2.7	20	±2.7
18	23	±2.7	20	±2.7
19	23	±2.7	20	±2.7
20	23	±2.7	20	±2.7
21	23	±2.7	20	±2.7
25	23	±2.7	20	±2.7
26	23	±2.7	20	±2.7
28	23	±2.7	20	±2.7
31	23	±2.7	20	±2.7
66	23	±2.7	20	±2.7
70	23	±2.7	20	±2.7
70	23	±2.7	20	±2.7

6.2.2G UE Maximum Output Power for V2X Communication

6.2.2G.1 UE Maximum Output Power for V2X Communication / Non-concurrent with E-UTRA uplink transmission

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- RB allocation

- Connection diagram

- The UE test mode is FFS.

- Test description and requirements

- Annexes A, F.1.2, and F.3.2

- Applicability spec

- GNSS in the initial conditions is FFS.

NOTE: This test need not be performed because the Maximum Power Reduction (MPR) can be applied regardless of the number of RBs.

6.2.2G.1.1 Test purpose

Same test purpose as in clause 6.2.2.1.

6.2.2G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X communication.

6.2.2G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.2G-1, the allowed V2X UE maximum output power for shall be as applied in Table 6.2.2.3-1 in subclause 6.2.2.

The normative reference for this requirement is TS 36.101 [2] clause 6.2.2G.

6.2.2G.1.4 Test description

6.2.2G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.2G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3.

Table 6.2.2G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 6.2.2G.1.4.3.
3. The V2X reference measurement channel is set according to Table 6.2.2G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode - FFS.

6.2.2G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Measure the mean power of the UE in the channel bandwidth for each test point in table 6.2.2G.1.5-1 according to the test configuration from Table 6.2.2G.1.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.2.2G.1.4.3 Message contents

FFS

6.2.2G.1.5 Test requirements

Table 6.2.2G.1.5-1: UE Power Class test requirements

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
47					23	±2.7 + TT		
Note 1: Void Note 2: For transmission bandwidths (Figure 5.4.2-1, Table 5.4.4-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance.								

6.2.2G.2 UE Maximum Output Power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmission

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram

- Message contents and Test requirements

- Applicability spec

- The uplink test tolerance @ 6 GHz is FFS.

6.2.2G.2.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.2G.2.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

6.2.2G.2.3 Minimum conformance requirements

For V2X UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, the UE maximum output power shall be as specified in Table 6.2.2G.2.3-1 for the corresponding inter-band con-current operation with uplink assigned to two bands.

Table 6.2.2G.2.3-1: Inter-band con-current V2X UE Power Class (two bands)

V2X con-current band Configuration	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
V2X_3A-47A					23	+2/-3[4]		
V2X_7A-47A					23	+2/-3[4]		
V2X_8A-47A					23	+2/-3[4]		
V2X_39A-47A					23	+2/-3[4]		
V2X_41A-47A					23	+2/-3[4]		

NOTE 1: The con-current band combinations are used for V2X Service.
NOTE 2: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance
NOTE 3: For inter-band con-current aggregation the maximum power requirement applies to the total transmitted power over all component carriers (per UE).
NOTE 4: [4] refers to the transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

The normative reference for this requirement is TS 36.101 [2] clause 6.2.2G.

6.2.2G.2.4 Test description

6.2.2G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.2G.2.4.1-1. The details of the uplink and V2X reference measurement channels (RMCs) are specified in Annexes A.2 and A.8.3 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.2G.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range for uplink and Low range for V2X, High range for uplink and High range for V2X				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest, Highest				
Test Parameters for Channel Bandwidths						
	Downlink	**Uplink Configuration**		**V2X Configuration**		
Ch BW	N/A for UE Maximum Output Power test case	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz		QPSK	1	10 MHz	QPSK	48
1.4 MHz		QPSK	5	20 MHz	QPSK	96
3 MHz		QPSK	1			
3 MHz		QPSK	4			
5 MHz		QPSK	1			
5 MHz		QPSK	8			
10 MHz		QPSK	1			
10 MHz		QPSK	12			
15 MHz		QPSK	1			
15 MHz		QPSK	16			
20 MHz		QPSK	1			
20 MHz		QPSK	18			

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: For E-UTRA bands not applied with Note 2 in Table 6.2.2.3-1:
The 1 RB allocation shall be tested at RB#0 for low and mid range, RB #max for high range test frequency.
The RBstart of non-1RB allocation shall be RB #0 for low and mid range, RB# (max +1 - RB allocation) for high range test frequency.

Note 3: For E-UTRA bands applied with Note 2 in Table 6.2.2.3-1:
If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max.
If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0.
If the test channel bandwidth = (FUL_high - FUL_low) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB #$\left\lceil N_{\mathrm{RB}}^{\mathrm{UL}} / 2 \right\rceil$ and RB #max.
For non-1RB allocation, test frequency is middle range, and the RBstart shall be RB #0.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 6.2.2G.2.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and V2X Reference Measurement Channels are set according to Table 6.2.2G.2.4.1-1

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 6.2.2G.2.4.3.

6.2.2G.2.4.2 Test procedure

1. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 6.2.2G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at P_{UMAX} level. Configure the UE to transmit PSCCH and PSSCH with the P_{UMAX} level of each test points.

3. Measure the mean power over all component carriers in the V2X con-current band configuration. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.2.2G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.2G.2.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2G.2.5-1.

Table 6.2.2G.2.5-1: Inter-band con-current V2X UE Power Class (two bands)

V2X con-current band Configuration	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
V2X_3A-47A					23	[+2.7/-3.7[4]]		
V2X_7A-47A					23	[+2.7/-3.7[4]]		
V2X_8A-47A					23	[+2.7/-3.7[4]]		
V2X_39A-47A					23	[+2.7/-3.7[4]]		
V2X_41A-47A					23	[+2.7/-3.7[4]]		

NOTE 1: The con-current band combinations are used for V2X Service.
NOTE 2: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance
NOTE 3: For inter-band con-current aggregation the maximum power requirement applies to the total transmitted power over all component carriers (per UE).
NOTE 4: [4] refers to the transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

6.2.3 Maximum Power Reduction (MPR)

Editor's note:

- Requirement for Band 44 is not yet finalised due to square brackets in core specification TS 36.101 Table 6.2.2-1.

- Test requirements values in this section need to be reviewed in order to take into account notes in Table 6.2.5.3-2: $\Delta T_{IB,c}$ regarding $\Delta T_{IB,c}$ and asymmetric lower tolerances in table 6.2.2.3-1.

6.2.3.1 Test purpose

The number of RB identified in Table 6.2.3.3-1 is based on meeting the requirements for adjacent channel leakage ratio and the maximum power reduction (MPR) due to Cubic Metric (CM).

Simple scaling can be used to derive the requirement for other bandwidth based on the previously agreed value for 5MHz channel bandwidth.

6.2.3.2 Test applicability

The requirements of this test apply in test cases 6.6.2.3 Adjacent Channel Leakage power Ratio to all types of E-UTRA Power Class 3 UE release 8 and forward

NOTE: As a result TC 6.2.3 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3.3 Minimum conformance requirements

For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2.3-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3.3-1.

Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For PRACH, PUCCH and SRS transmission, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For each subframe, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot, the maximum MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5.3 apply.

The normative reference for this requirement is TS 36.101 clause 6.2.3.

6.2.3.4 Test description

6.2.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, 10MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
			FDD	TDD

1.4MHz		QPSK	5	5
1.4MHz		QPSK	6	6
1.4MHz		16QAM	5	5
1.4MHz		16QAM	6	6
3.0MHz		QPSK	4	4
3.0MHz		QPSK	15	15
3.0MHz		16QAM	4	4
3.0MHz		16QAM	15	15
5MHz		QPSK	8	8
5MHz		QPSK	25	25
5MHz		16QAM	8	8
5MHz		16QAM	25	25
10MHz		QPSK	12	12
10MHz		QPSK	50	50
10MHz		16QAM	12	12
10MHz		16QAM	50 (Note 3)	50 (Note 3)
15MHz		QPSK	16	16
15MHz		QPSK	75	75
15MHz		16QAM	16	16
15MHz		16QAM	75 (Note 3)	75 (Note 3)
20MHz		QPSK	18	18
20MHz		QPSK	100	100
20MHz		16QAM	18	18
20MHz		16QAM	100 (Note 3)	100 (Note 3)
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth.				
Note 3: Applies only for UE-Categories ≥2.				

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.2.3.4.1-1.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.2.4.3.

6.2.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at $P_{UMAX\ level}$.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.3.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3.5-1.

Table 6.2.3.5-1: UE Power Class test requirements

E-UTRA Band	Class 1 (dBm)	Tol. (Db)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	QPSK partial RB allocation Tol. (dB))	QPSK full RB allocation Tol. (dB))	16QAM partial RB allocation Tol. (dB)	16QAM full RB allocation Tol. (dB)
1					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
2					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
3					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
4					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
5					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
6					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
7					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
8					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
9					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
10					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
11					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
12					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
13					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
14					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
…									
17					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
18					23	±2.7[3]	+2.7 / [3] -3.7	+2.7 / [3] -3.7	+2.7 / [3] -4.7
19					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
20					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
21					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
22					23	+3.0/-4.5	+3.0/-5.5	+3.0/-5.5	+3.0/-6.5
23					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
24					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
25					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
26					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
27					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
28					23	+2.7/-3.2	+2.7/-4.2	+2.7/-4.2	+2.7/-5.2
30					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
31					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
...									
33					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
34					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7

35					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
36					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
37					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
38					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
39					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
40					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
41					23	±2.7[1]	+2.7 / -3.7 [1,2]	+2.7 / -3.7 [1,2]	+2.7 / -4.7 [1,2]
42					23	+3.0 / -4.0	+3.0 / -5.0	+3.0 / -5.0	+3.0 / -6.0
43					23	+3.0 / -4.0	+3.0 / -5.0	+3.0 / -5.0	+3.0 / -6.0
44					23	+2.7/ [-3.7]	+2.7 / [-4.7]	+2.7 / [-4.7]	+2.7 / [-5.7]
45					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
…									
65					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
66					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
…									
70					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7

Note 1: For transmission bandwidths (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

Note 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5.3-1 apply

Note 3: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5dB for transmission bandwidths confined within 815 MHz and 818 MHz

6.2.3_1 Maximum Power Reduction (MPR) for HPUE

6.2.3_1.1 Test purpose

Same test purpose as in clause 6.2.3.1 with the following exception:

- Instead of Table 6.2.3.3-1 → use Table 6.2.3_1.3-1

6.2.3_1.2 Test applicability

The requirements of this test apply in test cases 6.6.2.3_1 Adjacent Channel Leakage power Ratio for HPUE to all types of E-UTRA Power Class 1 or Power Class 2 UE release 10 and forward.

NOTE: As a result TC 6.2.3_1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3_1.3 Minimum conformance requirements

For UE Power Class 1 and 2, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2_1.3-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3_1.3-1.

Table 6.2.3_1.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 2

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For a power class 2 capable UE operating on Band 41, when an IE *P-max* as defined in [5] of 23 dBm or lower is indicated in the cell or if the TDD frame configuration is 0 or 6, the requirements for power class 2 are not applicable, and the corresponding requirements for a power class 3 UE shall apply.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5_1.3 apply.

The normative reference for this requirement is TS 36.101 clause 6.2.3.

6.2.3_1.4 Test description

Same test description as in clause 6.2.3.4.

6.2.3_1.5 Test requirements

Same test requirements as in clause 6.2.3.5 with the following exceptions:

- Instead of Table 6.2.3.5-1 → use Table 6.2.3_1.5-1

Table 6.2.3_1.5-1: UE Power Class 1 and 2 test requirements

E-UTRA Band	Class 1 (dBm)	Tol. (Db)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	QPSK partial RB allocation Tol. (dB))	QPSK full RB allocation Tol. (dB))	16QAM partial RB allocation Tol. (dB)	16QAM full RB allocation Tol. (dB)
14	31					+2.7/ -3.7	+2.7 / -4.7	+2.7 / -4.7	+2.7 / **-5.7**
41			26			±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
Note 1: For transmission bandwidths (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.									
Note 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5.3-1 apply									

6.2.3_2 Maximum Power Reduction (MPR) for Multi-Cluster PUSCH

6.2.3_2.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified maximum output power with MPR and tolerance when operating in multi-cluster PUSCH scenarios.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.3_2.2 Test applicability

The requirements of this test apply in test cases 6.6.2.3_2 Adjacent Channel Leakage power Ratio to all types of E-UTRA UE release 10 and forward that support multi cluster PUSCH within a component carrier for the tested band but do not support UL 64QAM.

NOTE: As a result TC 6.2.3_2 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3_2.3 Minimum conformance requirements

For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in table 6.2.2-1 due to multi-cluster PUSCH, is specified as follows:

$$MPR = CEIL \{M_A, 0.5\}$$

Where M_A is defined as follows

$$M_A = 8.00\text{-}10.12A; \quad 0.00 < A \leq 0.33$$

$$5.67 - 3.07A; \quad 0.33 < A \leq 0.77$$

$$3.31; \quad 0.77 < A \leq 1.00$$

Where

$$A = N_{RB_alloc} / N_{RB.}$$

CEIL$\{M_{A,}$ 0.5$\}$ means rounding upwards to closest 0.5dB, i.e. MPR $\in$ [3.0, 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0]

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2.5.3 apply.

The normative reference for this requirement is TS 36.101 clause 6.2.3.

6.2.3_2.4 Test description

6.2.3_2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in clause 5.4.2.1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3_2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3_2.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Highest	
Test Parameters for Channel Bandwidths		
Configuration ID	**Downlink Configuration**	**Uplink Configuration**

	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	Cluster1 RB allocations (L_{CRB} @ RB_{start})	Cluster2 RB allocations (L_{CRB} @ RB_{start})
1	5MHz		16QAM	2@0	1@24
2	5MHz		16QAM	18@0	2@22
3	5MHz		16QAM	2@0	18@6
4	10MHz		16QAM	3@0	2@48
5	10MHz		16QAM	42@0	3@45
6	10MHz		16QAM	3@0	42@6
7	15MHz		16QAM	8@0	7@68
8	15MHz		16QAM	60@0	4@68
9	15MHz		16QAM	4@0	60@12
10	20MHz		16QAM	4@0	4@96
11	20MHz		16QAM	92@0	4@96
12	20MHz		16QAM	4@0	92@8
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.2.3_2.4.1-1.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3_2.4.3.

6.2.3_2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.3_2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at $P_{UMAX\ level}$.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3_2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.3_2.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3_2.5-1.

Table 6.2.3_2.5-1: UE Power Class test requirements for Multi-Cluster PUSCH

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	31					23	+2.7 / -12.7
2	31					23	+2.7 / -7.7
3	31					23	+2.7 / -7.7
4	5, 6, 8, 11, 12, 13, 14, 17, 24, 27, 30					23	+2.7 / -12.7
5	5, 6, 8, 11, 12, 13, 14, 17, 24, 27, 30					23	+2.7 / -7.7
6	5, 6, 8, 11, 12, 13, 14, 17, 24, 27, 30					23	+2.7 / -7.7
7	18, 19, 21, 26, 34					23	+2.7 / -11.7
8	18, 19, 21, 26, 34					23	+2.7 / -7.7
9	18, 19, 21, 26, 34					23	+2.7 / -7.7
10	1, 2, 3, 4, 7, 9, 10, 20, 23, 25, 28, 33, 35, 36, 37, 38, 39, 40, 41,44, 45, 65, 66, 70					23	+2.7 / -13.2
	22, 42, 43					23	+3.0 / -13.5
11	1, 2, 3, 4, 7, 9, 10, 20, 23, 25, 28, 33, 35, 36, 37, 38, 39, 40, 41, 44, 45, 65, 66, 70					23	+2.7 / -7.7
	22, 42, 43					23	+3.0 / -8.0
12	1, 2, 3, 4, 7, 9, 10, 20, 23, 25, 28,33, 35, 36, 37, 38, 39, 40, 41, 44, 45, 65, 66, 70					23	+2.7 / -7.7
	22, 42, 43					23	+3.0 / -8.0

6.2.3_3 Maximum Power Reduction (MPR) for UL 64QAM

Editor's note:

- Requirement for Band 44 is not yet finalised due to square brackets in core specification TS 36.101 Table 6.2.2-1.

- Test requirements values in this section need to be reviewed in order to take into account notes in Table 6.2.5.3-2: $\Delta T_{IB,c}$ regarding $\Delta T_{IB,c}$ and asymmetric lower tolerances in table 6.2.2.3-1.

6.2.3_3.1 Test purpose

The number of RB identified in Table 6.2.3_3.3-1 is based on meeting the requirements for adjacent channel leakage ratio and the maximum power reduction (MPR) due to Cubic Metric (CM).

Simple scaling can be used to derive the requirement for other bandwidth based on the previously agreed value for 5MHz channel bandwidth.

6.2.3_3.2 Test applicability

The requirements of this test apply in test cases 6.6.2.3_3 Adjacent Channel Leakage power Ratio to E-UTRA UE from release 13 and forward that support UL 64QAM.

NOTE: As a result TC 6.2.3_3 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3_3.3 Minimum conformance requirements

For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2.3-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3_3.3-1.

Table 6.2.3_3.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

For each subframe, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot, the maximum MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5.3 apply.

The normative reference for this requirement is TS 36.101 clause 6.2.3.

6.2.3_3.4 Test description

6.2.3_3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3_3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3_3.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, 10MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		64QAM	5	5
1.4MHz		64QAM	6	6
3.0MHz		64QAM	4	4
3.0MHz		64QAM	15	15
5MHz		64QAM	8	8
5MHz		64QAM	25	25
10MHz		64QAM	12	12
10MHz		64QAM	50	50
15MHz		64QAM	16	16
15MHz		64QAM	75	75
20MHz		64QAM	18	18
20MHz		64QAM	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth.				

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.2.3_3.4.1-1.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.2.4.3.

6.2.3_3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.3_3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at $P_{UMAX\ level}$.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3_3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.3_3.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3_3.5-1.

Table 6.2.3_3.5-1: UE Power Class test requirements

E-UTRA Band	Class 1 (dBm)	Tol. (Db)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	64QAM partial RB allocation Tol. (dB)	64QAM full RB allocation Tol. (dB)
1					23	+2.7 / -4.7	+2.7 / -6.2
2					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
3					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
4					23	+2.7 / -4.7	+2.7 / -6.2
5					23	+2.7 / -4.7	+2.7 / -6.2
6					23	+2.7 / -4.7	+2.7 / -6.2
7					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
8					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
9					23	+2.7 / -4.7	+2.7 / -6.2
10					23	+2.7 / -4.7	+2.7 / -6.2
11					23	+2.7 / -4.7	+2.7 / -6.2
12					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
13					23	+2.7 / -4.7	+2.7 / -6.2
14					23	+2.7 / -4.7	+2.7 / -6.2
…							
17					23	+2.7 / -4.7	+2.7 / -6.2
18					23	+2.7 / [3] -4.7	+2.7 / [3] -6.2
19					23	+2.7 / -4.7	+2.7 / -6.2
20					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
21					23	+2.7 / -4.7	+2.7 / -6.2
22					23	+3.0/-6.5	+3.0/-8
23					23	+2.7 / -4.7	+2.7 / -6.2
24					23	+2.7 / -4.7	+2.7 / -6.2
25					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
26					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
27					23	+2.7 / -4.7	+2.7 / -6.2
28					23	+2.7/-5.2	+2.7/-6.7
31					23	+2.7 / -4.7	+2.7 / -6.2
...							
33					23	+2.7 / -4.7	+2.7 / -6.2
34					23	+2.7 / -4.7	+2.7 / -6.2
35					23	+2.7 / -4.7	+2.7 / -6.2

36					23	+2.7 / -4.7	+2.7 / -6.2
37					23	+2.7 / -4.7	+2.7 / -6.2
38					23	+2.7 / -4.7	+2.7 / -6.2
39					23	+2.7 / -4.7	+2.7 / -6.2
40					23	+2.7 / -4.7	+2.7 / -6.2
41					23	+2.7 / [1,2] -4.7	+2.7 / [1,2] -6.2
42					23	+3.0 / -6.0	+3.0 / -7.5
43					23	+3.0 / -6.0	+3.0 / -7.5
44					23	+2.7 / [-5.7]	+2.7 / [-7.2]
45					23	+2.7 / -4.7	+2.7 / -6.2
…							
65					23	+2.7 / -4.7	+2.7 / -6.2
66					23	+2.7 / -4.7	+2.7 / -6.2
…							
70					23	+2.7 / -4.7	+2.7 / -6.2

Note 1: For transmission bandwidths (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

Note 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5.3-1 apply

Note 3: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5dB for transmission bandwidths confined within 815 MHz and 818 MHz

6.2.3_4 Maximum Power Reduction (MPR) for Multi-Cluster PUSCH with UL 64QAM

6.2.3_4.1 Test purpose

Same test purpose as in clause 6.2.3_2.

6.2.3_4.2 Test applicability

The requirements of this test apply in test cases 6.6.2.3_4 Adjacent Channel Leakage power Ratio to E-UTRA UE from release 13 and forward that support UL 64QAM and multi cluster PUSCH within a component carrier for the tested band.

NOTE: As a result TC 6.2.3_4 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3_4.3 Minimum conformance requirements

For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in table 6.2.2-1 due to multi-cluster PUSCH, is specified as follows:

$$MPR = CEIL \{M_A, 0.5\}$$

Where M_A is defined as follows

$$M_A = 8.00\text{-}10.12A;\ 0.00 < A \leq 0.33$$

$$5.67 - 3.07A;\ 0.33 < A \leq 0.77$$

$$3.31;\ 0.77 < A \leq 1.00$$

Where

$$A = N_{RB_alloc} / N_{RB.}$$

CEIL{M_A, 0.5} means rounding upwards to closest 0.5dB, i.e. MPR ∈ [3.0, 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0]

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2.5.3 apply.

The normative reference for this requirement is TS 36.101 clause 6.2.3.

6.2.3_4.4 Test description

6.2.3_4.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in clause 5.4.2.1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3_4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3_4.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1			Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			Highest		
Test Parameters for Channel Bandwidths					
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	Cluster1 RB allocations (L_{CRB} @ RB_{start})	Cluster2 RB allocations (L_{CRB} @ RB_{start})
1	5MHz		64QAM	2@0	1@24
2	5MHz		64QAM	18@0	2@22
3	5MHz		64QAM	2@0	18@6
4	10MHz		64QAM	3@0	2@48
5	10MHz		64QAM	42@0	3@45
6	10MHz		64QAM	3@0	42@6
7	15MHz		64QAM	8@0	7@68
8	15MHz		64QAM	60@0	4@68
9	15MHz		64QAM	4@0	60@12
10	20MHz		64QAM	4@0	4@96
11	20MHz		64QAM	92@0	4@96
12	20MHz		64QAM	4@0	92@8
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.2.3_4.4.1-1.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3_4.4.3.

6.2.3_4.4.2 Test procedure

Same test procedure as in clause 6.2.3_2.4.2

6.2.3_4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.3_4.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3_4.5-1.

Table 6.2.3_4.5-1: UE Power Class test requirements for Multi-Cluster PUSCH with UL 64QAM

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	5					23	+2.7 / -12.7
2	5					23	+2.7 / -7.7
3	5					23	+2.7 / -7.7
4	11, 12, 13, 14, 17, 24, 27, 30					23	+2.7 / -12.7
5	11, 12, 13, 14, 17, 24, 27, 30					23	+2.7 / -7.7
6	11, 12, 13, 14, 17, 24, 27, 30					23	+2.7 / -7.7
7	18, 19, 21, 26, 34					23	+2.7 / -11.7
8	18, 19, 21, 26, 34					23	+2.7 / -7.7
9	18, 19, 21, 26, 34					23	+2.7 / -7.7
10	1, 2, 3, 4, 7, 9, 10, 20, 23, 25, 33, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 65, 66, 70					23	+2.7 / -13.2
11	1, 2, 3, 4, 7, 9, 10, 20, 23, 25, 28,33, 35, 36, 37, 38, 39, 40, 41, 45, 65, 66, 70					23	+2.7 / -7.7
11	22					23	+2.7 / -8.0
12	1, 2, 3, 4, 7, 9, 10, 20,22, 23, 25, 28,33, 35, 36, 37, 38, 39, 40, 41, 45, 65, 66, 70					23	+2.7 / -7.7

6.2.3A Maximum Power Reduction (MPR) for CA

6.2.3A.1 Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA)

6.2.3A.1.1 Test purpose

The number of RB identified in Table 6.2.3A.1.3-1 is based on meeting the requirements for Adjacent Channel Leakage power Ratio (ACLR) for CA and the maximum power reduction (MPR) for intra-band contiguous CA Bandwidth Class C due to Cubic Metric (CM).

6.2.3A.1.2 Test applicability

The requirements of this test apply in test case 6.6.2.3A.1 Adjacent Channel Leakage power Ratio (ACLR) for CA to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

NOTE: As a result TC 6.2.3A.1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3A.1.3 Minimum conformance requirements

For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A.0-2 due to higher order modulation and contiguously allocated transmissions (resource blocks) is specified in Table 6.2.3A.1.3-1. In case the modulation format is different on different component carriers then the MPR is determined by the rules applied to higher order of those modulations.

Table 6.2.3A.1.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	CA bandwidth Class B and C							MPR (dB)
	25 RB + 50 RB	50 RB + 50 RB	25 RB + 100 RB	50 RB + 100 RB	75 RB + 75 RB	75 RB + 100 RB	100 RB + 100 RB	
QPSK	> 8 and ≤ 25	> 12 and ≤ 50	> 8 and ≤ 25	> 12 and ≤ 50	> 16 and ≤ 75	> 16 and ≤ 75	> 18 and ≤ 100	≤ 1
QPSK	> 25	> 50	> 25	> 50	> 75	> 75	> 100	≤ 2
16 QAM	≤ 8	≤ 12	≤ 8	≤ 12	≤ 16	≤ 16	≤ 18	≤ 1
16 QAM	> 8 and ≤ 25	> 12 and ≤ 50	> 8 and ≤ 25	> 12 and ≤ 50	> 16 and ≤ 75	> 16 and ≤ 75	> 18 and ≤ 100	≤ 2
16 QAM	> 25	> 50	> 25	> 50	> 75	> 75	> 100	≤ 3

For PUCCH and SRS transmission, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For intra-band contiguous CA Bandwidth Class C with non-contiguous resource allocation the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A.0-2 is specified as follows:

$$MPR = CEIL \{ \min(M_A, M_{IM5}), 0.5\}$$

Where M_A is defined as follows:

$M_A =$ 8.2; $0 \le A < 0.025$

9.2 - 40A; $0.025 \le A < 0.05$

8 - 16A; $0.05 \le A < 0.25$

4.83 - 3.33A; $0.25 \le A \le 0.4$

3.83 - 0.83A; $0.4 \le A \le 1$

and M_{IM5} is defined as follows

$M_{IM5} =$ 4.5 ; $\Delta_{IM5} < 1.5 * BW_{Channel_CA}$

6.0 ; $1.5 * BW_{Channel_CA} \le \Delta_{IM5} < BW_{Channel_CA}/2 + F_{OOB}$

M_A ; $\Delta_{IM5} \ge BW_{Channel_CA}/2 + F_{OOB}$For intra-band contiguous carrier aggregation bandwidth class B with non-contiguous resource allocation, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A.0-2 is specified as follows

$$MPR = CEIL \{ M_A, 0.5\}$$

Where M_A is defined as follows:

$M_A =$ 10.5 – 17.5A ; $0 \le A < 0.2$

8.5 – 7.5A ; $0.2 \le A < 0.6$

5.5 – 2.5A ; $0.6 \le A \le 1$

Where

$A = N_{RB_alloc} / N_{RB_agg.}$

$\Delta_{IM5} = \max(| F_{C_agg} - (3*F_{agg_alloc_low} - 2*F_{agg_alloc_high}) |, \quad | F_{C_agg} \quad - (3*F_{agg_alloc_high} - 2*F_{agg_alloc_low}) |)$

$F_{C_agg} = (F_{edge_high} + F_{edge_low})/2$

CEIL{$M_{A,}$ 0.5} means rounding upwards to closest 0.5dB, i.e. MPR $\in$ [3.0, 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5, 8.0, 8.5]

For intra-band carrier aggregation, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot, the maximum MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by MPR, the power limits specified in sub-clause 6.2.5A.1 apply.

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.3A.

6.2.3A.1.4 Test description

6.2.3A.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3A.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low and High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}			**DL Allocation**	**CC MOD**	**UL Allocation**				
ID	**PCC N_{RB}**	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	100	25		QPSK	8	P_8@0	S_0@0		
2	100	25		QPSK	25	P_25@0	S_0@0		
3	100	25		QPSK	125	P_100@0	S_25@0		
4	100	25		16QAM	8	P_8@0	S_0@0		
5	100	25		16QAM	25	P_25@0	S_0@0		
6	100	25		16QAM	125	P_100@0	S_25@0		
7	100	25		QPSK	2	P_1@0	S_1@24		
8	75	75		QPSK	16	P_16@0	S_0@0		
9	75	75		QPSK	75	P_75@0	S_0@0		
10	75	75		QPSK	150	P_75@0	S_75@0		
11	75	75		16QAM	16	P_16@0	S_0@0		
12	75	75		16QAM	75	P_75@0	S_0@0		
13	75	75		16QAM	150	P_75@0	S_75@0		
14	75	75		QPSK	2	P_1@0	S_1@74		
15	100	50		QPSK	12	P_12@0	S_0@0		
16	100	50		QPSK	50	P_50@0	S_0@0		
17	100	50		QPSK	150	P_100@0	S_50@0		
18	100	50		16QAM	12	P_12@0	S_0@0		
19	100	50		16QAM	50	P_50@0	S_0@0		
20	100	50		16QAM	150	P_100@0	S_50@0		
21	100	50		QPSK	2	P_1@0	S_1@49		
22	100	75		QPSK	16	P_16@0	S_0@0		
23	100	75		QPSK	75	P_75@0	S_0@0		
24	100	75		QPSK	175	P_100@0	S_75@0		
25	100	75		16QAM	16	P_16@0	S_0@0		
26	100	75		16QAM	75	P_75@0	S_0@0		
27	100	75		16QAM	175	P_100@0	S_75@0		
28	100	75		QPSK	2	P_1@0	S_1@74		
29	100	100		QPSK	18	P_18@0	S_0@0		
30	100	100		QPSK	100	P_100@0	S_0@0		
31	100	100		QPSK	200	P_100@0	S_100@0		

32	100	100		16QAM	18	P_18@0	S_0@0		
33	100	100		16QAM	100	P_100@0	S_0@0		
34	100	100		16QAM	200	P_100@0	S_100@0		
35	100	100		QPSK	2	P_1@0	S_1@99		
36	25	50		QPSK	8	P_8@0	S_0@0		
37	25	50		QPSK	25	P_25@0	S_0@0		
38	25	50		QPSK	75	P_25@0	S_50@0		
39	25	50		16QAM	8	P_8@0	S_0@0		
40	25	50		16QAM	25	P_25@0	S_0@0		
41	25	50		16QAM	75	P_25@0	S_50@0		
42	25	50		QPSK	2	P_1@0	S_1@49		
43	50	50		QPSK	12	P_12@0	S_0@0		
44	50	50		QPSK	50	P_50@0	S_0@0		
45	50	50		QPSK	100	P_50@0	S_50@0		
46	50	50		16QAM	12	P_12@0	S_0@0		
47	50	50		16QAM	50	P_50@0	S_0@0		
48	50	50		16QAM	100	P_50@0	S_50@0		
49	50	50		QPSK	2	P_1@0	S_1@49		

NOTE 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
NOTE 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.3A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3A.1.4.3.

6.2.3A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.3A.1.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.3A.1.4.1-1on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control “up” commands in the uplink scheduling information to the UE to ensure that the UE transmits at P_{UMAX} level.

6. Measure the mean power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.2.3A.1.5 Test Requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3A.1.5-1 or Table.6.2.3A.1.5-2, as applicable.

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Table 6.2.3A.1.5-1: CA UE Power Class test requirements, E UTRA bands ≤ 3GHz

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7/-2.7
2					23	+2.7/-3.7
3					23	+2.7/-4.7
4					23	+2.7/-3.7
5					23	+2.7/-4.7
6					23	+2.7/-6.2
7					23	+2.7/-14.2
8					23	+2.7/-2.7
9					23	+2.7/-3.7
10					23	+2.7/-4.7
11					23	+2.7/-3.7
12					23	+2.7/-4.7
13					23	+2.7/-6.2
14					23	+2.7/-14.2
15					23	+2.7/-2.7
16					23	+2.7/-3.7
17					23	+2.7/-4.7
18					23	+2.7/-3.7
19					23	+2.7/-4.7
20					23	+2.7/-6.2
21					23	+2.7/-14.2
22					23	+2.7/-2.7
23					23	+2.7/-3.7
24					23	+2.7/-4.7
25					23	+2.7/-3.7
26					23	+2.7/-4.7
27					23	+2.7/-6.2
28					23	+2.7/-14.2
29					23	+2.7/-2.7
30					23	+2.7/-3.7
31					23	+2.7/-4.7
32					23	+2.7/-3.7
33					23	+2.7/-4.7
34					23	+2.7/-6.2
35					23	+2.7/-14.2
36					23	+2.7/-2.7
37					23	+2.7/-3.7
38					23	+2.7/-4.7
39					23	+2.7/-3.7
40					23	+2.7/-4.7
41					23	+2.7/-6.2
42					23	+2.7/-17.2
43					23	+2.7/-2.7
44					23	+2.7/-3.7
45					23	+2.7/-4.7
46					23	+2.7/-3.7
47					23	+2.7/-4.7
48					23	+2.7/-6.2
49					23	+2.7/-17.2
NOTE 1: Lower limit is assuming $\Delta T_{C,c}$ and $\Delta T_{IB,c}$ are zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

Table 6.2.3A.1.5-2: CA UE Power Class test requirements, 3GHz < E UTRA bands ≤ 4.2GHz

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+3.0/-4.0
2					23	+3.0/-4.0
3					23	+3.0/-5.0
4					23	+3.0/-4.0
5					23	+3.0/-5.0
6					23	+3.0/-6.5
7					23	+3.0/-14.5
8					23	+3.0/-4.0
9					23	+3.0/-4.0
10					23	+3.0/-5.0
11					23	+3.0/-4.0
12					23	+3.0/-5.0
13					23	+3.0/-6.5
14					23	+3.0/-14.5
15					23	+3.0/-4.0
16					23	+3.0/-4.0
17					23	+3.0/-5.0
18					23	+3.0/-4.0
19					23	+3.0/-5.0
20					23	+3.0/-6.5
21					23	+3.0/-14.5
22					23	+3.0/-4.0
23					23	+3.0/-4.0
24					23	+3.0/-5.0
25					23	+3.0/-4.0
26					23	+3.0/-5.0
27					23	+3.0/-6.5
28					23	+3.0/-14.5
29					23	+3.0/-4.0
30					23	+3.0/-4.0
31					23	+3.0/-5.0
32					23	+3.0/-4.0
33					23	+3.0/-5.0
34					23	+3.0/-6.5
35					23	+3.0/-14.5
36					23	+3.0/-4.0
37					23	+3.0/-4.0
38					23	+3.0/-5.0
39					23	+3.0/-4.0
40					23	+3.0/-5.0
41					23	+3.0/-6.5
42					23	+3.0/-17.5
43					23	+3.0/-4.0
44					23	+3.0/-4.0
45					23	+3.0/-5.0
46					23	+3.0/-4.0
47					23	+3.0/-5.0
48					23	+3.0/-6.5
49					23	+3.0/-17.5
NOTE 1: Lower limit is assuming $\Delta T_{C,c}$ and $\Delta T_{IB,c}$ are zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

6.2.3A.1_1 Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Minimum conformance requirements are missing for aggregated BW 15+10 MHz.

6.2.3A.1_1.1 Test purpose

The number of RB identified in Table 6.2.3A.1_1.3-1 is based on meeting the requirements for Adjacent Channel Leakage power Ratio (ACLR) for CA for UL 64QAM and the maximum power reduction (MPR) for intra-band contiguous CA Bandwidth Class C due to Cubic Metric (CM).

6.2.3A.1_1.2 Test applicability

The requirements of this test apply in test case 6.6.2.3A.1_1 Adjacent Channel Leakage power Ratio (ACLR) for CA to all types of E-UTRA UE from release 13 and forward that support intra-band contiguous DL CA, UL CA and UL 64QAM.

NOTE: As a result TC 6.2.3A.1_1 has not been included in the test case applicability Table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3A.1_1.3 Minimum conformance requirements

For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A.0-2due to higher order modulation and contiguously aggregated transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3A.1_1.3-1. In case the modulation format is different on different component carriers then the MPR is determined by the rules applied to higher order of those modulations.

Table 6.2.3A.1_1.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	CA bandwidth Class B and C							MPR (dB)
	25 RB + 50 RB	50 RB + 50 RB	25 RB + 100 RB	50 RB + 100 RB	75 RB + 75 RB	75 RB + 100 RB	100 RB + 100 RB	
64 QAM	≤ 8 and allocation wholly contained within a single CC	≤ 12 and allocation wholly contained within a single CC	≤ 8 and allocation wholly contained within a single CC	≤ 12 and allocation wholly contained within a single CC	≤ 16 and allocation wholly contained within a single CC	≤ 16 and allocation wholly contained within a single CC	≤ 18 and allocation wholly contained within a single CC	≤ 2
64 QAM	> 8 or allocation extends across two CC's	> 12 or allocation extends across two CC's	> 8 or allocation extends across two CC's	> 12 or allocation extends across two CC's	> 16 or allocation extends across two CC's	> 16 or allocation extends across two CC's	> 18 or allocation extends across two CC's	≤ 3

For PUCCH and SRS transmissions, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For intra-band contiguous carrier aggregation bandwidth class C with non-contiguous resource allocation, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A-1 is specified as follows:

$$MPR = CEIL \{ \min(M_A, M_{IM5}), 0.5\}$$

Where M_A is defined as follows:

$M_A = 8.2$; $0 \le A < 0.025$

$9.2 - 40A$; $0.025 \le A < 0.05$

$8 - 16A$; $0.05 \le A < 0.25$

$4.83 - 3.33A$; $0.25 \le A \le 0.4$,

$3.83 - 0.83A$; $0.4 \le A \le 1$,

and M_{IM5} is defined as follows:

$M_{IM5} = 4.5$; $\Delta_{IM5} < 1.5 * BW_{Channel_CA}$

6.0 ; $1.5 * BW_{Channel_CA} \le \Delta_{IM5} < BW_{Channel_CA}/2 + F_{OOB}$

M_A; $\Delta_{IM5} \geq BW_{Channel_CA}/2 + F_{OOB}$

For intra-band contiguous carrier aggregation bandwidth class B with non-contiguous resource allocation, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A-1 is specified as follows:

$$MPR = CEIL \{ M_A, 0.5\}$$

Where M_A is defined as follows:

$$M_A = \begin{cases} 10.5 - 17.5A & ; 0 \leq A < 0.2 \\ 8.5 - 7.5A & ; 0.2 \leq A < 0.6 \\ 5.5 - 2.5A & ; 0.6 \leq A \leq 1 \end{cases}$$

Where

$A = N_{RB_alloc} / N_{RB_agg.}$

$\Delta_{IM5} = \max(| F_{C_agg} - (3*F_{agg_alloc_low} - 2*F_{agg_alloc_high}) |, | F_{C_agg} - (3*F_{agg_alloc_high} - 2*F_{agg_alloc_low}) |)$

$F_{C_agg} = (F_{edge_high} + F_{edge_low})/2$

CEIL{M_A, 0.5} means rounding upwards to closest 0.5dB, i.e. MPR∈ [3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5].

6.2.3A.1_1.4 Test description

6.2.3A.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in Table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.2.3A.1_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3A.1_1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low and High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}			**DL Allocation**	**CC MOD**	**UL Allocation**				
ID	**PCC N_{RB}**	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	100	25	N/A	64QAM	8	P_8@0	S_0@0		
2	100	25		64QAM	100	P_100@0	S_0@0		
3	100	25		64QAM	125	P_100@0	S_25@0		
4	100	50		64QAM	12	P_12@0	S_0@0		
5	100	50		64QAM	100	P_100@0	S_0@0		
6	100	50		64QAM	150	P_100@0	S_50@0		
7	75	75		64QAM	16	P_16@0	S_0@0		
8	75	75		64QAM	75	P_75@0	S_0@0		
9	75	75		64QAM	150	P_75@0	S_75@0		
10	100	75		64QAM	16	P_16@0	S_0@0		
11	100	75		64QAM	100	P_100@0	S_0@0		
12	100	75		64QAM	175	P_100@0	S_75@0		
13	100	100		64QAM	18	P_18@0	S_0@0		
14	100	100		64QAM	100	P_100@0	S_0@0		
15	100	100		64QAM	200	P_100@0	S_100@0		
16	25	50		64QAM	8	P_8@0	S_0@0		
17	25	50		64QAM	25	P_25@0	S_0@0		
18	25	50		64QAM	75	P_25@0	S_50@0		
19	50	50		64QAM	12	P_12@0	S_0@0		
20	50	50		64QAM	50	P_50@0	S_0@0		
21	50	50		64QAM	100	P_50@0	S_50@0		
22	50	100		64QAM	12	P_12@0	S_0@0		
23	50	100		64QAM	50	P_50@0	S_0@0		
24	50	100		64QAM	150	P_50@0	S_100@0		
NOTE 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. NOTE 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.									

6.2.3A.1_1.4.2 Test procedure

Same test procedure as defined in clause 6.2.3A.1.4.2 with the following exception:

- In Step 4, instead of Table 6.2.3A.1.4.1-1 → use Table 6.2.3A.1_1.4.1-1

6.2.3A.1_1.4.3 Message contents

Same message contents as defined in clause 6.2.3A.1.4.3.

6.2.3A.1_1.5 Test requirement

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3A.1_1.5-1 or Table.6.2.3A.1_1.5-2, as applicable.

Table 6.2.3A.1_1.5-1: CA UE Power Class test requirements, E UTRA bands ≤ 3GHz

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7/-4.7
2					23	+2.7/-6.2
3					23	+2.7/-6.2
4					23	+2.7/-4.7
5					23	+2.7/-6.2
6					23	+2.7/-6.2
7					23	+2.7/-4.7
8					23	+2.7/-6.2
9					23	+2.7/-6.2
10					23	+2.7/-4.7
11					23	+2.7/-6.2
12					23	+2.7/-6.2
13					23	+2.7/-4.7
14					23	+2.7/-6.2
15					23	+2.7/-6.2
16					23	+2.7/-4.7
17					23	+2.7/-6.2
18					23	+2.7/-6.2
19					23	+2.7/-4.7
20					23	+2.7/-6.2
21					23	+2.7/-6.2
22					23	+2.7/-4.7
23					23	+2.7/-6.2
24					23	+2.7/-6.2
NOTE 1: Lower limit is assuming ΔTC,c and ΔTIB,c are zero. If non-zero, PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

Table 6.2.3A.1_1.5-2: CA UE Power Class test requirements, 3GHz < E UTRA bands ≤ 4.2GHz

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+3.0/-5.0
2					23	+3.0/-6.5
3					23	+3.0/-6.5
4					23	+3.0/-5.0
5					23	+3.0/-6.5
6					23	+3.0/-6.5
7					23	+3.0/-5.0
8					23	+3.0/-6.5
9					23	+3.0/-6.5
10					23	+3.0/-5.0
11					23	+3.0/-6.5
12					23	+3.0/-6.5
13					23	+3.0/-5.0
14					23	+3.0/-6.5
15					23	+3.0/-6.5
16					23	+3.0/-5.0
17					23	+3.0/-6.5
18					23	+3.0/-6.5
19					23	+3.0/-5.0
20					23	+3.0/-6.5
21					23	+3.0/-6.5
22					23	+3.0/-5.0
23					23	+3.0/-6.5
24					23	+3.0/-6.5
NOTE 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

6.2.3A.2 Maximum Power Reduction (MPR) for CA (inter-band DL CA and UL CA)

Editor's note: 36.905 Test point analysis doc for eLAA is pending.

6.2.3A.2.1 Test purpose

The number of RB identified in Table 6.2.3A.2.3-1 is based on meeting the requirements for Adjacent Channel Leakage power Ratio (ACLR) for CA and Spectrum emission mask (SEM) for CA and the maximum power reduction (MPR) for inter-band CA Bandwidth Class A due to Cubic Metric (CM).

6.2.3A.2.2 Test applicability

The requirements of this test apply in test case 6.6.2.3A.2 Adjacent Channel Leakage power Ratio (ACLR) for CA and 6.6.2.1A.2 Spectrum emission mask (SEM) for CA to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA. The requirements also apply to all types of E-UTRA UE release 14 and forward that support eLAA.

NOTE: As a result TC 6.2.3A.2 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3A.2.3 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to one E-UTRA band (Table 5.4.2A-1), the requirements in subclause 6.2.3 apply.

For inter-band carrier aggregation with one component carrier per operating band and the uplink active in two E-UTRA bands, the requirements in subclause 6.2.3 apply [for each uplink carrier].

For UE Power Class 1 and 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A.0-1due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3A.2.3-1.

Table 6.2.3A.2.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For PRACH, PUCCH and SRS transmissions, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For each subframe, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5 apply.

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.3A and 6.2.3.

The allowed MPR for transmission on an Scell in Band 46 within a component carrier of a nominal channel bandwidth of 10 MHz or 20 MHz is in accordance with 6.2.3.3-1 for L = 5 (10 MHz) and L = 10 (20 MHz) with L defined in Clause 8.1.4 of [6]. For all other possible values of the *RIV* defined in Clause 8.1.4 of [6] the allowed MPR is 2.5 dB for QPSK modulation, 3 dB for 16QAM modulation and 4 dB for 64QAM modulation (256QAM is FFS).

6.2.3A.2.4 Test description

6.2.3A.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3A.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3A.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)		
Test Parameters for CA Configurations								
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**		
	PCC	**SCC**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**NRB_alloc**	**PCC & SCC RB allocations**	
	NRB	**NRB**						
1 (NOTE4)	6	25	N/A for this test	QPSK	QPSK	2	1	1
2	6	25		QPSK	QPSK	13	5	8
3	6	25		QPSK	QPSK	31	6	25
4 (NOTE4)	6	25		16QAM	16QAM	2	1	1
5	6	25		16QAM	16QAM	13	5	8
6	6	25		16QAM	16QAM	31	6	25
7	6	25		QPSK	16QAM	30	5	25
8 (NOTE4)	6	50		QPSK	QPSK	2	1	1
9	6	50		QPSK	QPSK	17	5	12
10	6	50		QPSK	QPSK	56	6	50
11 (NOTE4)	6	50		16QAM	16QAM	2	1	1
12	6	50		16QAM	16QAM	17	5	12
13	6	50		16QAM	16QAM	56	6	50
14	6	50		QPSK	16QAM	55	5	50
15 (NOTE4)	25	15		QPSK	QPSK	2	1	1
16	25	15		QPSK	QPSK	12	8	4
17	25	15		QPSK	QPSK	40	25	15
18 (NOTE4)	25	15		16QAM	16QAM	2	1	1
19	25	15		16QAM	16QAM	12	8	4
20	25	15		16QAM	16QAM	40	25	15
21	25	15		QPSK	16QAM	23	8	15
22 (NOTE4)	25	25		QPSK	QPSK	2	1	1
23	25	25		QPSK	QPSK	16	8	8
24	25	25		QPSK	QPSK	50	25	25
25 (NOTE4)	25	25		16QAM	16QAM	2	1	1
26	25	25		16QAM	16QAM	16	8	8
27	25	25		16QAM	16QAM	50	25	25

28	25	25		QPSK	16QAM	33	8	25
29 (NOTE4)	25	50		QPSK	QPSK	2	1	1
30	25	50		QPSK	QPSK	16	4	12
31 (NOTE4)	25	50		QPSK	QPSK	20	8	12
32	25	50		QPSK	QPSK	65	15	50
33 (NOTE4)	25	50		16QAM	16QAM	2	1	1
34	25	50		16QAM	16QAM	16	4	12
35 (NOTE4)	25	50		16QAM	16QAM	20	8	12
36	25	50		16QAM	16QAM	65	15	50
37	25	50		QPSK	16QAM	54	4	50
38 (NOTE4)	50	25		QPSK	QPSK	2	1	1
39	50	25		QPSK	QPSK	20	12	8
40	50	25		QPSK	QPSK	75	50	25
41 (NOTE4)	50	25		16QAM	16QAM	2	1	1
42	50	25		16QAM	16QAM	20	12	8
43	50	25		16QAM	16QAM	75	50	25
44	50	25		QPSK	16QAM	37	12	25
45 (NOTE4)	50	50		QPSK	QPSK	2	1	1
46	50	50		QPSK	QPSK	24	12	12
47	50	50		QPSK	QPSK	100	50	50
48 (NOTE4)	50	50		16QAM	16QAM	2	1	1
49	50	50		16QAM	16QAM	24	12	12
50	50	50		16QAM	16QAM	100	50	50
51	50	50		QPSK	16QAM	62	12	50
52 (NOTE4)	50	100		QPSK	QPSK	2	1	1
53	50	100		QPSK	QPSK	30	12	18
54	50	100		QPSK	QPSK	150	50	100
55 (NOTE4)	50	100		16QAM	16QAM	2	1	1
56	50	100		16QAM	16QAM	30	12	18
57	50	100		16QAM	16QAM	150	50	100
58	50	100		QPSK	16QAM	112	12	100
59 (NOTE4)	75	75		QPSK	QPSK	2	1	1
60	75	75		QPSK	QPSK	32	16	16
61	75	75		QPSK	QPSK	150	75	75
62 (NOTE4)	75	75		16QAM	16QAM	2	1	1
63	75	75		16QAM	16QAM	32	16	16
64	75	75		16QAM	16QAM	150	75	75
65	75	75		QPSK	16QAM	91	16	75
66 (NOTE4)	100	50		QPSK	QPSK	2	1	1

67	100	50		QPSK	QPSK	30	18	12
68	100	50		QPSK	QPSK	150	100	50
69 (NOTE4)	100	50		16QAM	16QAM	2	1	1
70	100	50		16QAM	16QAM	30	18	12
71	100	50		16QAM	16QAM	150	100	50
72	100	50		QPSK	16QAM	68	18	50
73 (NOTE4)	100	75		QPSK	QPSK	2	1	1
74	100	75		QPSK	QPSK	34	18	16
75	100	75		QPSK	QPSK	175	100	75
76 (NOTE4)	100	75		16QAM	16QAM	2	1	1
77	100	75		16QAM	16QAM	34	18	16
78	100	75		16QAM	16QAM	175	100	75
79	100	75		QPSK	16QAM	93	18	75
80 (NOTE4)	100	100		QPSK	QPSK	2	1	1
81	100	100		QPSK	QPSK	36	18	18
82	100	100		QPSK	QPSK	200	100	100
83 (NOTE4)	100	100		16QAM	16QAM	2	1	1
84	100	100		16QAM	16QAM	36	18	18
85	100	100		16QAM	16QAM	200	100	100
86	100	100		QPSK	16QAM	118	18	100
87 (NOTE5)	100	100		QPSK	QPSK	11	1	L=1
88 (NOTE5)	100	100		QPSK	QPSK	108	18	L=9
89 (NOTE5)	100	100		16QAM	16QAM	11	1	L=1
90 (NOTE5)	100	100		16QAM	16QAM	108	18	L=9

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Applicable only for 6.6.2.1A.2 Spectrum emission mask for CA (inter-band DL CA and UL CA)
Note 5: Applicable only for an LAA Scell configured in Band 46. For High range place test point with $RB_{start}=N-1$, with *N* defined in Clause 8.1.4 of [6].

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.2.3A.2.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3A.2.4.3.

6.2.3A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.3A.2.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.3A.2.4.1-1on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control “up” commands in the uplink scheduling information to the UE to ensure that the UE transmits at P_{UMAX} level.
6. Measure the mean power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.2.3A.2.5 Test Requirements

The maximum output power, derived in step 6 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3A.2.5-1, as applicable.

Table 6.2.3A.2.5-1: CA UE Output Power test requirements

Config ID	MPR (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
2	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
3	1	1	1.5	0	20.5	22	23	3	25.7	19.3
4	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
5	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
6	2	2	1.5	0	19.5	21	23	3	25.7	19.3
7	0	2	1.5	0	21.5	21	23	3	25.7	19.3
8	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
9	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
10	1	1	1.5	0	20.5	22	23	3	25.7	19.3
11	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
12	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
13	2	2	1.5	0	19.5	21	23	3	25.7	19.3
14	0	2	1.5	0	21.5	21	23	3	25.7	19.3
15	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
16	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
17	1	1	0	1.5	20.5	20.5	23	3	25.7	19.3
18	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
19	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
20	2	2	0	1.5	19.5	19.5	22.5	5	25.7	17.3
21	0	2	1.5	1.5	21.5	19.5	23	3	25.7	19.3
22	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
23	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
24	1	1	0	0	20.5	22	23	3	25.7	19.3
25	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
26	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
27	2	2	0	0	19.5	21	23	3	25.7	19.3
28	0	2	1.5	0	21.5	21	23	3	25.7	19.3
29	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
30	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
31	0	0	1.5	1.5	20.5	20.5	23	3	25.7	19.3
32	1	1	1.5	0	20.5	22	23	3	25.7	19.3
33	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
34	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
35	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
36	2	2	1.5	0	19.5	21	23	3	25.7	19.3
37	0	2	1.5	0	21.5	21	23	3	25.7	19.3
38	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
39	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
40	1	1	0	0	22	22	23	3	25.7	19.3

41	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
42	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
43	2	2	0	0	21	21	23	3	25.7	19.3
44	0	2	1.5	0	21.5	21	23	3	25.7	19.3
45	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
46	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
47	1	1	0	0	22	22	23	3	25.7	19.3
48	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
49	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
50	2	2	0	0	21	21	23	3	25.7	19.3
51	0	2	1.5	0	21.5	21	23	3	25.7	19.3
52	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
53	0	0	1.5	0	21.5	23	23	3	25.7	19.3
54	1	1	0	0	22	22	23	3	25.7	19.3
55	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
56	1	1	1.5	0	20.5	22	23	3	25.7	19.3
57	2	2	0	0	21	21	23	3	25.7	19.3
58	0	2	1.5	0	21.5	21	23	3	25.7	19.3
59	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
60	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
61	1	1	0	0	22	22	23	3	25.7	19.3
62	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
63	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
64	2	2	0	0	21	21	23	3	25.7	19.3
65	0	2	1.5	0	21.5	21	23	3	25.7	19.3
66	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
67	0	0	0	1.5	23	21.5	23	3	25.7	19.3
68	1	1	0	0	22	22	23	3	25.7	19.3
69	1	1	1.5	1.5	20.5	20.5	23	3	25.7	19.3
70	1	1	0	1.5	22	20.5	23	3	25.7	19.3
71	2	2	0	0	21	21	23	3	25.7	19.3
72	0	2	0	0	23	21	23	3	25.7	19.3
73	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
74	0	0	0	1.5	23	21.5	23	3	25.7	19.3
75	1	1	0	0	22	22	23	3	25.7	19.3
76	1	1	1.5	1.5	21.5	21.5	23	3	25.7	19.3
77	1	1	0	1.5	22	20.5	23	3	25.7	19.3
78	2	2	0	0	21	21	23	3	25.7	19.3
79	0	2	0	0	23	21	23	3	25.7	19.3
80	0	0	1.5	1.5	21.5	21.5	23	3	25.7	19.3
81	0	0	0	0	23	23	23	3	25.7	19.3
82	1	1	0	0	22	22	23	3	25.7	19.3
83	1	1	1.5	1.5	21.5	21.5	23	3	25.7	19.3

84	1	1	0	0	22	22	23	3	25.7	19.3
85	2	2	0	0	21	21	23	3	25.7	19.3
86	0	2	0	0	23	21	23	3	25.7	19.3
87	0	2.5	1.5	1.5	21.5	19	23	3	25.7	19.3
88	0	2.5	0	0	23	20.5	23	3	25.7	19.3
89	1	3	1.5	1.5	20.5	18.5	23	3	25.7	19.3
90	1	3	0	0	22	20	23	3	25.7	19.3
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero. $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.										
Note 2: $\Delta_{TC,c}$ does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points										

6.2.3A.2_1 Maximum Power Reduction (MPR) for CA (inter-band DL CA and UL CA) for UL 64QAM

6.2.3A.2_1.1 Test purpose

The number of RB identified in Table 6.2.3A.2_1.3-1 is based on meeting the requirements for Adjacent Channel Leakage power Ratio (ACLR) for CA and the maximum power reduction (MPR) for inter-band CA Bandwidth Class A due to Cubic Metric (CM).

6.2.3A.2_1.2 Test applicability

The requirements of this test apply in test case 6.6.2.3A.2_1 Adjacent Channel Leakage power Ratio (ACLR) for CA to all types of E-UTRA UE release 13 and forward that support inter-band DL CA, UL CA and UL 64QAM.

NOTE: As a result TC 6.2.3A.2_1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3A.2_1.3 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to one E-UTRA band (Table 5.4.2A-1), the requirements in subclause 6.2.3 apply.

For inter-band carrier aggregation with one component carrier per operating band and the uplink active in two E-UTRA bands, the requirements in subclause 6.2.3 apply [for each uplink carrier].

For UE Power Class 1 and 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A.0-1due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3A.2_1.3-1.

Table 6.2.3A.2_1.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

For PRACH, PUCCH and SRS transmissions, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For each subframe, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5 apply.

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.3A and 6.2.3.

6.2.3A.2_1.4 Test description

6.2.3A.2_1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3A.2_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3A.2_1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)		
Test Parameters for CA Configurations								
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**		
	PCC	**SCC**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**NRB_alloc**	**PCC & SCC RB allocations**	
	NRB	**NRB**						
1	6	25	N/A for this test	64QAM	64QAM	13	5	8
2	6	25		64QAM	64QAM	31	6	25
3	6	50		64QAM	64QAM	17	5	12
4	6	50		64QAM	64QAM	56	6	50
5	25	15		64QAM	64QAM	12	8	4
6	25	15		64QAM	64QAM	40	25	15
7	25	25		64QAM	64QAM	16	8	8
8	25	25		64QAM	64QAM	50	25	25
9	25	50		64QAM	64QAM	16	4	12
10	25	50		64QAM	64QAM	65	15	50
11	50	25		64QAM	64QAM	20	12	8
12	50	25		64QAM	64QAM	75	50	25
13	50	50		64QAM	64QAM	24	12	12
14	50	50		64QAM	64QAM	100	50	50
15	50	100		64QAM	64QAM	30	12	18
16	50	100		64QAM	64QAM	150	50	100
17	75	75		64QAM	64QAM	32	16	16
18	75	75		64QAM	64QAM	150	75	75
19	100	50		64QAM	64QAM	30	18	12
20	100	50		64QAM	64QAM	150	100	50
21	100	75		64QAM	64QAM	34	18	16
22	100	75		64QAM	64QAM	175	100	75
23	100	100		64QAM	64QAM	36	18	18
24	100	100		64QAM	64QAM	200	100	100
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.								
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.								
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.								

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.3A.2_1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3A.2_1.4.3.

6.2.3A.2_1.4.2 Test procedure

Same test procedure as defined in clause 6.2.3A.2.4.2 with the following exception:

- In Step 4, instead of Table 6.2.3A.2.4.1-1 □ use Table 6.2.3A.2_1.4.1-1

6.2.3A.2_1.4.3 Message contents

Same message contents as defined in clause 6.2.3A.2.4.3.

6.2.3A.2_1.5 Test Requirements

The maximum output power, derived in step 6 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3A.2_1.5-1, as applicable.

Table 6.2.3A.2_1.5-1: CA UE Output Power test requirements

Config ID	MPR (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC				
1	2	2	1.5	1.5	19.5	19.5	22.5	5	25.7	16.8
2	3	3	1.5	0	18.5	20	22.3	5	25.7	16.6
3	2	2	1.5	1.5	19.5	19.5	22.5	5	25.7	16.8
4	3	3	1.5	0	18.5	20	22.3	5	25.7	16.6
5	2	2	1.5	1.5	19.5	19.5	22.5	5	25.7	16.8
6	3	3	0	1.5	20	18.5	22.3	5	25.7	16.6
7	2	2	1.5	1.5	19.5	19.5	22.5	5	25.7	16.8
8	3	3	0	0	20	20	23	3	25.7	19.3.8
9	2	2	1.5	1.5	19.5	19.5	22.5	5	25.7	16.8
10	3	3	1.5	0	18.5	20	22.3	5	25.7	16.6
11	2	2	1.5	1.5	19.5	19.5	22.5	5	25.7	16.8
12	3	3	0	0	20	20	23	3	25.7	19.3
13	2	2	1.5	1.5	19.5	19.5	22.5	5	25.7	16.8
14	3	3	0	0	20	20	23	3	25.7	19.3
15	2	2	1.5	0	19.5	21	23	3	25.7	19.3
16	3	3	0	0	20	20	23	3	25.7	19.3
17	2	2	1.5	1.5	19.5	19.5	22.5	5	25.7	16.8
18	3	3	0	0	20	20	19.523	3	25.7	19.3
19	2	2	0	1.5	21		23	3	25.7	19.3
20	3	3	0	0	20	20	23	3	25.7	19.3
21	2	2	0	1.5	21	19.5	23	3	25.7	19.3
22	3	3	0	0	20	20	23	3	25.7	19.3
23	2	2	0	0	21	21	23	3	25.7	19.3
24	3	3	0	0	20	20	23	3	25.7	19.3

Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero. $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.
Note 2: $\Delta_{TC,c}$ does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points

6.2.3A.3 Maximum Power Reduction (MPR) for CA (intra-band non-contiguous DL CA and UL CA)

Editor's note: For a transition period until RAN5#73, this test case in version 13.1.0 of 36.521-1 shall be used. This is to ensure no test coverage is lost before the UL 64QAM test case becomes available.

6.2.3A.3.1 Test purpose

The number of RB identified in Table 6.2.3A.2.3-1 is based on meeting the requirements for Adjacent Channel Leakage power Ratio (ACLR) for CA and the maximum power reduction (MPR) for inter-band CA Bandwidth Class A due to Cubic Metric (CM).

6.2.3A.3.2 Test applicability

The requirements of this test apply in test case 6.6.2.3A.3 Adjacent Channel Leakage power Ratio (ACLR) for CA to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA but do not support UL 64QAM.

NOTE: As a result TC 6.2.3A.3 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3A.3.3 Minimum conformance requirements

For intra-band non-contiguous carrier aggregation with one uplink carrier, the requirements in subclause 6.2.3 apply.

For intra-band non-contiguous carrier aggregation with two uplink carriers MPR is specified for E-UTRA CA configurations with a maximum possible $W_{GAP} \leq 35$ MHz; the allowed MPR is

$$MPR = CEIL \{M_N, 0.5\}$$

where M_N is defined as follows

$$M_N = -0.125\ N + 18.25;\ 2 \leq N \leq 50$$

$$-0.0333\ N + 13.67;\ 50 < N \leq 200$$

where $N = N_{RB_alloc}$ is the number of allocated resource blocks. E-UTRA CA configurations with a maximum possible $W_{gap} > 35$ MHz and their corresponding MPR are intended to form part of a later release.

For intra-band carrier aggregation, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.3A.

6.2.3A.3.4 Test description

6.2.3A.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3A.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3A.3.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: Low Wgap, Maximum Wgap
Test CC Combination setting (N_{RB}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC

Test Parameters for CA Configurations									
ID	CA Configuration / N_{RB_agg}		W_{gap} [MHz]	DL Allocation		UL Allocation			
	PCC N_{RB}	SCCs N_{RB}		CC MOD	PCC & SCC RB allocation	CC MOD	PCC N_{RB_alloc} (L_{CRB} @ RB_{start})	CC MOD	SCC N_{RB_alloc} (L_{CRB} @ RB_{start})
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	16QAM	P_1@0	16QAM	S_1@24
2	25	25	35	N/A	N/A	16QAM	P_25@0	16QAM	S_25@0
3	25	25	5	N/A	N/A	16QAM	P_1@0	16QAM	S_1@24
4	25	25	5	N/A	N/A	16QAM	P_25@0	16QAM	S_25@0
5	100	100	5	N/A	N/A	16QAM	P_1@0	16QAM	S_1@99
6	100	100	5	N/A	N/A	16QAM	P_25@0	16QAM	S_25@75
7	100	100	5	N/A	N/A	16QAM	P_100@0	16QAM	S_100@0

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.3A.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3A.3.4.3.

6.2.3A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.3A.2.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.3A.3.4.1-1on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at P_{UMAX} level.

6. Measure the mean power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.2.3A.3.5 Test Requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3A.3.5-1, as applicable.

Table 6.2.3A.3.5-1: CA UE Output Power test requirements

Configuration ID	MPR (dB)	ΔT_C (dB)	P_{CMAX} (dBm)	$T(P_{CMAX_L})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
Test Requirements for CA_4A-4A Configurations						
1	18	0	5	7	25.7	-2,7
2	12	0	11	6	25.7	4.3
3	18	0	5	7	25.7	-2,7
4	12	0	11	6	25.7	4.3
5	18	0	5	7	25.7	-2.7
6	12	0	11	6	25.7	4.3
7	7	0	16	5	25.7	10.3
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.						

6.2.3A.3_1 Maximum Power Reduction (MPR) for CA (intra-band non-contiguous DL CA and UL CA) for UL 64QAM

6.2.3A.3_1.1 Test purpose

The number of RB identified in Table 6.2.3A.2.3-1 is based on meeting the requirements for Adjacent Channel Leakage power Ratio (ACLR) for CA and the maximum power reduction (MPR) for inter-band CA Bandwidth Class A due to Cubic Metric (CM).

6.2.3A.3_1.2 Test applicability

The requirements of this test apply in test case 6.6.2.3A.3_1 Adjacent Channel Leakage power Ratio (ACLR) for CA to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

NOTE: As a result TC 6.2.3A.3_1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3A.3_1.3 Minimum conformance requirements

For intra-band non-contiguous carrier aggregation with one uplink carrier, the requirements in subclause 6.2.3 apply.

For intra-band non-contiguous carrier aggregation with two uplink carriers MPR is specified for E-UTRA CA configurations with a maximum possible $W_{GAP} \leq 35$ MHz; the allowed MPR is

$$MPR = CEIL \{M_N, 0.5\}$$

where M_N is defined as follows

$$M_N = -0.125\ N + 18.25;\ 2 \leq N \leq 50$$

$$-0.0333\ N + 13.67;\ 50 < N \leq 200$$

where $N = N_{RB_alloc}$ is the number of allocated resource blocks. E-UTRA CA configurations with a maximum possible $W_{gap} > 35$ MHz and their corresponding MPR are intended to form part of a later release.

For intra-band carrier aggregation, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.3A.

6.2.3A.3_1.4 Test description

6.2.3A.3_1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3A.3_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3A.3_1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1				NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.				Refer to test points A: Mid frequency, Maximum Wgap(low + high frequency)					
Test CC Combination setting (N_{RB}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC					
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	64QAM	P_1@0	16QAM	S_1@24
2	25	25	35	N/A	N/A	64QAM	P_25@0	16QAM	S_25@0
3	25	25	5	N/A	N/A	64QAM	P_1@0	16QAM	S_1@24
4	25	25	5	N/A	N/A	64QAM	P_25@0	16QAM	S_25@0
5	100	100	5	N/A	N/A	64QAM	P_1@0	16QAM	S_1@99
6	100	100	5	N/A	N/A	64QAM	P_25@0	16QAM	S_25@75
7	100	100	5	N/A	N/A	64QAM	P_100@0	16QAM	S_100@0

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.3A.3_1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3A.3_1.4.3.

6.2.3A.3_1.4.2 Test procedure

Same test procedure as defined in clause 6.2.3A.3.4.2 with the following exception:

- In Step 4, instead of Table 6.2.3A.3.4.1-1 □ use Table 6.2.3A.3_1.4.1-1

6.2.3A.3_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.2.3A.3_1.5 Test Requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3A.3_1.5-1, as applicable.

Table 6.2.3A.3_1.5-1: CA UE Output Power test requirements

Configuration ID	MPR (dB)	ΔT_C (dB)	P_{CMAX} (dBm)	$T(P_{CMAX_L})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
Test Requirements for CA_4A-4A Configurations						
1	18	0	5	7	25.7	-2,7
2	12	0	11	6	25.7	4.3
3	18	0	5	7	25.7	-2,7
4	12	0	11	6	25.7	4.3
5	18	0	5	7	25.7	-2.7
6	12	0	11	6	25.7	4.3
7	7	0	16	5	25.7	10.3
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.						

6.2.3B Maximum Power Reduction (MPR) for UL-MIMO

6.2.3B.1 Test purpose

The number of RB identified in Table 6.2.3B.3-1 is based on meeting the requirements for adjacent channel leakage ratio for UL-MIMO and the maximum power reduction (MPR) for UL-MIMO due to Cubic Metric (CM).

6.2.3B.2 Test applicability

The requirements of this test apply in test cases 6.6.2.3B Adjacent Channel Leakage power Ratio to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

NOTE: As a result TC 6.2.3B has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3B.3 Minimum conformance requirements

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power is measured as the sum of the maximum output power at each UE antenna connector. For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2B.3-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3B.3-1 with UL-MIMO configurations defined in Table 6.2.2B.3-2.

Table 6.2.3B.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2.5B.3 apply.

The normative reference for this requirement is TS 36.101 clause 6.2.3B.

6.2.3B.4 Test description

6.2.3B.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in clause 5.4.2B.1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] clause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1	Lowest, 5MHz, 10MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	5	5
1.4MHz		QPSK	6	6
1.4MHz		16QAM	5	5
1.4MHz		16QAM	6	6
3.0MHz		QPSK	4	4
3.0MHz		QPSK	15	15
3.0MHz		16QAM	4	4
3.0MHz		16QAM	15	15
5MHz		QPSK	8	8
5MHz		QPSK	25	25
5MHz		16QAM	8	8
5MHz		16QAM	25	25
10MHz		QPSK	12	12
10MHz		QPSK	50	50
10MHz		16QAM	12	12
10MHz		16QAM	50 (Note 3)	50 (Note 3)
15MHz		QPSK	16	16
15MHz		QPSK	75	75
15MHz		16QAM	16	16
15MHz		16QAM	75 (Note 3)	75 (Note 3)
20MHz		QPSK	18	18
20MHz		QPSK	100	100
20MHz		16QAM	18	18
20MHz		16QAM	100 (Note 3)	100 (Note 3)
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth.				
Note 3: Applies only for UE-Categories ≥2.				

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.28.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.2.3B.4.1-1.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.3B.4.3.

6.2.3B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.2.3B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at PUMAX level.

3. Measure the sum of mean power of the UE at each transmit antenna connector in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.3B.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.3B.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3B.5-1.

Table 6.2.3B.5-1: UE Power Class test requirements

E-UTRA Band	Class 1 (dBm)	Tol. (Db)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	QPSK partial RB allocation Tol. (dB))	QPSK full RB allocation Tol. (dB))	16QAM partial RB allocation Tol. (dB)	16QAM full RB allocation Tol. (dB)
1					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
2					23	+2.7/-3.7[1]	+2.7/-4.7[1,2]	+2.7/-4.7[1,2]	+2.7/-5.7[1,2]
3					23	+2.7/-3.7[1]	+2.7/-4.7[1,2]	+2.7/-4.7[1,2]	+2.7/-5.7[1,2]
4					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
5					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
6					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
7					23	+2.7/-3.7[1]	+2.7/-4.7[1,2]	+2.7/-4.7[1,2]	+2.7/-5.7[1,2]
8					23	+2.7/-3.7[1]	+2.7/-4.7[1,2]	+2.7/-4.7[1,2]	+2.7/-5.7[1,2]
9					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
10					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
11					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
12					23	+2.7/-3.7[1]	+2.7/-4.7[1,2]	+2.7/-4.7[1,2]	+2.7/-5.7[1,2]
13					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
14					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
…									
17					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
18					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
19					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
20					23	+2.7/-3.7[1]	+2.7/-4.7[1,2]	+2.7/-4.7[1,2]	+2.7/-5.7[1,2]
21					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
22					23	+3.0/-5.5	+3.0/-6.5	+3.0/-6.5	+3.0/-7.5
…									
23					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
24					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
25					23	+2.7/-3.7[1]	+2.7/-[4.7][1,2]	+2.7/-[4.7][1,2]	+2.7/-[5.7][1,2]
26					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
27					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7

28					23	+2.7/[-3.7]	+2.7/[-4.7]	+2.7/[-4.7]	+2.7/[-5.7]
30					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
31					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
...									
33					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
34					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
35					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
36					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
37					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
38					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
39					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
40					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
41					23	+2.7/-3.7[1]	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
42					23	+3.0/-5.0	+3.0/-6.0[1,2]	+3.0/-6.0[1,2]	+3.0/-7.0[1,2]
43					23	+3.0/-5.0	+3.0/-6.0	+3.0/-6.0	+3.0/-7.0[1,2]
44					23	+2.7/[-3.7]	+2.7/[-4.7]	+2.7/[-4.7]	+2.7/[-5.7]
45					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
…									
65					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
66					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7
…									
70					23	+2.7/-3.7	+2.7/-4.7	+2.7/-4.7	+2.7/-5.7

Note 1: For transmission configurations (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

Note 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5B.3-1 apply

6.2.3D UE Maximum Output Power for ProSe

6.2.3D.0 Minimum conformance requirements

For UE Power Class 1, 2 and 3, this subclause specifies the allowed Maximum Power Reduction (MPR) power for ProSe physical signals due to higher order modulation and transmit bandwidth configuration (resource blocks).

The allowed MPR for the maximum output power for ProSe physical signal PSSS shall be as be as specified in subclause 6.2.3 for PUSCH QPSK modulation for the corresponding transmission bandwidth.

The allowed MPR for the maximum output power for ProSe physical signal SSSS is specified in Table 6.2.3D.0-1.

For a power class 2 capable UE operating on Band 41, the corresponding requirements for a power class 3 UE apply when an IE *P-max* as defined in [5] of 23 dBm or lower is indicated in the cell or if the TDD frame configuration is 0 or 6.

Table 6.2.3D.0-1: Maximum Power Reduction (MPR) for SSSS for Power Class 1, 2 and 3

Channel bandwidth	MPR for SSSS (dB)
1.4 MHz	
3.0 MHz	
5.0 MHz	≤ 4
10 MHz	≤ 4
15 MHz	≤ 4
20 MHz	≤ 4

The normative reference for this requirement is TS 36.101 [2] clause 6.2.3D.

6.2.3D.1 Maximum Power Reduction (MPR) for ProSe Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Message exceptions content needs further investigation (some values still TBD).
- Test system uncertainties and test tolerances.

6.2.3D.1.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specific maximum output power with MPR and tolerance when operating in ProSe Discovery mode.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.3D.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which supports ProSe Direct Discovery and SLSS transmission and reception.

6.2.3D.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2.3D.0.

6.2.3D.1.4 Test description

6.2.3D.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3D.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3D.1.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, Highest		
	Downlink Configuration	**Uplink Configuration**	**Sidelink Configuration (PSSS/SSSS transmission)**
Ch BW	RB allocation	RB allocation	RB allocation
5MHz	8	8	6
10MHz	16	16	6
15MHz	25	25	6
20MHz	30	30	6

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.67.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exception are defined in clause 6.2.3D.1.4.3
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 6.2.3D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message content exception are defined in clause 6.2.3D.1.4.3
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is closed and UE is set to announce discovery.

6.2.3D.1.4.2 Test procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 6.2.3D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration of the two PSSS symbols, excluding transient period within one sub-frame.
4. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration of the two SSSS symbols, excluding transient period within one sub-frame.

6.2.3D.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 6.2.3D.1.4.3-1: ACTIVATE TEST MODE: Maximum Power Reduction for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 6.2.3D.1.4.3-2: CLOSE UE TEST LOOP: Maximum Power Reduction for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 6.2.3D.1.4.3-3: *MAC-MainConfig-RBC*: Maximum Power Reduction for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

Table 6.2.3D.1.4.3-4: *RRC-RRCConnectionReconfiguration*: Maximum Output Power for ProSe Direct Discovery (applicable only for Step 2 of Test procedure)

Information Element	Value	Comment	Condition
networkControlledSyncTx	ON	Configured	

6.2.3D.1.5 Test requirements

The maximum output power for PSSS, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.2.5-1. The maximum output power for SSSS, derived in step 4 shall be within the range prescribed by the maximum output power and tolerance in Table 6.2.3D.5-1

Table 6.2.3D.5-1: UE Power Class test requirements for SSSS

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
1					19	±2.7		
2					19	±2.7[2]		
3					19	±2.7[2]		
4					19	±2.7		
5					19	±2.7		
6					19	±2.7		
7					19	±2.7[2]		
8					19	±2.7[2]		
9					19	±2.7		
10					19	±2.7		
11					19	±2.7		
12					19	±2.7[2]		
13					19	±2.7		
14					19	±2.7		
…								
17					19	±2.7		
18					19	±2.7[6]		
19					19	±2.7		
20					19	±2.7[2]		
21					19	±2.7		
22					19	+3.0/-4.5		
23					19	±2.7[5]		
24					19	±2.7		
25					19	±2.7[2]		
26					19	±2.7[2]		
27					19	±2.7		
28					19	+2.7/-3.2		
30					19	±2.7		
31					19	±2.7		
...								
33					19	±2.7		
34					19	±2.7		
35					19	±2.7		
36					19	±2.7		
37					19	±2.7		
38					19	±2.7		
39					19	±2.7		
40					19	±2.7		
41					19	±2.7[2]		
42					19	+3.0/-4.0		
43					19	+3.0/-4.0		
44					19	+2.7/[-3.7]		
…								

Note 1: The above tolerances are applicable for UE(s) that support up to 4 E-UTRA operating bands. For UE(s) that support 5 or more E-UTRA bands the maximum output power is expected to decrease with each additional band and is FFS

Note 2: For transmission bandwidths (Figure 5.4.2-1, Table 5.4.4-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

Note 3: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance.

Note 4: For the UE which supports both Band 11 and Band 21 operating frequencies, the tolerance is FFS.

Note 5: When NS_20 is signalled, the total output power within 2000-2005 MHz shall be limited to 7 dBm.

Note 6: For a UE that supports both Band 18 and Band 26, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5dB for transmission bandwidths confined within 815 MHz and 818 MHz.

6.2.3D.2 Maximum Power Reduction (MPR) ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Many clauses are TBD

6.2.3D.2.1 Test purpose

TBD

6.2.3D.2.2 Test applicability

TBD

6.2.3D.2.3 Minimum conformance requirements

TBD

6.2.3D.2.4 Test description

TBD

6.2.3D.2.4.1 Initial conditions

TBD

6.2.3D.2.4.2 Test procedure

TBD

6.2.3D.2.4.3 Message contents

TBD

6.2.3D.2.5 Test requirements

TBD

6.2.3E Maximum Power Reduction (MPR) for UE category 0

6.2.3E.1 Test purpose

Same test purpose as in clause 6.2.3.1.

6.2.3E.2 Test applicability

The requirements of this test apply in test case 6.6.2.3E Adjacent Channel Leakage power Ratio for UE category 0 to all types of E-UTRA UE release 12 and forward of UE category 0.

NOTE: As a result TC 6.2.3E has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.3.3.

6.2.3E.4 Test description

6.2.3E.4.1 Initial condition

Same initial conditions as in clause 6.2.3.4.1 with following exceptions for HD-FDD:

- Instead of Table 6.2.3.4.1-1 → use Table 6.2.3E.4.1-1.

- Connect SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.2.3E.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, 10MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	5	5
1.4MHz		QPSK	6	6
1.4MHz		16QAM	5	5
3.0MHz		QPSK	4	4
3.0MHz		QPSK	15	15
3.0MHz		16QAM	4	4
3.0MHz		16QAM	5	5
5MHz		QPSK	8	8
5MHz		QPSK	25	25
5MHz		16QAM	5	5
10MHz		QPSK	12	12
10MHz		QPSK	36	36
10MHz		16QAM	5	5
15MHz		QPSK	16	16
15MHz		QPSK	36	36
15MHz		16QAM	5	5
20MHz		QPSK	18	18
20MHz		QPSK	36	36
20MHz		16QAM	5	5
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth.				

6.2.3E.4.2 Test procedure

Same test procedure as in clause 6.2.3.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframe are not under test.

6.2.3E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.2.3E.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3E.5-1.

Table 6.2.3E.5-1: UE Power Class test requirements

E-UTRA Band	Class 1 (dBm)	Tol. (Db)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	QPSK partial RB allocation Tol. (dB))	QPSK full RB allocation Tol. (dB))	16QAM partial RB allocation Tol. (dB)	16QAM full RB allocation Tol. (dB)[3,4]
2					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
3					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
4					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
5					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
8					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
13					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
20					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7
39					23	±2.7	+2.7 / -3.7	+2.7 / -3.7	+2.7 / -4.7
41					23	±2.7[1]	+2.7 / [1,2] -3.7	+2.7 / [1,2] -3.7	+2.7 / [1,2] -4.7

Note 1: For transmission bandwidths (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.
Note 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5.3-1 apply
Note 3: Full allocation for 16QAM cat0
Note 4: Only applicable in 3MHz

6.2.3EA Maximum Power Reduction (MPR) for UE category M1

6.2.3EA.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance covering configurations where a maximum power reduction is allowed in the UE.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.3EA.2 Test applicability

The requirements of this test apply in test case 6.6.2.3EA Adjacent Channel Leakage power Ratio for UE category M1 to all types of E-UTRA UE release 13 and forward of UE category M1.

NOTE: As a result TC 6.2.3EA has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3EA.3 Minimum conformance requirements

For UE Power Class 3 and 5, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2EA-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3EA-1 and 6.2.3EA-2.

Table 6.2.3EA-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	

QPSK	>2	>2	>1	>4	-	-	≤ 1
QPSK	>5	>5	-	-	-	-	≤ 2
16 QAM	≤ 2	≤ 2	>1	>3	-	-	≤ 1
16QAM	>2	>2	>3	>5	-	-	≤ 2

Table 6.2.3EA-2: Maximum Power Reduction (MPR) for Power Class 5

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	>2	>2	>3	>5	-	-	≤ 1
QPSK	>5	>5	-	-	-	-	≤ 2
16 QAM	≤ 2	≤ 2	>3	>5	-	-	≤ 1
16QAM	>2	>2	>5	-	-	-	≤ 2

For PRACH, PUCCH and SRS transmissions, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For each subframe, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5 EA.3 apply.

No other MPR requirement than those specified in Table 6.2.3EA-1 and Table 6.2.3EA-2 applies to category M1 UE.

6.2.3EA.4 Test description

6.2.3EA.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.2.3EA.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest, 5MHz, 10MHz, 15 MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
Low range, Mid range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	0
7	3MHz		QPSK	5	0
8	3MHz		QPSK	6	0
9	3MHz		16QAM	2	0
10	3MHz		16QAM	5	0
11	5MHz		QPSK	6	0
12 (Note 4)	5MHz		16QAM	1	0
13	5MHz		16QAM	3	0
14	5MHz		16QAM	5	0
15 (Note 4)	10MHz		QPSK	4	0
16	10MHz		QPSK	6	0
17 (Note 4)	10MHz		16QAM	3	0
18	10MHz		16QAM	5	0
19	15MHz		QPSK	6	0
20	15MHz		16QAM	5	0
High range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	1
7	3MHz		QPSK	5	1
8	3MHz		QPSK	6	1
9	3MHz		16QAM	2	1
10	3MHz		16QAM	5	1
11	5MHz		QPSK	6	3
12 (Note 4)	5MHz		16QAM	1	3
13	5MHz		16QAM	3	3
14	5MHz		16QAM	5	3
15 (Note 4)	10MHz		QPSK	4	7
16	10MHz		QPSK	6	7
17 (Note 4)	10MHz		16QAM	3	7
18	10MHz		16QAM	5	7
19	15MHz		QPSK	6	11
20	15MHz		16QAM	5	11

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4

Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.

Note 4: Only for power class 3 UE

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.3EA.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.2.3EA.4.3.

6.2.3EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.2.3EA.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at $P_{UMAX\ level}$.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.

6.2.3EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA.

6.2.3EA.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3EA.5-1, 6.2.3EA.5-2 and6.2.3EA.5-3.

Table 6.2.3EA.5-1: UE Power Class test requirements for bands without $\Delta T_{C,c}$ (Low/Mid/High range) and bands with $\Delta T_{C,c}$ (Mid range) except band 28

Configuration ID	Power class 3					Power class 5				
	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
2	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
3	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
4	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
5	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
6	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
7	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
8	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
9	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
10	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
11	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
12	0	23	2.0	25.7	20.3	N/A				
13	1	22	2.0	25.7	19.3	0	20	2.0	22.7	17.3
14	2	21	2.0	25.7	18.3	1	19	3.5	22.7	14.8
15	0	23	2.0	25.7	20.3	N/A				
16	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
17	0	23	2.0	25.7	20.3	N/A				
18	1	22	2.0	25.7	19.3	0	20	2.0	22.7	17.3
19	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
20	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3

Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5
Note 2: $\Delta T_{C,c}$ applicability per band is indicated by note 2 in Table 6.2.2EA-1

Table 6.2.3EA.5-2: UE Power Class test requirements for bands with $\Delta T_{C,c}$ (Low/High range)

Configuration ID	Power class 3					Power class 5				
	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	21.5	2.0	25.7	18.8	0	18.5	4.0	22.7	13.8
2	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
3	2	19.5	3.5	25.7	15.3	2	16.5	5.0	22.7	10.8
4	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
5	2	19.5	3.5	25.7	15.3	2	16.5	5.0	22.7	10.8
6	0	21.5	2.0	25.7	18.8	0	18.5	4.0	22.7	13.8
7	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
8	2	19.5	3.5	25.7	15.3	2	16.5	5.0	22.7	10.8
9	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
10	2	19.5	3.5	25.7	15.3	2	16.5	5.0	22.7	10.8
11	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
12	0	21.5	2.0	25.7	18.8	N/A				
13	1	20.5	2.5	25.7	17.3	0	18.5	4.0	22.7	13.8
14	2	19.5	3.5	25.7	15.3	1	17.5	5.0	22.7	11.8
15	0	21.5	2.0	25.7	18.8	N/A				
16	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
17	0	21.5	2.0	25.7	18.8	N/A				
18	1	20.5	2.5	25.7	17.3	0	18.5	4	22.7	13.8
19	0	21.5	2.0	25.7	18.8	0	18.5	4.0	22.7	13.8
20	0	21.5	2.0	25.7	18.8	0	18.5	4.0	22.7	13.8

Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5
Note 2: $\Delta T_{C,c}$ applicability per band is indicated by note 2 in Table 6.2.2EA-1

Table 6.2.3EA.5-3: UE Power Class test requirements for band 28

Configuration ID	Power class 3					Power class 5				
	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	N/A									
2	N/A									
3	N/A									
4	N/A									
5	N/A									
6	0	23	2.0	25.7	19.8	0	20	2.0	22.7	16.8
7	1	22	2.0	25.7	18.8	1	19	3.5	22.7	14.3
8	2	21	2.0	25.7	17.8	2	18	4.0	22.7	12.8
9	1	22	2.0	25.7	18.8	1	19	3.5	22.7	14.3
10	2	21	2.0	25.7	17.8	2	18	4.0	22.7	12.8
11	1	22	2.0	25.7	18.8	1	19	3.5	22.7	14.3
12	0	23	2.0	25.7	19.8	N/A				
13	1	22	2.0	25.7	18.8	0	20	2.0	22.7	16.8
14	2	21	2.0	25.7	17.8	1	19	3.5	22.7	14.3
15	0	23	2.0	25.7	19.8	N/A				
16	1	22	2.0	25.7	18.8	1	19	3.5	22.7	14.3
17	0	23	2.0	25.7	19.8	N/A				
18	1	22	2.0	25.7	18.8	0	20	2.0	22.7	16.8
19	0	23	2.0	25.7	19.8	0	20	2.0	22.7	16.8
20	0	23	2.0	25.7	19.8	0	20	2.0	22.7	16.8

Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5
Note 2: $\Delta T_{C,c}$ applicability per band is indicated by note 2 in Table 6.2.2EA-1

6.2.3F Maximum Power Reduction (MPR) for category NB1

6.2.3F.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance covering configurations where a maximum power reduction is allowed in the UE.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.3F.2 Test applicability

The requirements of this test apply in test case 6.6.2.3F Adjacent Channel Leakage power Ratio for category NB1 to all types of release 13 and forward of UE category NB1.

NOTE: As a result TC 6.2.3F has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3F.3 Minimum conformance requirements

For UE category NB1 power class 3 and 5 the allowed Maximum Power Reduction (MPR) for the maximum output power given in Table 6.2.2F.3-1 is specified in Table 6.2.3F.3-1.

Table 6.2.3F.3-1: Maximum Power Reduction (MPR) for UE category NB1 Power Class 3 and 5

Modulation	QPSK		
Tone positions for 3 Tones allocation	0-2	3-5 and 6-8	9-11
MPR	≤ 0.5 dB	0 dB	≤ 0.5 dB
Tone positions for 6 Tones allocation	0-5 and 6-11		
MPR	≤ 1 dB	≤ 1 dB	
Tone positions for 12 Tones allocation	0-11		
MPR	≤ 2 dB		

For the UE maximum output power modified by MPR, the power limits specified in sub-clause 6.2.5F.3 apply.

The normative reference for this requirement is TS 36.101 clause 6.2.3F.

6.2.3F.4 Test description

6.2.3F.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 6.2.3F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.2.3F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 8.1.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.2		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A for Maximum Power Reduction (MPR) test case	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		BPSK	1@0	15
4		BPSK	1@11	15
5 (Note 1)		QPSK	3@0	15
6 (Note 1)		QPSK	3@3	15
7 (Note 1)		QPSK	3@9	15
8 (Note 1)		QPSK	6@0	15
9 (Note 1)		QPSK	6@6	15
10 (Note 1)		QPSK	12@0	15
Note 1: Applicable to UE supporting UL multi-tone transmissions				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.2.3F.4.1-1.

5. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.2.3F.4.3.

6.2.3F.4.2 Test procedure

1. SS sends uplink scheduling information via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.2.3F.4.1-1 and with scheduling pattern and repetitions according to Annex A.2. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms) for 15 kHz sub-carrier spacing, or for 3.75 kHz sub-carrier spacing at least one slot (2 ms) excluding the 2304Ts gap when UE is not transmitting.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.2.3F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.2.3F.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3F.5-1.

Table 6.2.3F.5-1: Maximum Power Reduction test requirements

Test ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2.0	25.7	20.3	20	2.5	22.7	16.8
2	0	23	2.0	25.7	20.3	20	2.5	22.7	16.8
3	0	23	2.0	25.7	20.3	20	2.5	22.7	16.8
4	0	23	2.0	25.7	20.3	20	2.5	22.7	16.8
5	0.5	22.5	2.0	25.7	19.8	19.5	3.5	22.7	15.3
6	0	23	2.0	25.7	20.3	20	2.5	22.7	16.8
7	0.5	22.5	2.0	25.7	19.8	19.5	3.5	22.7	15.3
8	1	22	2.0	25.7	19.3	19	3.5	22.7	14.8
9	1	22	2.0	25.7	19.3	19	3.5	22.7	14.8
10	2	21	2.0	25.7	18.3	18	4.0	22.7	13.3
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5F									

6.2.3G Maximum Power Reduction (MPR) for V2X communication

Editor's note: This test case is incomplete. The following items are missing or incomplete:

- Test description

- Test requirement including the test tolerance in Annex F.3.2

- Applicability spec

- Connection diagram

- UE test mode

- GNSS in the initial conditions is FFS.

6.2.3G.1 Maximum Power Reduction (MPR) for V2X Communication / Power class 3

6.2.3G.1.1 Maximum Power Reduction (MPR) for V2X Communication / Power class 3 / Contiguous allocation of PSCCH and PSSCH / Non-concurrent with E-UTRA uplink transmissions

6.2.3G.1.1.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance covering configurations where a maximum power reduction is allowed in the UE.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.3G.1.1.2 Test applicability

The requirements of this test apply in the test case 6.6.2.3G Adjacent Channel Leakage power Ratio for V2X Communication to all types of E-UTRA UE release 14 and forward that support V2X communication.

NOTE: As a result TC 6.2.3G.1.1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.3G.1.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table [FFS], this subclause specifies the allowed Maximum Power Reduction (MPR) power for V2X physical channels and signals due to PSCCH and PSSCH simultaneous transmission.

For contiguous allocation of PSCCH and PSSCH simultaneous transmission, the allowed MPR for the maximum output power for V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2.3G.1.1.3-1 for power class 3.

Table 6.2.3G.1.1.3-1: Maximum Power Reduction (MPR) for power class 3 V2X Communication (Contiguous PSCCH and PSSCH transmission)

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK							≤ 1.5
16 QAM							≤ 2

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.3G.

6.2.3G.1.1.4 Test description

6.2.3G.1.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3G.1.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3.

Table 6.2.3G.1.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10 MHz	QPSK	[48]
10 MHz	16QAM	[48]
20 MHz	QPSK	[96]
20 MHz	16QAM	[96]

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 6.2.3G.1.1.4.3.
3. The V2X reference measurement channel is set according to Table 6.2.3G.1.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode - FFS.

6.2.3G.1.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Measure the mean power of the UE in the channel bandwidth for each test point in Table 6.2.3G.1.1.5-1 according to the test configuration from Table 6.2.3G.1.1.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.2.3G.1.1.4.3 Message contents

FFS

6.2.3G.1.1.5 Test Requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3G.1.1.5-1.

Table 6.2.3G.1.1.5-1: UE Power Class 3 test requirements

E-UTRA Band	**Class 3 (dBm)**	**QPSK Tol. (dB))**	**16QAM Tol. (dB)**
47	23	+2.7 / [-4.2]	+2.7 / [-4.7]
Note 1: For transmission bandwidths (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.			
Note 2: For the UE maximum output power modified by MPR, the power limits specified in Table 6.2.5.3-1 apply.			

6.2.3G.1.2

6.2.3G.1.3 Maximum Power Reduction (MPR) for V2X Communication / Power class 3 / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmission

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram

- Message contents and test requirements

- Applicability spec

- The test point selection is FFS.

6.2.3G.1.3.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance covering configurations where a maximum power reduction is allowed in the UE.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2.3G.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

6.2.3G.1.3.3 Minimum conformance requirements

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, the allowed MPR requirements in subclause 6.2.3G apply for V2X PSSCH and PSCCH transmission. The allowed MPR requirements in subclause 6.2.4D apply for other V2X sidelink transmission (PSBCH/PSSS/SSSS). The MPR requirements in subclause 6.2.3 apply for uplink transmission.

The normative reference for this requirement is TS 36.101 [2] clause 6.2.3G.

6.2.3G.1.3.4 Test description

6.2.3G.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.3G.1.3.4.1-1. The details of the uplink and V2X reference measurement channels (RMCs) are specified in A.2 and A.8.3 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.3G.1.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range for uplink and Low range for V2X, High range for uplink and High range for V2X				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest, Highest				
Test Parameters for Channel Bandwidths						
	Downlink	**Uplink Configuration**		**V2X Configuration**		
Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4MHz		QPSK	5	10 MHz	QPSK	48
1.4MHz		QPSK	6	10 MHz	16QAM	48
1.4MHz		16QAM	5	20 MHz	QPSK	96
1.4MHz		16QAM	6	20 MHz	16QAM	96
3MHz		QPSK	4			
3MHz		QPSK	15			
3MHz		16QAM	4			
3MHz		16QAM	15			
5MHz		QPSK	8			
5MHz		QPSK	25			
5MHz		16QAM	8			
5MHz		16QAM	25			
10MHz		QPSK	12			
10MHz		QPSK	50			
10MHz		16QAM	12			
10MHz		16QAM	50 (Note 3)			
15MHz		QPSK	16			
15MHz		QPSK	75			
15MHz		16QAM	16			
15MHz		16QAM	75 (Note 3)			
20MHz		QPSK	18			
20MHz		QPSK	100			
20MHz		16QAM	18			
20MHz		16QAM	100 (Note 3)			
Note 1: For the uplink RB allocation,						
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth.						
Note 3: Applies only for UE-Categories ≥2.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 6.2.3G.1.3.4.3
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 6.2.3G.1.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 6.2.3G.1.3.4.3.

6.2.3G.1.3.4.2 Test procedure

1. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 6.2.3G.1.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at P_{UMAX} level. Configure the UE to transmit PSCCH and PSSCH with the P_{UMAX} level of each test points.

3. Measure the mean power over all component carriers in the V2X con-current band configuration. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.2.3G.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

6.2.3G.1.3.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.3G.13.5-1.

Table 6.2.3G.1.3.5-1: Inter-band con-current V2X UE Power Class test requirements

V2X con-current band Configuration	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	QPSK full RB allocation Tol. (dB))	16QAM full RB allocation Tol. (dB)
V2X_3A-47A					23	[+2.7 / -3.7]	[+2.7 / -4.7]
V2X_7A-47A					23	[+2.7 / [1,2] -3.7]	[+2.7 / [1,2] -4.7]
V2X_8A-47A					23	[+2.7 / [1,2] -3.7]	[+2.7 / [1,2] -4.7]
V2X_39A-47A					23	[+2.7 / -3.7]	[+2.7 / -4.7]
V2X_41A-47A					23	[+2.7 / -3.7]	[+2.7 / -4.7]

NOTE 1: The con-current band combinations are used for V2X Service.
NOTE 2: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance
NOTE 3: For inter-band con-current aggregation the maximum power requirement applies to the total transmitted power over all component carriers (per UE).
NOTE 4: [4] refers to the transmission bandwidths (Figure 5.4.2-1) confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

6.2.4 Additional Maximum Power Reduction (A-MPR)

Editor's note: The following aspects are either missing or not yet determined:

- TT and test points are TBD.

6.2.4.1 Test purpose

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction A-MPR is allowed for the output power as specified in Table 6.2.2.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2.4.2 Test applicability

The requirements of this test apply in test case 6.6.2.2 Additional Spectrum Emission Mask for network signalled values NS_03, NS_04, NS_06, NS_07, NS_11, NS_20, NS_21 and NS_27 to all types of E-UTRA Power Class 3 UE release 8 and forward.

The requirements of this test apply in test case 6.6.3.3 Additional Spurious Emissions for network signalled values NS_05, NS_07, NS_08, NS_09, NS_11, NS_12, NS_13, NS_14, NS_15, NS_16, NS_17, NS_18, NS_19, NS_20, NS_21, NS_22, NS_23, NS_24, NS_25 and NS_27 to all types of E-UTRA Power Class 3 UE release 8 and forward.

NOTE: As a result TC 6.2.4 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4.3 Minimum conformance requirements

For UE Power Class 3 the specific requirements and identified sub-clauses are specified in Table 6.2.4.3-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in Table 6.2.4.3-1 to 6.2.4.3-24 are in addition to the allowed MPR requirements specified in clause 6.2.3. For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2.5 apply.

Table 6.2.4.3-1: Additional Maximum Power Reduction (A-MPR) / Spectrum Emission requirements

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.2-1	1.4,3,5,10,15,20	Table 5.4.2-1	N/A
NS_03	6.6.2.2.3.1	2,4,10, 23, 25,35,36, 66, 70	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.3.2	41	5	>6	≤1
			10, 15, 20	Table 6.2.4.3-2	
NS_04	6.6.2.2.3.2, 6.6.3.3.3.1	41	5,10, 15, 20	Table 6.2.4.3-3, Table 6.2.4.3-4	
NS_05	6.6.3.3.3.2	1	10,15,20	≥ 50 [1]	≤ 1 [1]
			15, 20	Table 6.2.4.3-5 [2]	
		65 [3]	10,15,20	≥ 50	≤ 1 [1]
			15,20	Table 6.2.4.3-5 [2]	
NS_06	6.6.2.2.3.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.4.2-1	N/A
NS_07	6.6.2.2.3.3 6.6.3.3.3.3	13	10	Table 6.2.4.3-6	Table 6.2.4.3-6
NS_08	6.6.3.3.3.4	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.3.5	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4.3-7	Table 6.2.4.3-7
NS_11	6.6.2.2.1 6.6.3.3.3.6	23[1]	1.4, 3, 5, 10,15,20	Table 6.2.4.3-8	Table 6.2.4.3-8
NS_12	6.6.3.3.3.7	26	1.4, 3, 5, 10, 15	Table 6.2.4.3-9, Table 6.2.4.3-10	Table 6.2.4.3-9, Table 6.2.4.3-10
NS_13	6.6.3.3.3.8	26	5	Table 6.2.4.3-11	Table 6.2.4.3-11
NS_14	6.6.3.3.3.9	26	10, 15	Table 6.2.4.3-12	Table 6.2.4.3-12
NS_15	6.6.3.3.3.10	26	1.4, 3, 5, 10, 15	Table 6.2.4.3-13 Table 6.2.4.3-14	Table 6.2.4.3-13, Table 6.2.4.3-14
NS_16	6.6.3.3.3.11	27	3, 5, 10	Table 6.2.4.3-15, Table 6.2.4.3-16, Table 6.2.4.3-17	
NS_17	6.6.3.3.3.12	28	5, 10	Table 5.4.2-1	N/A
NS_18	6.6.3.3.3.13	28	5	≥ 2	≤ 1
			10, 15, 20	≥ 1	≤ 4
NS_19	6.6.3.3.3.14	44	10, 15, 20	Table 6.2.4.3-18	Table 6.2.4.3-18
NS_20	6.2.2 6.6.2.2.1 6.6.3.3.3.15	23	5, 10, 15, 20	Table 6.2.4.3-19	Table 6.2.4.3-19
NS_21	6.6.2.2.3.1 6.6.3.3.3.16	30	5, 10	Table 6.2.4.3-20	Table 6.2.4.3-20
NS_22	6.6.3.3.3.17	42, 43	5, 10, 15, 20	Table 6.2.4.3-21	
NS_23	6.6.3.3.3.18	42, 43	5, 10, 15, 20	N/A	
NS_24	6.6.3.3.3.19	65 [4]	5, 10, 15, 20	Table 6.2.4.3-22	
NS_25	6.6.3.3.3.20	65 [4]	5, 10, 15, 20	Table 6.2.4.3-23	
…					
NS_27	6.6.2.2.3.4, 6.6.3.3.3.21	48	5, 10, 15, 20	Table 6.2.4.3-24	
…					
NS_32	-	-	-	-	-

Note 1 Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned, where channel BW is as defined in subclause 5.6. A-MPR for operations below this frequency is not covered in this version of specifications except for the channel assignments in Note2 as the emissions requirement in 6.6.3.3.3.2 may not be met. For 10MHz channel

	bandwidth whose carrier frequency is larger than or equal to 1945 MHz or 15 MHz channel bandwidth whose carrier frequency is larger than or equal to 1947.5 MHz, no A-MPR applies.
Note 2	Applicable when carrier frequency is 1932.5 MHz for 15MHz channel bandwidth or 1930 MHz for 20MHz channel bandwidth case.
Note 3:	Applicable when the E-UTRA carrier is within 1920-1980 MHz.
Note 4:	Applicable when the upper edge of the channel bandwidth frequency is greater than 1980MHz.

Table 6.2.4.3-2: A-MPR for NS_04 for bandwidths > 5MHz (Rel-11 and earlier)

Channel bandwidth [MHz]	Parameters	Region A	Region B		Region C
10	RB_{start} [1]	0 – 12	13 – 36		37 – 49
	RB_{start} [1] + L_{CRB} [2] [RBs]	N/A (Note 3)	14 - 37	>37	N/A (Note 3)
	A-MPR [dB]	≤3dB	0	≤2dB	≤3dB
15	RB_{start} [1]	0 – 18	19 – 55		56 – 74
	RB_{start} [1] + L_{CRB} [2] [RBs]	N/A (Note 3)	20 - 56	>56	N/A (Note 3)
	A-MPR [dB]	≤3dB	0	≤2dB	≤3dB
20	RB_{start} [1]	0 – 24	25 – 74		75 – 99
	RB_{start} [1] + L_{CRB} [2] [RBs]	N/A (Note 3)	26 - 75	>75	N/A (Note 3)
	A-MPR [dB]	≤3dB	0	≤2dB	≤3dB

Note 1: RB_{start} indicates the lowest RB index of transmitted resource blocks.
Note 2: L_{CRB} is the length of a contiguous resource block allocation.
Note 3: Any RB allocation that starts in Region A or C is allowed the specified A-MPR.
Note 4: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis.
Note 5: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe.

Table 6.2.4-3: A-MPR requirements for "NS_04" with bandwidth >5MHz (Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0)

Channel bandwidth [MHz]	Parameters						
5	Fc [MHz]	≤ 2499.5					> 2499.5
	RB_{start}	0 - 8			9 – 24		0 - 24
	L_{CRB} [RBs]	> 0			> 0		> 0
	A-MPR [dB]	≤ 2			0		0
10	Fc [MHz]	≤ 2504					> 2504
	RB_{start}	0 - 8			9 - 35	36 - 49	0 - 49
	L_{CRB} [RBs]	≤ 15	> 15 and < 25	≥ 25	N/A	> 0	> 0
	RB_{start} + L_{CRB} [RBs]	N/A	N/A	N/A	≥ 45	N/A	N/A
	A-MPR [dB]	≤ 3	≤ 1	≤ 2	≤ 1	0	0
15	Fc [MHz]	≤ 2510.8					> 2510.8
	RB_{start}	0 - 13			14 – 59	60 – 74	0 - 74
	L_{CRB} [RBs]	≤ 18 or ≥ 36	> 18 and < 36		N/A	> 0	> 0
	RB_{start} + L_{CRB} [RBs]	N/A	N/A		≥ 62	N/A	N/A
	A-MPR [dB]	≤ 3	≤ 1		≤ 1	0	0
20	Fc [MHz]	≤ 2517.5					> 2517.5
	RB_{start}	0 – 22			23 – 76	77 – 99	0 - 99
	L_{CRB} [RBs]	≤ 18 or ≥ 40	> 18 and < 40		N/A	> 0	> 0
	RB_{start} + L_{CRB} [RBs]	N/A	N/A		≥ 86	N/A	N/A
	A-MPR [dB]	≤ 3	≤ 1		≤ 1	0	0

NOTE 1: RB_{start} indicates the lowest RB index of transmitted resource blocks
NOTE 2: L_{CRB} is the length of a contiguous resource block allocation
NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis
NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe

Table 6.2.4.3-4: A-MPR requirements for "NS_04" for Power Class 3 UE (Rel-12 and later and bit 2 of modifiedMPRbehavior = 1)

Channel bandwidth [MHz]	Parameters						
5	Fc [MHz]	≤ 2500.5					> 2500.5
	RB_{start}	0 - 8			9 – 24		0 - 24
	L_{CRB} [RBs]	> 0			> 0		> 0
	A-MPR [dB]	≤ 2			0		0
10	Fc [MHz]	≤ 2504					> 2504
	RB_{start}	0 - 8			9 - 35	36 - 49	0 - 49
	L_{CRB} [RBs]	≤ 15	> 15 and < 25	≥ 25	N/A	> 0	> 0
	$RB_{start} + L_{CRB}$ [RBs]	N/A	N/A	N/A	≥ 45	N/A	N/A
	A-MPR [dB]	≤ 3	≤ 1	≤ 2	≤ 1	0	0
15	Fc [MHz]	≤ 2510.8					> 2510.8
	RB_{start}	0 - 13			14 – 59	60 – 74	0 - 74
	L_{CRB} [RBs]	≤ 18 or ≥ 36	> 18 and < 36		N/A	> 0	> 0
	$RB_{start} + L_{CRB}$ [RBs]	N/A	N/A		≥ 62	N/A	N/A
	A-MPR [dB]	≤ 3	≤ 1		≤ 1	0	0
20	Fc [MHz]	≤ 2517.5					> 2517.5
	RB_{start}	0 – 22			23 – 76	77 – 99	0 - 99
	L_{CRB} [RBs]	≤ 18 or ≥ 40	> 18 and < 40		N/A	> 0	> 0
	$RB_{start} + L_{CRB}$ [RBs]	N/A	N/A		≥ 86	N/A	N/A
	A-MPR [dB]	≤ 3	≤ 1		≤ 1	0	0

NOTE 1: RB_{start} indicates the lowest RB index of transmitted resource blocks
NOTE 2: L_{CRB} is the length of a contiguous resource block allocation
NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis
NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe

Table 6.2.4.3-5: A-MPR for "NS_05"

Channel Bandwidth [MHz]	Parameters							
15	Fc [MHz]	1932.5						
	RB_{start}	0-7	8 – 66			67-74		
	L_{CRB} [RBs]	≥1	≤30	31 – 54	>54	≤6	>6	
	A-MPR [dB]	≤11	0	≤3	≤5	≤5	≤1	
20	Fc [MHz]	1930						
	RB_{start}	0-23	24-75				76-99	
	L_{CRB} [RBs]	≥1	≤24	25 – 40	41 – 50	> 50	≤6	>6
	A-MPR [dB]	≤11	0	≤3	≤5	≤10	≤5	≤1

Table 6.2.4.3-6: A-MPR for "NS_07"

Parameters	Region A		Region B				Region C	
RB_{start} [1]	0 – 12		13 –18		19 – 42		43 – 49	
L_{CRB} [2] [RBs]	6 – 8	1 to 5 and 9-50	<8	≥8	<18	≥18	≤2	>2
A-MPR [dB]	≤8	≤12	0	≤12	0	≤6	≤3	0

Note 1: RB_{start} indicates the lowest RB index of transmitted resource blocks
Note 2: L_{CRB} is the length of a contiguous resource block allocation
Note 3: For intra-subframe frequency hopping between two regions, notes 1 and 2 apply on a per slot basis.
Note 4: For intra-subframe frequency hopping between two regions, the larger A-MPR value of the two regions may be applied for both slots in the subframe.

Table 6.2.4.3-7: A-MPR for "NS_10"

Channel bandwidth [MHz]	Parameters	Region A
15	RB_{start} [1]	0 – 10
	L_{CRB} [RBs]	1 -20
	A-MPR [dB]	≤ 2
20	RB_{start} [1]	0 – 15
	L_{CRB} [RBs]	1 -20
	A-MPR [dB]	≤ 5

Note 1: RB_{start} indicates the lowest RB index of transmitted resource blocks.
Note 2: L_{CRB} is the length of a contiguous resource block allocation.
Note 3: For intra-subframe frequency hopping which intersects Region A, notes 1 and 2 apply on a per slot basis.
Note 4: For intra-subframe frequency hopping which intersect Region A, the larger A-MPR value may be applied for both slots in the subframe.

Table 6.2.4.3-8: A-MPR for NS_11

Channel Bandwidth [MHz]	Parameters						
3	Fc [MHz]	<2004	≥2004				
	L_{CRB} [RBs]	1-15	>5				
	A-MPR [dB]	≤5	≤ 1				
5	Fc [MHz]	<2004	2004 ≤ Fc <2007		≥2007		
	L_{CRB} [RBs]	1-25	1-6 & 15-25	8-12	>6		
	A-MPR [dB]	≤7	≤ 4	0	≤ 1		
10	Fc [MHz]	2005 ≤ Fc <2015		2015			
	RB_{start}	0-49		0-49			
	L_{CRB} [RBs]	1-50		1-50			
	A-MPR [dB]	≤ 12		0			
15	Fc [MHz]	<2012.5					
	RB_{start}	0-4	5-21		22-56		57-74
	L_{CRB} [RBs]	≥1	7-50	0-6 & ≥50	≤25	>25	>0
	A-MPR [dB]	≤15	≤7	≤10	0	≤6	≤15
	Fc [MHz]	2012.5					
	RB_{start}	0-12	13-39		40-65		66-74
	L_{CRB} [RBs]	≥1	≥30	<30	≥ (69 – RB_{start})		≥1
	A-MPR [dB]	≤10	≤6	0	≤2		≤6.5
20	Fc [MHz]	2010					
	RB_{start}	0-12	13-29		30-68		69-99
	L_{CRB} [RBs]	≥1	10-60	1-9 & >60	1-24	≥25	≥1
	A-MPR [dB]	≤15	≤7	≤10	0	≤7	≤15

Table 6.2.4.3-9: A-MPR for "NS_12" (Rel-11 and earlier)

Channel bandwidth [MHz]	Parameters	Region A		Region B
1.4	RB_{start}	0		1-2
	L_{CRB} [RBs]	≤3	≥4	≥4
	A-MPR [dB]	≤3	≤6	≤3
3	RB_{start}	0-3		4-5
	L_{CRB} [RBs]	4-9	1-3 and 10-15	≥9
	A-MPR [dB]	≤4	≤3	≤3
5	RB_{start}	0-6		7-9
	L_{CRB} [RBs]	≤8	≥9	≥15
	A-MPR [dB]	≤5	≤3	≤3

Table 6.2.4.3-10: A-MPR for "NS_12" (Rel-12 and later)

Channel bandwidth [MHz]	Parameters	Region A		Region B
1.4	RB_{start}	0		1-2
	L_{CRB} [RBs]	≤3	≥4	≥4
	A-MPR [dB]	≤3	≤6	≤3
3	RB_{start}	0-3		4-5
	L_{CRB} [RBs]	1-15		≥9
	A-MPR [dB]	≤4		≤3
5	RB_{start}	0-6		0-9
	L_{CRB} [RBs]	≤8		≥9
	A-MPR [dB]	≤5		≤3
10	RB_{start}	0-15		0-22
	L_{CRB} [RBs]	≤18		≥20
	A-MPR [dB]	≤4		≤2
15	RB_{start}	0-30		0-30
	L_{CRB} [RBs]	≤30		≥32
	A-MPR [dB]	≤4		≤3

Table 6.2.4.3-11: A-MPR for "NS_13"

Channel bandwidth [MHz]	Parameters	Region A	
5	RB_{start}	0-2	
	L_{CRB} [RBs]	≤5	≥18
	A-MPR [dB]	≤3	≤2

Table 6.2.4.3-12: A-MPR for "NS_14"

Channel bandwidth [MHz]	Parameters	Region A	
10	RB_{start}	0	
	L_{CRB} [RBs]	≤5	≥50
	A-MPR [dB]	≤3	≤1
15	RB_{start}	≤8	
	L_{CRB} [RBs]	≤16	≥50
	A-MPR [dB]	≤3	≤1

Table 6.2.4.3-13: A-MPR for "NS_15" for E-UTRA highest channel edge ≤ 845 MHz

Channel bandwidth [MHz]	Parameters	Region A	Region B	Region C
5	RB_{end} [RB]			19-24
	L_{CRB} [RB]			≥18
	A-MPR [dB]			≤2
10	RB_{end} [RB]	0-4	29-44	45-49
	L_{CRB} [RB]	≤2	≥24	>0
	A-MPR [dB]	≤4	≤4	≤9
15	RB_{end} [RB]	0-12	44-61	62-74
	L_{CRB} [RB]	≤2	≥20	>0
	A-MPR [dB]	≤4	≤5	≤9

Table 6.2.4.3-14: A-MPR for "NS_15" for E-UTRA highest channel edge > 845 MHz and ≤ 849 MHz

Channel bandwidth [MHz]	Parameters	Region A	Region B	Region C
1.4	RB_{end} [RB]			4-5
	A-MPR [dB]			≤3
3	RB_{end} [RB]	0-1	8-12	13-14
	L_{CRB} [RB]	≤2	≥8	>0
	A-MPR [dB]	≤4	≤4	≤9
5	RB_{end} [RB]	0-4	12-19	20-24
	L_{CRB} [RB]	≤2	≥8	>0
	A-MPR [dB]	≤4	≤5	≤9
10	RB_{end} [RB]	0-12	23-36	37-49
	L_{CRB} [RB]	≤2	≥15	>0
	A-MPR [dB]	≤4	≤6	≤9
15	RB_{end} [RB]	0-20	26-53	54-74
	L_{CRB} [RB]	≤2	≥20	>0
	A-MPR [dB]	≤4	≤5	≤9

Table 6.2.4.3-15: A-MPR for "NS_16" with channel lower edge at ≥807 MHz and <808.5 MHz

Channel band-width [MHz]	Parameter	Region A	Region B	Region C	Region D	Region E
3 MHz	RB_{start}	0	1-2			
	L_{CRB} [RBs]	≥12	12			
	A-MPR [dB]	≤2	≤1			
5 MHz	RB_{start}	0-1	2	2-9	2-5	
	L_{CRB} [RBs]	1 - 25	12	15-18	20	
	A-MPR [dB]	≤5	≤1	≤2	≤3	
10 MHz	RB_{start}	0 - 8	0-14		15-20	15-24
	L_{CRB} [RBs]	1 - 12	15-20	≥24	≥30	24-27
	A-MPR [dB]	≤5	≤3	≤7	≤3	≤1

Table 6.2.4.3-16: A-MPR for "NS_16" with channel lower edge at ≥808.5 MHz and <812 MHz

Channel band-width [MHz]	Parameter	Region A	Region B	Region C	Region D	Region E
5 MHz	RB_{start}	0	0-1	1-5		
	L_{CRB} [RBs]	16-20	≥24	16-20		
	A-MPR [dB]	≤2	≤3	≤1		
10 MHz	RB_{start}	0-6		0-10	0-14	11-20
	L_{CRB} [RBs]	1-12	15-20	24-32	≥36	24-32
	A-MPR [dB]	≤5	≤2	≤4	≤5	≤1

Table 6.2.4.3-17: A-MPR for "NS_16" with channel lower edge at ≥812 MHz

Channel band-width [MHz]	Parameter	Region A	Region B	Region C	Region D
10 MHz	RB_{start}	0 - 9	0	1-14	0-5
	L_{CRB} [RBs]	27-32	36-40	36-40	≥45
	A-MPR [dB]	≤1	≤2	≤1	≤3

Table 6.2.4.3-18: A-MPR for "NS_19"

Channel bandwidth [MHz]	Parameters	Region A		Region B
10	RB_{start}			0-6
	L_{CRB} [RBs]			≥40
	A-MPR [dB]			≤1
15	RB_{start}	0-6		7-20
	L_{CRB} [RBs]	≤18	≥36	≥42
	A-MPR [dB]	≤2	≤3	≤2
20	RB_{start}	0-14		15-30
	L_{CRB} [RBs]	≤40	≥45	≥50
	A-MPR [dB]	≤2	≤3	≤2

Table 6.2.4.3-19: A-MPR for "NS_20"

Channel bandwidth [MHz]	Parameters							
5	Fc (MHz)	< 2007.5		2007.5 ≤ Fc < 2012.5			2012.5 ≤ Fc ≤ 2017.5	
	RB_{start}	≤24		0-3		4-6	≤24	
	L_{CRB} (RBs)	>0		15-19	≥20	≥18	1-25	
	A-MPR [dB]	≤17		≤1	≤4	≤2	≤ 0	
10	Fc (MHz)	2005						
	RB_{start}	0-25		26-34			35-49	
	L_{CRB} (RBs)	>0		8-15		>15	>0	
	A-MPR [dB]	≤16		≤2		≤5	≤ 6	
	Fc (MHz)	2015						
	RB_{start}	0-5				6-10		
	L_{CRB} (RBs)	≥32				≥40		
	A-MPR [dB]	≤4				≤2		
15	Fc (MHz)	2012.5						
	RB_{start}	0-14			15-24		25-39	61-74
	L_{CRB} (RBs)	1-9 & 40-75	10-39		24-29	≥30	≥36	≤6
	A-MPR [dB]	≤11	≤6		≤1	≤7	≤5	≤6
20	Fc (MHz)	2010						
	RB_{start}	0-21	22-31		32-38	39-49	50-69	70-99
	L_{CRB} (RBs)	>0	1-9 & 31-75	10-30	≥15	≥24	≥25	>0
	A-MPR [dB]	≤17	≤12	≤6	≤9	≤7	≤5	≤16

NOTE 1: When NS_20 is signalled the minimum requirements for the 10 MHz bandwidth are specified for E-UTRA UL carrier centre frequencies of 2005 MHz or 2015 MHz.
NOTE 2: When NS_20 is signalled the minimum requirements for the 15 MHz channel bandwidth are specified for E-UTRA UL carrier centre frequency of 2012.5 MHz.

Table 6.2.4.3-20: A-MPR for "NS_21"

Channel Bandwidth [MHz]	Parameters	Region A		Region B	
10	RB_{start}	0 – 6	0 – 6	N/A	N/A
	RB_{end}	N/A	N/A	43 – 49	43 – 49
	L_{CRB} [RBs]	1 – 2	3 – 12, 32 - 50	1 – 2	3 – 12, 32 - 50
	A-MPR [dB]	≤ 4	≤ 3	≤ 4	≤ 3

Table 6.2.4.3-21: A-MPR for "NS_22"

Channel bandwidth [MHz]	Parameters	Region A	Region B	Region C	Region D
5	No A-MPR is needed for 5 MHz channel bandwidth				
10	RB_{start}	0-13	0-17	≤ 6	≥12
	L_{CRB} [RBs]	> 36	33-36	≤ 32	≤ 32
	RBstart + LCRB [RBs]	N/A	N/A	N/A	≥44
	A-MPR [dB]	≤ 4	≤ 3	≤ 3	≤ 3
15	RB_{start}	0-24	0-38	≤ 14	≥ 23
	L_{CRB} [RBs]	> 50	37-50	≤ 36	≤ 36
	RBstart + LCRB [RBs]	N/A	N/A	N/A	≥59
	A-MPR [dB]	≤ 5	≤ 4	≤ 3	≤ 3
20	RB_{start}	0-35	0-51	≤ 21	≥ 31
	L_{CRB} [RBs]	> 64	49-64	≤ 48	≤ 48
	RBstart + LCRB [RBs]	N/A	N/A	N/A	≥79
	A-MPR [dB]	≤ 5	≤ 4	≤ 3	≤ 3

NOTE 1: RB_{start} indicates the lowest RB index of transmitted resource blocks
NOTE 2: L_{CRB} is the length of a contiguous resource block allocation
NOTE 3: For intra-subframe frequency hopping between two regions, notes 1 and 2 apply on a per slot basis.
NOTE 4: For intra-subframe frequency hopping between two regions, the larger A-MPR value of the two regions may be applied for both slots in the subframe.

Table 6.2.4.3-22: A-MPR for "NS_24"

Channel Bandwidth [MHz]	Parameters							
5	Fc [MHz]	Fc > [1987.5]						
	RB_{start}	0 – 24						
	L_{CRB} [RBs]	0 – 24						
	A-MPR [dB]	≤ 10						
10	Fc [MHz]	1975 < Fc ≤ 1985					1985<Fc≤1995	Fc>1995
	RB_{start}	0 - 1	2 - 14	15 - 26	36 - 49		0 - 49	0 - 49
	L_{CRB} [RBs]	> 10	≥ 35	N/A	≤ 2	> 11	0 - 49	0 - 49
	RB_{end}	N/A	N/A	> 48	N/A	N/A	N/A	N/A
	A-MPR [dB]	≤ 2	≤ 2	1	≤ 3	≤ 1	≤ 9	≤ 17
15	Fc [MHz]	1972.5 < Fc ≤ 1987.5						Fc > 1987.5
	RB_{start}	0 - 11				12 - 74		0 - 74
	L_{CRB} [RBs]	≤ 45		> 45		> 3		0 - 74
	RB_{end}	N/A		N/A		≥ 45		N/A
	A-MPR [dB]	≤ 2		≤ 8		≤ 7		≤ 17
20	Fc [MHz]	Fc > 1970						
	RB_{start}	0 – 99						
	L_{CRB} [RBs]	0 – 99						
	A-MPR [dB]	≤ 17						

Table 6.2.4.3-23: A-MPR for "NS_25"

Channel Bandwidth [MHz]	Parameters								
5	Fc [MHz]	Fc > [1997.5]							
	RB_{start}	0 - 9				10 – 24			
	L_{CRB} [RBs]	> 12				N/A			
	RB_{end}	N/A				≥ 22			
	A-MPR [dB]	≤ 5				≤ 2			
10	Fc [MHz]	1975 < Fc ≤ 1985		1985 < Fc ≤ 1995			Fc > 1995		
	RB_{start}	0-1	2-49	0		1 - 18	19-49	0-6	7-15	16-49
	L_{CRB} [RBs]	> 10	N/A	≤ 25	> 25	> 25	N/A	N/A	> 20	N/A
	RB_{end}	N/A	> 48	N/A	N/A	N/A	> 42	N/A	N/A	> 35
	A-MPR [dB]	≤ 1	≤ 1	≤ 1	≤ 5	≤ 5	≤ 1	≤ 10	≤ 7	≤ 11
15	Fc [MHz]	1972.5 < Fc ≤ 1987.5						Fc > 1987.5		
	RB_{start}	0 - 4		5 - 30		31 - 62	63 - 74	0 - 74		
	L_{CRB} [RBs]	≥ 15		≥ 45		N/A	N/A	0 - 74		
	RB_{end}	N/A		N/A		> 71	N/A	N/A		
	A-MPR [dB]	≤ 4		≤ 3		≤ 1	≤ 1	≤ 13		
20	Fc [MHz]	1970 < Fc ≤ 1990						Fc > 1990		
	RB_{start}	0 - 13		14 - 40		41 - 99		0 - 99		
	L_{CRB} [RBs]	N/A		≥ 32		N/A		0 - 99		
	RB_{end}	N/A		N/A		> 72		N/A		
	A-MPR [dB]	≤ 11		≤ 11		≤13		≤ 13		

Table 6.2.4.3-24: A-MPR for "NS_27“

Parameters				
Channel bandwidth [MHz]	**RB_{start}**	**RB_{end}**	**L_{CRB}**	**A-MPR**
15	0 – 6		≤ 15	≤ 4 dB
		68 – 74		
	≥ 0		≥ 60	≤ 2 dB
20	0 – 12		≤ 20	≤ 4 dB
		87 – 99		
	13 – 15		≤ 3	≤ 1 dB
		84 – 86		
	≥ 0		≥ 60	≤ 3 dB

For PRACH, PUCCH and SRS transmissions, the allowed A-MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For each subframe, the A-MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot; the maximum A-MPR over the two slots is then applied for the entire subframe.

The normative reference for this requirement is TS 36.101 clause 6.2.4.

6.2.4.4 Test description

6.2.4.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.4.4.1-1 through table 6.2.4.4.1-24. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					Lowest, 5MHz, 10MHz, Highest		
Test Parameters for NS_03 A-MPR							
		Downlink Configuration			**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
			FDD	**TDD**		**FDD**	**TDD**
1	1.4MHz	N/A for A-MPR testing.			QPSK	6	6
2	1.4MHz				QPSK	5	5
3	1.4MHz				16QAM (Note 6)	5	5
4	3MHz				QPSK	15	15
5	3MHz				QPSK	4	4
6	3MHz				16QAM (Note 6)	15	15
7	3MHz				16QAM (Note 6)	4	4
8	5MHz				QPSK	25	25
9	5MHz				QPSK	8	8
10	5MHz				QPSK	6	6
11	5MHz				16QAM (Note 6)	25	25
12	5MHz				16QAM (Note 6)	8	8
13	10MHz				QPSK	50	50
14	10MHz				QPSK	12	12
15	10MHz				QPSK	6	6
16	10MHz				16QAM (Note 6)	50 (Note 4)	50 (Note 4)
17	10MHz				16QAM (Note 6)	12	12
18	15MHz				QPSK	75	75
19	15MHz				QPSK	16	16
20	15MHz				QPSK	8	8
21	15MHz				16QAM (Note 6)	75 (Note 4)	75 (Note 4)
22	15MHz				16QAM (Note 6)	16	16
23	20MHz				QPSK	100	100
24	20MHz				QPSK	18	18
25	20MHz				QPSK	10	10
26	20MHz				16QAM (Note 6)	100 (Note 4)	100 (Note 4)
27	20MHz				16QAM (Note 6)	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Note 4: Applies only for UE-Categories ≥2.

Note 5: For band 23, above table only applies to mid and high range test frequencies. Low range test frequencies will be covered by NS_11 test configuration table.

Note 6: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-2: Test Configuration Table (network signalled value "NS_04")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0: For 5 MHz bandwidth: 2499.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866 Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39686 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10 MHz, 15 MHz, 20MHz		
Test Parameters for NS_04 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation TDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1 (Note 6)	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Note 6)	5MHz			QPSK	8	Note 3
3(Note 6)	5MHz			QPSK	6	Note 3
4 (Note 6)	5MHz			16QAM (Note 5)	25	0
5 (Note 6)	5MHz			16QAM (Note 5)	8	Note 3
6 (Note 6)	10MHz			QPSK	1	0
7 (Note 6)	10MHz			QPSK	12	0
8 (Note 6)	10MHz			QPSK	50	0
9 Note 6)	10MHz			16QAM (Note 5)	50 (Note 4)	0
10 (Note 6)	10MHz			QPSK	24	13
11 (Note 6)	10MHz			16QAM (Note 5)	24	13
12 (Note 6)	10MHz			QPSK	36	13
13 (Note 6)	10MHz			QPSK	12	37
14 (Note 6)	10MHz			QPSK	1	49
15 (Note 6)	15MHz			QPSK	1	0
16 (Note 6)	15MHz			QPSK	16	0
17 (Note 6)	15MHz			QPSK	75	0
18 (Note 6)	15MHz			16QAM	75	0

			(Note 5)	(Note 4)	
19 (Note 6)	15MHz		QPSK	36	19
20 (Note 6)	15MHz		16QAM (Note 5)	36 (Note 4)	19
21 (Note 6)	15MHz		QPSK	50	19
22 (Note 6)	15MHz		QPSK	18	56
23 (Note 6)	15MHz		QPSK	1	74
24 (Note 6)	20MHz		QPSK	1	0
25 (Note 6)	20MHz		QPSK	18	0
26 (Note 6)	20MHz		QPSK	100	0
27 (Note 6)	20MHz		16QAM (Note 5)	100 (Note 4)	0
28 (Note 6)	20MHz		QPSK	50	25
29 (Note 6)	20MHz		16QAM (Note 5)	50 (Note 4)	25
30 (Note 6)	20MHz		QPSK	75	25
31 (Note 6)	20MHz		QPSK	25	75
32 (Note 6)	20MHz		QPSK	1	99
33 (Note 8)	5MHz		QPSK	1	0
34 (Note 8)	5MHz		QPSK	16	9
35 (Note 9)	5MHz		QPSK	25	0
36 (Note 8)	5MHz		16QAM (Note 5)	16	9
37 (Note 9)	5MHz		16QAM (Note 5)	25	0
38 (Note 8)	10MHz		QPSK	1	0
39 (Note 8)	10MHz		QPSK	1	49
40 (Note 8)	10MHz		QPSK	24	0
41 (Note 8)	10MHz		QPSK	40	10
42 (Note 7)	10MHz		QPSK	50	0
43 (Note 7)	10MHz		16QAM (Note 5)	50	0
44 (Note 8)	15MHz		QPSK	1	0
45 (Note 8)	15MHz		QPSK	1	74
46 (Note 8)	15MHz		QPSK	32	0
47 (Note 8)	15MHz		QPSK	60	15
48 (Note 7)	15MHz		QPSK	75	0
49 (Note 7)	15MHz		16QAM (Note 5)	75	0
50 (Note 8)	20MHz		QPSK	1	0
51 (Note 8)	20MHz		QPSK	1	99
52 (Note 8)	20MHz		QPSK	36	0
53 (Note 8)	20MHz		QPSK	75	25
54 (Note 7)	20MHz		QPSK	100	0
55 (Note 7)	20MHz		16QAM (Note 5)	100	0

Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in subclause 6.2.4 as not all combinations are necessarily required based on the applicability of the UE.
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 4: Applies only for UE-Categories ≥2.
Note 5: The 16QAM configurations shall not apply to UEs which support UL 64QAM.
Note 6: Applies only for Rel-11 and earlier.
Note 7: Applies only for Rel-12 and later.
Note 8: Applies only for Rel-12 and later and Low Range.
Note 9: Applies only for Rel-12 and later and Mid, High Range and additional test frequencies.

Table 6.2.4.4.1-3: Test Configuration Table (network signalled value "NS_05")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range In case of Low range: - For 5MHz Channel Bandwidth: 1927.2MHz (NUL = 18072) - For 10 MHz Channel Bandwidth: 1934.7 MHz (NUL = 18147) - For 15 MHz Channel Bandwidth: 1932.5 MHz (NUL = 18125) - For 20 MHz Channel Bandwidth: 1930 MHz (NUL = 18100)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_05 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	1	24
3	5MHz			QPSK	25	0
4	10MHz			QPSK	1	0
5	10MHz			QPSK	1	49
6	10MHz			QPSK	12	0
7	10MHz			QPSK	12	38
8	10MHz			QPSK	48	0
9	10MHz			QPSK	48	2
10 (Note 8)	10MHz			QPSK	50	0
11 (Note 8)	10MHz			16QAM (Note 7)	50 (Note 4)	0
12 (Note 9)	15MHz			QPSK	1	8
13 (Note 9)	15MHz			QPSK	1	66
14 (Note 9)	15MHz			QPSK	16	8
15 (Note 9)	15MHz			QPSK	16	51
16 (Note 9)	15MHz			QPSK	30	8
17 (Note 9)	15MHz			QPSK	30	37
18 (Note 9)	20MHz			QPSK	1	24
19 (Note 9)	20MHz			QPSK	1	75
20 (Note 9)	20MHz			QPSK	18	24
21 (Note 9)	20MHz			QPSK	18	58
22 (Note 9)	20MHz			QPSK	24	24
23 (Note 9)	20MHz			QPSK	24	52
24 (Note 10)	15MHz			QPSK	1	0
25 (Note 10)	15MHz			QPSK	1	74
26 (Note 10)	15MHz			QPSK	16	0
27 (Note 10)	15MHz			QPSK	16	59

28 (Note 10)	15MHz		QPSK	48	0
29 (Note 10)	15MHz		QPSK	48	27
30 (Note 10)	15MHz		QPSK	75	0
31 (Note 10)	15MHz		16QAM (Note 7)	75 (Note 4)	0
32 (Note 10)	20MHz		QPSK	1	0
33 (Note 10)	20MHz		QPSK	1	99
34 (Note 10)	20MHz		QPSK	18	0
35 (Note 10)	20MHz		QPSK	18	82
36 (Note 10)	20MHz		QPSK	48	0
37 (Note 10)	20MHz		QPSK	48	52
38 (Note 10)	20MHz		QPSK	100	0
39 (Note 10)	20MHz		16QAM (Note 7)	100 (Note 4)	0
40 (Note 11)	10MHz		QPSK	50	0
41 (Note 11)	10MHz		16QAM (Note 7)	50 (Note 4)	0
42 (Note 11)	15MHz		QPSK	1	0
43 (Note 11)	15MHz		QPSK	75	0
44 (Note 11)	15MHz		QPSK	16	8
45 (Note 11)	15MHz		QPSK	30	8
46 (Note 11)	15MHz		QPSK	54	8
47 (Note 11)	15MHz		QPSK	64	8
48 (Note 11)	15MHz		QPSK	1	74
49 (Note 11)	15MHz		QPSK	6	69
50 (Note 11)	15MHz		QPSK	8	67
51 (Note 11)	20MHz		QPSK	1	0
52 (Note 11)	20MHz		QPSK	100	0
53 (Note 11)	20MHz		QPSK	18	24
54 (Note 11)	20MHz		QPSK	24	24
55 (Note 11)	20MHz		QPSK	40	24
56 (Note 11)	20MHz		QPSK	50	24
57 (Note 11)	20MHz		QPSK	72	24
58 (Note 11)	20MHz		QPSK	1	99
59 (Note 11)	20MHz		QPSK	6	94
60 (Note 11)	20MHz		QPSK	24	76
61	10MHz		QPSK	50	0

(Note 12)					
62 (Note 12)	10MHz		16QAM (Note 7)	50 (Note 4)	0
63 (Note 12)	15MHz		QPSK	1	0
64 (Note 12)	15MHz		QPSK	1	74
65 (Note 12)	15MHz		QPSK	16	0
66 (Note 12)	15MHz		QPSK	16	59
67 (Note 12)	15MHz		QPSK	48	0
68 (Note 12)	15MHz		QPSK	48	27
69 (Note 12)	15MHz		QPSK	75	0
70 (Note 12)	15MHz		16QAM (Note 7)	75 (Note 4)	0
71 (Note 12)	20MHz		QPSK	1	0
72 (Note 12)	20MHz		QPSK	1	99
73 (Note 12)	20MHz		QPSK	18	0
74 (Note 12)	20MHz		QPSK	18	82
75 (Note 12)	20MHz		QPSK	48	0
76 (Note 12)	20MHz		QPSK	48	52
77 (Note 12)	20MHz		QPSK	100	0
78 (Note 12)	20MHz		16QAM (Note 7)	100 (Note 4)	0

Note 1: Void
Note 2: Void
Note 3: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 4: Applies only for UE-Categories ≥2.
Note 5: Void.
Note 6: Void.
Note 7: The 16QAM configurations shall not apply to UEs which support UL 64QAM.
Note 8: Applies when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 9: Applies for low range and when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 10: Applies for mid range and when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 11: Applies only for low range and when bit number 1 in modifiedMPRbehavior = 1 (Rel-12 minimum requirements apply) for Band1 and low range for Band65.
Note 12: Applies only for mid range and when bit number 1 in modifiedMPRbehavior = 1 (Rel-12 minimum requirements apply) for Band1 and mid range for Band65.
Note 13: ModifiedMPRbehavior is defined in annex J.1.

Table 6.2.4.4.1-4: Test Configuration Table (network signalled value "NS_06")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz	
Test Parameters for NS_06 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	1.4MHz	N/A for A-MPR testing		QPSK	6
2	1.4MHz			QPSK	5
3	1.4MHz			16QAM (Note 4)	5
4	5MHz			QPSK	25
5	5MHz			QPSK	8
6	5MHz			16QAM (Note 4)	8
7	10MHz			QPSK	50
8	10MHz			QPSK	12
9	10MHz			16QAM (Note 4)	12

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-5: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10MHz		
Test Parameters for NS_07 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	10MHz	N/A for A-MPR testing		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			16QAM (Note 3)	36 (Note 2)	13
7	10MHz			QPSK	16	19
8	10MHz			QPSK	12	19
9	10MHz			16QAM (Note 3)	16	19
10	10MHz			QPSK	30	19
11	10MHz			16QAM (Note 3)	30 (Note 2)	19
12	10MHz			QPSK	6	43
13	10MHz			QPSK	2	48
14	10MHz			QPSK	50	0
15	10MHz			QPSK	12	0
16	10MHz			16QAM (Note 3)	50 (Note 2)	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-6: Test Configuration Table (network signalled value "NS_08")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz	
Test Parameters for NS_08 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	10MHz			QPSK	1
5	10MHz			QPSK	12
6	10MHz			QPSK	40
7	10MHz			QPSK	50
8	10MHz			16QAM (Note 5)	50 (Note 4)
9	15MHz			QPSK	1
10	15MHz			QPSK	16
11	15MHz			QPSK	40
12	15MHz			QPSK	75
13	15MHz			16QAM (Note 5)	75 (Note 4)

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max + 1 - RB allocation) of the channel bandwidth
Note 4: Applies only for UE-Categories ≥2.
Note 5: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-7: Test Configuration Table (network signalled value "NS_09")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	10MHz			QPSK	1
5	10MHz			QPSK	12
6	10MHz			QPSK	40
7	10MHz			QPSK	50
8	10MHz			16QAM (Note 5)	50 (Note 4)
9	15MHz			QPSK	1
10	15MHz			QPSK	16
11	15MHz			QPSK	40
12	15MHz			QPSK	54
13	15MHz			QPSK	75
14	15MHz			16QAM (Note 5)	75 (Note 4)

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max + 1 - RB allocation) of the channel bandwidth
Note 4: Applies only for UE-Categories ≥2.
Note 5: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-8: Test Configuration Table (network signalled value "NS_10")

Void, not tested

Table 6.2.4.4.1-9: Test Configuration Table (network signalled value "NS_11")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 3 MHz Channel Bandwidth: a. 2001.5 MHz (N_{UL} = 25515) b. 2004.5 MHz (N_{UL} = 25545) For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2004.5 MHz (N_{UL} = 25545) c. 2007.5 MHz (N_{UL} = 25575) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2005.5 MHz (N_{UL} = 25555) c. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2007.5 MHz (N_{UL} = 25575) b. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				3MHz, 5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_11 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	3MHz	N/A for A-MPR testing		QPSK	6
2	3MHz			QPSK	15
3	3MHz			16QAM (Note 4)	6
4	3MHz			16QAM (Note 4)	15
5	5MHz			QPSK	1
6	5MHz			QPSK	8
7	5MHz			QPSK	25
8	5MHz			16QAM (Note 4)	8
9	5MHz			16QAM (Note 4)	25
10	10MHz			QPSK	1
11	10MHz			QPSK	12
12	10MHz			QPSK	50
13	10MHz			16QAM (Note 4)	12
14	10MHz			16QAM (Note 4)	50 (Note 3)
15	15MHz			QPSK	1
16	15MHz			QPSK	8

17	15MHz		QPSK	25
18	15MHz		QPSK	30
19	15MHz		QPSK	75
20	15MHz		16QAM (Note 4)	8
21	15MHz		16QAM (Note 4)	25
22	15MHz		16QAM (Note 4)	30
23	15MHz		16QAM (Note 4)	75
24	20MHz		QPSK	1
25	20MHz		QPSK	10
26	20MHz		QPSK	25
27	20MHz		QPSK	100
28	20MHz		16QAM (Note 4)	10
29	20MHz		16QAM (Note 4)	25
30	20MHz		16QAM (Note 4)	100

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-10: Test Configuration Table (network signalled value "NS_12")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: UL 814.9 MHz (N_{UL} = 26699) For 3 MHz Channel Bandwidth: UL 815.7 MHz (N_{UL} = 26707) For 5 MHz Channel Bandwidth: UL 816.7 MHz (N_{UL} = 26717) For 10 MHz Channel Bandwidth: UL 819.2 MHz (N_{UL} = 26742) For 15 MHz Channel Bandwidth: UL 821.7 MHz (N_{UL} = 26767)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz and 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for A-MPR testing.		QPSK	1	0
2	1.4 MHz			QPSK	6	0
3	1.4 MHz			QPSK	1	1
4	1.4 MHz			QPSK	5	1
5	1.4 MHz			16QAM (Note 3)	6	0
6 (Note 1)	3 MHz			QPSK	4	0
7 (Note 1)	3 MHz			QPSK	10	0
8	3 MHz			QPSK	4	4
9	3 MHz			QPSK	10	4
10 (Note 1)	3 MHz			16QAM (Note 3)	15	0
11	5 MHz			QPSK	8	0
12	5 MHz			QPSK	15	0
13	5 MHz			QPSK	8	7
14 (Note 1)	5 MHz			QPSK	15	7
15	5 MHz			16QAM (Note 3)	25	0
16 (Note 2)	10 MHz			QPSK	18	0
17 (Note 2)	10 MHz			QPSK	18	16
18 (Note 2)	10 MHz			16QAM (Note 3)	50	0
19 (Note 2)	15 MHz			QPSK	30	0
20 (Note 2)	15 MHz			QPSK	30	31
21 (Note 2)	15 MHz			16QAM (Note 3)	75	0
Note 1: Only for UEs of Rel-11 and earlier Note 2: Only for UEs of Rel-12 and later Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.2.4.4.1-11: Test Configuration Table (network signalled value "NS_13")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: UL 819.7 MHz (N_{UL} = 26747) For 3 MHz Channel Bandwidth: UL 820.5 MHz (N_{UL} = 26755) For 5 MHz Channel Bandwidth: UL 821.5 MHz (N_{UL} = 26765)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3MHz and 5 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (Note 1)	1.4 MHz	N/A for A-MPR testing.		QPSK	6	0
2 (Note 1)	3 MHz			QPSK	15	0
3	5 MHz			QPSK	1	0
4	5 MHz			QPSK	25	0
5	5 MHz			QPSK	15	0
6	5 MHz			QPSK	15	7
7	5 MHz			16QAM (Note 2)	25	0
Note 1: Only for UEs of Rel-12 and later Note 2: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.2.4.4.1-12: Test Configuration Table (network signalled value "NS_14")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 10 MHz Channel Bandwidth: UL 829 MHz (N_{UL} = 26840) For 15 MHz Channel Bandwidth: Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10 MHz, 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	10 MHz	N/A for A-MPR testing.		QPSK	1	0
2	10 MHz			QPSK	25	0
3	10 MHz			QPSK	50	0
4	10 MHz			QPSK	25	1
5 (Note 1)	10 MHz			16QAM (Note 2)	50	0
6	15 MHz			QPSK	8	0
7	15 MHz			QPSK	25	0
8	15 MHz			QPSK	75	0
9	15 MHz			QPSK	50	15
10 (Note 1)	15 MHz			16QAM (Note 2)	75	0
Note 1: Applies only for UE-Categories ≥2. Note 2: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.2.4.4.1-13: Test Configuration Table (network signalled value "NS_15")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	For 1.4 MHz Channel Bandwidth: High range For 3 MHz Channel Bandwidth: UL 843.5 MHz (N_{UL} = 26985) or High range For 5 MHz Channel Bandwidth: UL 842.5 MHz (N_{UL} = 26975) or High range For 10 MHz Channel Bandwidth: UL 840 MHz (N_{UL} = 26950) or High range For 15 MHz Channel Bandwidth: UL 837.5 MHz (N_{UL} = 26925) or High range
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz

Test Parameters for Channel Bandwidths						
		Downlink Configuration		Uplink Configuration		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 3)	1.4 MHz	N/A for A-MPR testing.		QPSK	4	0
2 (note 3)	1.4 MHz			16QAM (Note 4)	6	0
3 (note 3)	3 MHz			QPSK	6	7
4 (note 3)	3 MHz			QPSK	12	1
5 (note 3)	3 MHz			16QAM (Note 4)	15	0
6 (note 2)	3 MHz			QPSK	15	0
7 (note 3)	5 MHz			QPSK	6	14
8 (note 3)	5 MHz			QPSK	20	0
9 (note 3)	5 MHz			16QAM (Note 4)	25	0
10 (note 2)	5 MHz			QPSK	16	9
11 (note 2)	5 MHz			QPSK	25	0
12 (note 3)	10 MHz			QPSK	1	39
13 (note 3)	10 MHz			QPSK	1	10
14 (note 3)	10 MHz			QPSK	3	0
15 (note 3)	10 MHz			QPSK	20	3
16 (note 3)	10 MHz			QPSK	36	1
17 (note 3)	10 MHz			QPSK	50	0
18 (note 1, 3)	10 MHz			16QAM (Note 4)	50	0
19 (note 2)	10 MHz			QPSK	20	25
20 (note 2)	10 MHz			QPSK	45	0
21 (note 3)	15 MHz			QPSK	18	36
22 (note 3)	15 MHz			QPSK	25	1

23 (note 3)	15 MHz		QPSK	54	0
24 (note 1, 3)	15 MHz		16QAM (Note 4)	75	0
25 (note 2)	15 MHz		QPSK	18	44
26 (note 2)	15 MHz		QPSK	60	2

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only test frequency < high range.
Note 3: Applicable only to high range frequency testing.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-14: Test Configuration Table (network signalled value "NS_16")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: Low range For 3 MHz Channel Bandwidth: Low range, 810 MHz (N_{UL}= 27070) For 5 MHz Channel Bandwidth: Low range, 811 MHz (N_{UL}= 27080), 814.5 MHz (N_{UL}= 27115) For 10 MHz Channel Bandwidth: Low range, 813.5 MHz (N_{UL}= 27105), 817 MHz (N_{UL}= 27140)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for A-MPR testing.		QPSK	1	0
2	1.4 MHz			QPSK	6	0
3	1.4 MHz			16QAM (Note 4)	6	0
4	3 MHz			QPSK	1	0
5	3 MHz			QPSK	12	1
6	3 MHz			QPSK	15	0
7	3 MHz			16QAM (Note 4)	15	0
8	5 MHz			QPSK	1	0
9	5 MHz			QPSK	12	2
10	5 MHz			QPSK	18	2
11	5 MHz			QPSK	20	0
12	5 MHz			QPSK	20	2
13	5 MHz			QPSK	25	0
14	5 MHz			16QAM (Note 4)	25	0
15	10 MHz			QPSK	1	0
16 (Note 2)	10 MHz			QPSK	1	10

17 (Note 2)	10 MHz		QPSK	20	0
18 (Note 2)	10 MHz		QPSK	27	15
19 (Note 2)	10 MHz		QPSK	32	15
20	10 MHz		QPSK	32	0
21	10 MHz		QPSK	50	0
22 (Note 1)	10 MHz		16QAM (Note 4)	50	0
23 (Note 3)	10 MHz		QPSK	40	0
24 (Note 3)	10 MHz		QPSK	40	1

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applies only for 10 MHz channel for Low Range, and 813.5 MHz
Note 3: Applies only for 10 MHz channel for 817 MHz range
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-15: Test Configuration Table (network signalled value "NS_17")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)			Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)			Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)			5MHz, 10MHz		
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	5MHz			16QAM (Note 4)	25 (Note 3)
5	10MHz			QPSK	1
6	10MHz			QPSK	12
7	10MHz			QPSK	50
8	10MHz			16QAM (Note 4)	50 (Note 3)

Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-16: Test Configuration Table (network signalled value "NS_18")

Initial Conditions

Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	5MHz			16QAM (Note 4)	25 (Note 3)
5	10MHz			QPSK	1
6	10MHz			QPSK	12
7	10MHz			QPSK	50
8	10MHz			16QAM (Note 4)	50 (Note 3)
9	15MHz			QPSK	1
10	15MHz			QPSK	16
11	15MHz			QPSK	75
12	15MHz			16QAM (Note 4)	75 (Note 3)
13	20MHz			QPSK	1
14	20MHz			QPSK	18
15	20MHz			QPSK	100
16	20MHz			16QAM (Note 4)	100 (Note 3)

Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-17: Test Configuration Table (network signalled value "NS_19")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				3MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	3MHz	N/A		QPSK	15
2	3MHz			16QAM (Note 4)	15 (Note 3)
3	10MHz			QPSK	40
4	10MHz			16QAM (Note 4)	40 (Note 3)
5	15MHz			QPSK	1
6	15MHz			QPSK	18
7	15MHz			QPSK	36
8	15MHz			QPSK	45
9	15MHz			16QAM (Note 4)	45 (Note 3)
10	20MHz			QPSK	1
11	20MHz			QPSK	40
12	20MHz			QPSK	45
13	20MHz			QPSK	50
14	20MHz			16QAM (Note 4)	50 (Note 3)

Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-18: Test Configuration Table (network signalled value "NS_20")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2007.5 MHz (N_{UL} = 25575) c. 2012.5 MHz (N_{UL} = 25625) d. 2017.5 MHz (N_{UL} = 25675) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_20 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		QPSK	8
2	5MHz			QPSK	15
3	5MHz			QPSK	25
4	5MHz			16QAM (Note 4)	15
5	5MHz			16QAM (Note 4)	25
6	10MHz			QPSK	8
7	10MHz			QPSK	12
8	10MHz			QPSK	50
9	10MHz			16QAM (Note 4)	12
10	10MHz			16QAM (Note 4)	50 (Note 3)
11	15MHz			QPSK	6
12	15MHz			QPSK	25
13	15MHz			QPSK	36
14	15MHz			QPSK	75
15	15MHz			16QAM (Note 4)	25
16	15MHz			16QAM (Note 4)	36
17	15MHz			16QAM (Note 4)	75
18	20MHz			QPSK	8
19	20MHz			QPSK	18

20	20MHz		QPSK	25
21	20MHz		QPSK	75
22	20MHz		QPSK	100
23	20MHz		16QAM (Note 4)	18
24	20MHz		16QAM (Note 4)	25
25	20MHz		16QAM (Note 4)	75
26	20MHz		16QAM (Note 4)	100

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-19: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range or High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 2)	5 MHz			QPSK	1	0
2 (note 2)	5 MHz			QPSK	25	0
3 (note 2)	10 MHz			QPSK	1	0
4 (note 3)	10 MHz			QPSK	1	49
5 (note 2)	10 MHz			QPSK	15	0
6 (note 3)	10 MHz			QPSK	3	47
7 (note 3)	10 MHz			QPSK	50	0
8 (note 1, 3)	10 MHz			16QAM (Note 4)	50	0

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only to low range frequency testing.
Note 3: Applicable only to high range frequency testing.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-20: Test Configuration Table (network signalled value "NS_22")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_22 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	25	0
3	5MHz			QPSK	1	24
4	5MHz			16QAM	1	0
5	5MHz			16QAM	1	24
6	10MHz			QPSK	50	0
7	10MHz			QPSK	36	0
8	10MHz			QPSK	1	0
9	10MHz			QPSK	1	49
10	10MHz			16QAM	1	0
11	10MHz			16QAM	1	49
12	15MHz			QPSK	75	0
13	15MHz			QPSK	50	0
14	15MHz			QPSK	1	0
15	15MHz			QPSK	1	74
16	15MHz			16QAM	1	0
17	15MHz			16QAM	1	74
18	20MHz			QPSK	100	0
19	20MHz			QPSK	64	0
20	20MHz			QPSK	1	0
21	20MHz			QPSK	1	99
22	20MHz			16QAM	1	0
23	20MHz			16QAM	1	99
Note 1: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.2.4.4.1-21: Test Configuration Table (network signalled value "NS_23")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_23 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	1	24
3	5MHz			QPSK	25	0
4	5MHz			16QAM	1	0
5	5MHz			16QAM	1	24
6	10MHz			QPSK	50	0
7	15MHz			QPSK	75	0
8	20MHz			QPSK	100	0
Note 1: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.2.4.4.1-22: Test Configuration Table (network signalled value "NS_24")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Refer to F_{UL} in test parameters with following: 5 MHz CH BW: - 1985 MHz (N_{UL} = 131722) - 2007.5 MHz (N_{UL} = high range) 10 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) - 2005 MHz (N_{UL} = high range) 15 MHZ CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) - 2002.5 MHz (N_{UL} = high range) 20 MHz CH BW: - 2000 MHz (N_{UL} = high range)
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_24 A-MPR

			Downlink Configuration		Uplink Configuration		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	2007.5	5MHz	N/A for A-MPR testing		QPSK	1	0
2	2007.5	5MHz			QPSK	8	17
3	2007.5	5MHz			QPSK	25	0
4 (Notes 2,3)	2007.5	5MHz			16QAM	25	0
5	1985	5MHz			QPSK	8	17
6	1980	10MHz			QPSK	12	1
7 (Notes 2,3)	1980	10MHz			16QAM	50	0
8	1980	10MHz			QPSK	48	2
9	1980	10MHz			QPSK	25	25
10	1980	10MHz			QPSK	1	49
11	1980	10MHz			QPSK	12	38
12 (Notes 2,3)	1980	10MHz			16QAM	12	38
13	1980	10MHz			QPSK	3	47
14	1980	10MHz			QPSK	8	1
15	1990	10MHz			QPSK	1	0
16	1990	10MHz			QPSK	12	38
17 (Notes 2,3)	1990	10MHz			16QAM	50	0
18	2005	10MHz			QPSK	12	38
19	2005	10MHz			QPSK	50	0
20 (Notes 2,3)	2005	10MHz			16QAM	50	0
21	1980	15MHz			QPSK	1	11
22	1980	15MHz			QPSK	16	11
23	1980	15MHz			QPSK	45	11
24 (Notes 2,3)	1980	15MHz			16QAM	50	0
25	1980	15MHz			QPSK	16	28
26	1980	15MHz			QPSK	16	59
27	1980	15MHz			QPSK	60	15
28	1980	15MHz			QPSK	30	12
29	2002.5	15MHz			QPSK	1	0
30	2002.5	15MHz			QPSK	16	59
31 (Notes 2,3)	2002.5	15MHz			16QAM	16	59
32 (Notes 2,3)	2002.5	15MHz			16QAM	75	0
33	2000	20MHz			QPSK	1	0
34	2000	20MHz			QPSK	18	82
35 (Notes 2,3)	2000	20MHz			16QAM	18	82
36 (Notes 2,3)	2000	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 2:	Applies only for UE-Categories ≥2.
Note 3:	The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-23: Test Configuration Table (network signalled value "NS_25")

	Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to F_{UL} in test parameters with following: 5 MHz CH BW: - 2007.5 MHz (N_{UL} = high range) 10 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) - 2005 MHz (N_{UL} = high range) 15 MHZ CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) - 2002.5 MHz (N_{UL} = high range) 20 MHz CH BW: - 2000 MHz (N_{UL} = high range)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_25 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	2007.5	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Notes 2,3)	2007.5	5MHz			16QAM	25	0
3	2007.5	5MHz			QPSK	8	9
4	2007.5	5MHz			QPSK	1	24
5	2007.5	5MHz			QPSK	8	17
6 (Notes 2,3)	2007.5	5MHz			16QAM	8	17
7	1980	10MHz			QPSK	12	1
8 (Notes 2,3)	1980	10MHz			16QAM	50	0
9 (Notes 2,3)	1980	10MHz			16QAM	48	2
10	1980	10MHz			QPSK	25	25
11	1980	10MHz			QPSK	1	49
12	1980	10MHz			QPSK	12	38
13	1990	10MHz			QPSK	12	0
14	1990	10MHz			QPSK	25	0
15	1990	10MHz			QPSK	50	0
16 (Notes 2,3)	1990	10MHz			16QAM	25	0
17	1990	10MHz			QPSK	48	2
18	1990	10MHz			QPSK	30	19
19 (Notes 2,3)	1990	10MHz			16QAM	30	19
20	1990	10MHz			QPSK	12	31
21	2005	10MHz			QPSK	1	0
22	2005	10MHz			QPSK	12	6
23	2005	10MHz			QPSK	50	0
24 (Notes 2,3)	2005	10MHz			16QAM	50	0
25	2005	10MHz			QPSK	40	10
26 (Notes 2,3)	2005	10MHz			16QAM	40	10
27	2005	10MHz			QPSK	32	18
28 (Notes 2,3)	2005	10MHz			16QAM	32	18
29	2005	10MHz			QPSK	12	23
30	1980	15MHz			QPSK	16	4
31	1980	15MHz			QPSK	75	0
32	1980	15MHz			QPSK	60	15
33 (Notes 2,3)	1980	15MHz			16QAM	40	35
34	1980	15MHz			QPSK	1	74
35	1980	15MHz			QPSK	12	63
36	1980	15MHz			QPSK	16	55
37	2002.5	15MHz			QPSK	1	0
38	2002.5	15MHz			QPSK	16	0
39 (Notes 2,3)	2002.5	15MHz			16QAM	16	0
40 (Notes 2,3)	2002.5	15MHz			16QAM	1	0
41	1980	20MHz			QPSK	1	0

42	1980	20MHz		QPSK	18	0
43 (Notes 2,3)	1980	20MHz		16QAM	100	0
44	1980	20MHz		QPSK	64	36
45	1980	20MHz		QPSK	18	72
46 (Notes 2,3)	1980	20MHz		16QAM	54	46
47	1980	20MHz		QPSK	18	55
48	2000	20MHz		QPSK	1	0
49	2000	20MHz		QPSK	18	72
50 (Notes 2,3)	2000	20MHz		16QAM	18	72
51 (Notes 2,3)	2000	20MHz		16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4.4.1-24: Test Configuration Table (network signalled value "NS_27")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal			
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Refer to Frequency column in test parameters			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz			
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid	5MHz	N/A for A-MPR testing		QPSK	1	0
2	High	5MHz			QPSK	1	24
3	Low/Mid/High	5MHz			QPSK	25	0
4	Low/Mid/High	5MHz			16QAM	25	0
5	Low/Mid	10MHz			QPSK	1	0
6	High	10MHz			QPSK	1	49
7	Low/Mid/High	10MHz			QPSK	50	0
8 (Note 2)	Low/Mid/High	10MHz			16QAM	50	0
9	Low/Mid	15MHz			QPSK	1	0
10	Low	15MHz			QPSK	1	7
11	Low/Mid	15MHz			QPSK	16	0
12	High	15MHz			QPSK	1	74
13	High	15MHz			QPSK	1	67
14	High	15MHz			QPSK	16	74
15	Low/Mid/High	15MHz			QPSK	75	0
16 (Note 2)	Low/Mid/High	15MHz			16QAM	75	0
17	Low/Mid	20MHz			QPSK	1	0
18	Low	20MHz			QPSK	1	13
19	Low	20MHz			QPSK	1	16
20	Low/Mid	20MHz			QPSK	21	0
21	High	20MHz			QPSK	1	99
22	High	20MHz			QPSK	1	86
23	High	20MHz			QPSK	1	83
24	High	20MHz			QPSK	21	0
25	Low/Mid/High	20MHz			QPSK	100	0
26 (Note 2)	Low/Mid/High	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Editor's note: The following lines belong at the end of section 6.2.4.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to the applicable table from Table 6.2.4.4.1-1 to Table 6.2.4.4.1-24.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4.4.3.

6.2.4.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to the applicable table from Table 6.2.4.4.1-1 to Table 6.2.4.4.1-24. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions for each network signalled value.

6.2.4.4.3.1 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

6.2.4.4.3.2 Message contents exceptions (network signalled value "NS_04")

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_04"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	4 (NS_04)		

6.2.4.4.3.3 Message contents exceptions (network signalled value "NS_05")

1. Information element additionalSpectrumEmission is set to NS_05. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_05"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	5 (NS_05)		

6.2.4.4.3.4 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.4-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_06"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

6.2.4.4.3.5 Message contents exceptions (network signalled value "NS_07")

1. Information element additionalSpectrumEmission is set to NS_07. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_07"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	7 (NS_07)		

6.2.4.4.3.6 Message contents exceptions (network signalled value "NS_08")

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.6-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_08"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	8 (NS_08)		

6.2.4.4.3.7 Message contents exceptions (network signalled value "NS_09")

1. Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.7-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_09"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	9 (NS_09)		

6.2.4.4.3.8 Message contents exceptions (network signalled value "NS_10")

Void

6.2.4.4.3.9 Message contents exceptions (network signalled value "NS_11")

1. Information element additionalSpectrumEmission is set to NS_11. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.9-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_11"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	11 (NS_11)		

6.2.4.4.3.10 Message contents exceptions (network signalled value "NS_12")

1. Information element additionalSpectrumEmission is set to NS_12. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.10-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_12"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	12 (NS_12)		

6.2.4.4.3.11 Message contents exceptions (network signalled value "NS_13")

1. Information element additionalSpectrumEmission is set to NS_13. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.11-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_13"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	13 (NS_13)		

6.2.4.4.3.12 Message contents exceptions (network signalled value "NS_14")

1. Information element additionalSpectrumEmission is set to NS_14. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.12-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_14"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	14 (NS_14)		

6.2.4.4.3.13 Message contents exceptions (network signalled value "NS_15")

1. Information element additionalSpectrumEmission is set to NS_15. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.13-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_15"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	15 (NS_15)		

6.2.4.4.3.14 Message contents exceptions (network signalled value "NS_16")

1. Information element additionalSpectrumEmission is set to NS_16. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.14-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_16"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	16 (NS_16)		

6.2.4.4.3.15 Message contents exceptions (network signalled value "NS_17")

1. Information element additionalSpectrumEmission is set to NS_17. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.15-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_17"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	17 (NS_17)		

6.2.4.4.3.16 Message contents exceptions (network signalled value "NS_18")

1. Information element additionalSpectrumEmission is set to NS_18. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.16-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_18"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	18 (NS_18)		

6.2.4.4.3.17 Message contents exceptions (network signalled value "NS_19")

1. Information element additionalSpectrumEmission is set to NS_19. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.17-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_19"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	19 (NS_19)		

6.2.4.4.3.18 Message contents exceptions (network signalled value "NS_20")

1. Information element additionalSpectrumEmission is set to NS_20. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.18-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_20"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	20 (NS_20)		

6.2.4.4.3.19 Message contents exceptions (network signalled value "NS_21")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.19-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_21"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	21 (NS_21)		

6.2.4.4.3.20 Message contents exceptions (network signalled value "NS_22")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.20-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_22"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	22 (NS_22)		

6.2.4.4.3.21 Message contents exceptions (network signalled value "NS_23")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.21-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_23"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	23 (NS_23)		

6.2.4.4.3.22 Message contents exceptions (network signalled value "NS_24")

1. Information element additionalSpectrumEmission is set to NS_24. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.22-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_24"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	24 (NS_24)		

6.2.4.4.3.23 Message contents exceptions (network signalled value "NS_25")

1. Information element additionalSpectrumEmission is set to NS_25. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.23-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_25"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	25 (NS_25)		

6.2.4.4.3.24 Reserved

6.2.4.4.3.25 Message contents exceptions (network signalled value "NS_27")

1. Information element additionalSpectrumEmission is set to NS_27. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_27"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	27 (NS_27)		

6.2.4.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4.5-1 to Table 6.2.4.5-27. The allowed A-MPR values

specified in Table 6.2.4.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5.3-1 apply.

Table 6.2.4.5-1: UE Power Class test requirements (network signalled value "NS_03") (for Bands 4, 10, 23, 35, 36, 66, and 70)

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	1	0	0	22	2.0	25.7	19.3
2	0	0	0	23	2.0	25.7	20.3
3	1	0	0	22	2.0	25.7	19.3
4	1	1	0	21	2.0	25.7	18.3
5	0	0	0	23	2.0	25.7	20.3
6	2	1	0	20	2.5	25.7	16.8
7	1	0	0	22	2.0	25.7	19.3
8	1	1	0	21	2.0	25.7	18.3
9	0	1	0	22	2.0	25.7	19.3
10	0	0	0	23	2.0	25.7	20.3
11	2	1	0	20	2.5	25.7	16.8
12	1	1	0	21	2.0	25.7	18.3
13	1	1	0	21	2.0	25.7	18.3
14	0	1	0	22	2.0	25.7	19.3
15	0	0	0	23	2.0	25.7	20.3
16	2	1	0	20	2.5	25.7	16.8
17	1	1	0	21	2.0	25.7	18.3
18	1	1	0	21	2.0	25.7	18.3
19	0	1	0	22	2.0	25.7	19.3
20	0	0	0	23	2.0	25.7	20.3
21	2	1	0	20	2.5	25.7	16.8
22	1	1	0	21	2.0	25.7	18.3
23	1	1	0	21	2.0	25.7	18.3
24	0	1	0	22	2.0	25.7	19.3
25	0	0	0	23	2.0	25.7	20.3
26	2	1	0	20	2.5	25.7	16.8
27	1	1	0	21	2.0	25.7	18.3

Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.

Table 6.2.4.5-2: UE Power Class test requirements (network signalled value "NS_03") (for Bands 2 and 25)

Configuration ID	EUTRA band	Test Freq.	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	2, 25	Mid					23	+2.7 / -3.7
1	2, 25	Low, High					23	+2.7 / -5.7
2	2, 25	Mid					23	+2.7 / -2.7
2	2, 25	Low, High					23	+2.7 / -4.2
3	2, 25	Mid					23	+2.7 / -3.7
3	2, 25	Low, High					23	+2.7 / -5.7
4	2, 25	Mid					23	+2.7 / -4.7
4	2, 25	Low, High					23	+2.7 / -7.7
5	2, 25	Mid					23	+2.7 / -2.7
5	2, 25	Low, High					23	+2.7 / -4.2
6	2, 25	Mid					23	+2.7 / -6.2
6	2, 25	Low, High					23	+2.7 / -9.2
7	2, 25	Mid					23	+2.7 / -3.7
7	2, 25	Low, High					23	+2.7 / -5.7
8	2, 25	All					23	+2.7 / -4.7
9	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
9	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
10	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
10	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
11	2, 25	All					23	+2.7 / -6.2
12	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
12	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
13	2, 25	All					23	+2.7 / -4.7
14	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
14	2, 25	Low @ RB#0, High @ RB#(max+1-RB					23	+2.7 / -5.7

		allocation)						
15	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
15	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
16	2, 25	All					23	+2.7 / -6.2
17	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
17	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
18	2, 25	All					23	+2.7 / -4.7
19	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
19	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
20	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
20	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
21	2, 25	All					23	+2.7 / -6.2
22	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
22	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
23	2, 25	All					23	+2.7 / -4.7
24	2, 25	All					23	+2.7 / -3.7
25	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
25	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
26	2, 25	All					23	+2.7 / -6.2
27	2, 25	All					23	+2.7 / -4.7

Table 6.2.4.5-3: UE Power Class test requirements (network signalled value "NS_04")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	1	1	0	21	2.0	25.7	18.3
2 (RBstart=0; Low Range)	0	1	1.5	20.5	2.5	25.7	17.3
2 (RBstart=0; Mid, High Range)	0	1	0	22	2.0	25.7	19.3
2 (RBstart=17; Low, Mid Range)	0	1	0	22	2.0	25.7	19.3
2 (RBstart=17; High Range)	0	1	1.5	20.5	2.5	25.7	17.3
3 (RBstart=0; Low Range)	0	0	1.5	21.5	2.0	25.7	18.8
3 (RBstart=0; Mid, High Range)	0	0	0	23	2.0	25.7	20.3
3 (RBstart=19; Low, Mid Range)	0	0	0	23	2.0	25.7	20.3
3 (RBstart=19; High Range)	0	0	1.5	21.5	2.0	25.7	18.8
4	1	1	0	21	2.0	25.7	18.3
5 (RBstart=0; Low Range)	1	1	1.5	19.5	3.5	25.7	15.3
5 (RBstart=0; Mid, High Range)	1	1	0	21	2.0	25.7	18.3
5 (RBstart=17; Low, Mid Range)	1	1	0	21	2.0	25.7	18.3
5 (RBstart=17; High Range)	1	1	1.5	19.5	3.5	25.7	15.3
6 (Low Range)	0	3	1.5	18.5	4.0	25.7	13.8
6 (Mid, High Range)	0	3	0	20	2.5	25.7	16.8
7 (Low Range)	0	3	1.5	18.5	4.0	25.7	13.8
7 (Mid, High Range)	0	3	0	20	2.5	25.7	16.8
8	1	3	0	19	3.5	25.7	14.8
9	2	3	0	18	4.0	25.7	13.3
10	1	0	0	22	2.0	25.7	19.3
11	2	0	0	21	2.0	25.7	18.3
12	1	2	0	20	2.5	25.7	16.8

13 (Low, Mid Range)	0	3	0	20	2.5	25.7	16.8
13 (High Range)	0	3	1.5	18.5	4.0	25.7	13.8
14 (Low, Mid Range)	0	3	0	20	2.5	25.7	16.8
14 (High Range)	0	3	1.5	18.5	4.0	25.7	13.8
15 (Low Range)	0	3	1.5	18.5	4.0	25.7	13.8
15 (Mid, High Range)	0	3	0	20	2.5	25.7	16.8
16 (Low, Mid Range)	0	3	1.5	18.5	4.0	25.7	13.8
16 (High Range)	0	3	0	20	2.5	25.7	16.8
17	1	3	0	19	3.5	25.7	14.8
18	2	3	0	18	4.0	25.7	13.3
19	1	0	0	22	2.0	25.7	19.3
20	2	0	0	21	2.0	25.7	18.3
21	1	2	0	20	2.5	25.7	16.8
22	1	3	0	19	2.0	25.7	16.3
23 (Low, Mid Range)	0	3	0	20	2.5	25.7	16.8
23 (High Range)	0	3	1.5	18.5	4.0	25.7	13.8
24 (Low Range)	0	3	1.5	18.5	4.0	25.7	13.8
24 (Mid, High Range)	0	3	0	20	2.5	25.7	16.8
25 (Low Range)	0	3	1.5	18.5	4.0	25.7	13.8
25 (Mid, High Range)	0	3	0	20	2.5	25.7	16.8
26	1	3	0	19	3.5	25.7	14.8
27	2	3	0	18	4.0	25.7	13.3
28	1	0	0	22	2.0	25.7	19.3
29	2	0	0	21	2.0	25.7	18.3
30	1	2	0	20	2.5	25.7	16.8
31	1	3	0	19	3.5	25.7	14.8
32 (Low, Mid Range)	0	3	0	20	2.5	25.7	16.8
32 (High Range)	0	3	1.5	18.5	4.0	25.7	13.8
33	0	2	1.5	19.5	3.5	25.7	15.3
34	1	0	0	22	2.0	25.7	19.3
35	1	0	0	22	2.0	25.7	19.3
36	2	0	0	21	2.0	25.7	18.3
37	2	0	0	21	2.0	25.7	18.3
38	0	3	1.5	18.5	4.0	25.7	13.8
39	0	0	0	23	2.0	25.7	20.3
40	1	1	0	21	2.0	25.7	18.3
41	1	1	0	21	2.0	25.7	18.3
42 (Low Range)	1	2	0	20	2.5	25.7	16.8
42 (Mid, High	1	0	0	22	2.0	25.7	19.3

Range, 2504.1 MHz)							
43 (Low Range)	2	2	0	19	3.5	25.7	14.8
43 (Mid, High Range, 2504.1 MHz)	2	0	0	21	2.0	25.7	18.3
44	0	3	1.5	18.5	4.0	25.7	13.8
45	0	0	0	23	2.0	25.7	20.3
46	1	1	0	21	2.0	25.7	18.3
47	1	1	0	21	2.0	25.7	18.3
48 (Low Range)	1	3	0	19	3.5	25.7	14.8
48 (Mid, High Range, 2510.9 MHz)	1	0	0	22	2.0	25.7	19.3
49 (Low Range)	2	3	0	18	4.0	25.7	13.3
49 (Mid, High Range, 2510.9 MHz)	2	0	0	21	2.0	25.7	18.3
50	0	3	1.5	18.5	4.0	25.7	13.8
51	0	0	0	23	2.0	25.7	20.3
52	1	1	0	21	2.0	25.7	18.3
53	1	1	0	21	2.0	25.7	18.3
54 (Low Range)	1	3	0	19	3.5	25.7	14.8
54 (Mid, High Range, 2517.6 MHz)	1	0	0	22	2.0	25.7	19.3
55 (Low Range)	2	3	0	18	4.0	25.7	13.3
55 (Mid, High Range, 2517.6 MHz)	2	0	0	21	2.0	25.7	18.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4.5-4: UE Power Class test requirements (network signalled value "NS_05")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	2.0	25.7	20.3
2	0	0	0	23	2.0	25.7	20.3
3	1	0	0	22	2.0	25.7	19.3
4	0	0	0	23	2.0	25.7	20.3
5	0	0	0	23	2.0	25.7	20.3
6	0	0	0	23	2.0	25.7	20.3
7	0	0	0	23	2.0	25.7	20.3
8	1	0	0	22	2.0	25.7	19.3
9	1	0	0	22	2.0	25.7	19.3
10	1	1	0	21	2.0	25.7	18.3
11	2	1	0	20	2.5	25.7	16.8
12	0	0	0	23	2.0	25.7	20.3
13	0	0	0	23	2.0	25.7	20.3
14	0	0	0	23	2.0	25.7	20.3
15	0	0	0	23	2.0	25.7	20.3
16	1	0	0	22	2.0	25.7	19.3
17	1	0	0	22	2.0	25.7	19.3
18	0	0	0	23	2.0	25.7	20.3
19	0	0	0	23	2.0	25.7	20.3
20	0	0	0	23	2.0	25.7	20.3
21	0	0	0	23	2.0	25.7	20.3
22	1	0	0	22	2.0	25.7	19.3
23	1	0	0	22	2.0	25.7	19.3
24	0	0	0	23	2.0	25.7	20.3
25	0	0	0	23	2.0	25.7	20.3
26	0	0	0	23	2.0	25.7	20.3
27	0	0	0	23	2.0	25.7	20.3
28	1	0	0	22	2.0	25.7	19.3
29	1	0	0	22	2.0	25.7	19.3
30	1	1	0	21	2.0	25.7	18.3
31	2	1	0	20	2.5	25.7	16.8
32	0	0	0	23	2.0	25.7	20.3
33	0	0	0	23	2.0	25.7	20.3
34	0	0	0	23	2.0	25.7	20.3
35	0	0	0	23	2.0	25.7	20.3
36	1	0	0	22	2.0	25.7	19.3
37	1	0	0	22	2.0	25.7	19.3
38	1	1	0	21	2.0	25.7	18.3
39	2	1	0	20	2.5	25.7	16.8
40	1	1	0	21	2.0	25.7	18.3
41	2	1	0	20	2.5	25.7	16.8
42	0	11	0	12	6.0	25.7	5.3
43	1	11	0	11	6.0	25.7	4.3
44	0	0	0	23	2.0	25.7	20.3
45	1	0	0	22	2.0	25.7	19.3
46	1	3	0	19	3.5	25.7	14.8
47	1	5	0	17	5.0	25.7	11.3
48	0	5	0	18	4.0	25.7	13.3
49	0	5	0	18	4.0	25.7	13.3
50	0	1	0	22	2.0	25.7	19.3
51	0	11	0	12	6.0	25.7	5.3
52	1	11	0	11	6.0	25.7	4.3
53	0	0	0	23	2.0	25.7	20.3
54	1	0	0	22	2.0	25.7	19.3
55	1	3	0	19	3.5	25.7	14.8
56	1	5	0	17	5.0	25.7	11.3
57	1	10	0	12	6.0	25.7	5.3
58	0	5	0	18	4.0	25.7	13.3
59	0	5	0	18	4.0	25.7	13.3
60	1	1	0	21	2.0	25.7	18.3
61	1	0	0	22	2.0	25.7	19.3

62	2	0	0	21	2.0	25.7	18.3
63	0	0	0	23	2.0	25.7	20.3
64	0	0	0	23	2.0	25.7	20.3
65	0	0	0	23	2.0	25.7	20.3
66	0	0	0	23	2.0	25.7	20.3
67	1	0	0	22	2.0	25.7	19.3
68	1	0	0	22	2.0	25.7	19.3
69	1	0	0	22	2.0	25.7	19.3
70	2	0	0	21	2.0	25.7	18.3
71	0	0	0	23	2.0	25.7	20.3
72	0	0	0	23	2.0	25.7	20.3
73	0	0	0	23	2.0	25.7	20.3
74	0	0	0	23	2.0	25.7	20.3
75	1	0	0	22	2.0	25.7	19.3
76	1	0	0	22	2.0	25.7	19.3
77	1	1	0	21	2.0	25.7	18.3
78	2	1	0	20	2.5	25.7	16.8

Table 6.2.4.5-5: UE Power Class test requirements (network signalled value "NS_06") (for Bands 13, 14, and 17)

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	13,14,17					23	+2.7 / -3.7
2	13,14,17					23	+2.7 / -2.7
3	13,14,17					23	+2.7 / -2.7
4	13,14,17					23	+2.7 / -3.7
5	13,14,17					23	+2.7 / -2.7
6	13,14,17					23	+2.7 / -3.7
7	13,14,17					23	+2.7 / -3.7
8	13,14,17					23	+2.7 / -2.7
9	13,14,17					23	+2.7 / -3.7

Table 6.2.4.5-6: UE Power Class test requirements (network signalled value "NS_06") (for Band 12)

Configuration ID	EUTRA band	Test Freq.	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	12	Mid					23	+2.7 / -3.7
1	12	Low, High					23	+2.7 / -5.7
2	12	Mid					23	+2.7 / -2.7
2	12	Low, High					23	+2.7 / -4.2
3	12	Mid					23	+2.7 / -2.7
3	12	Low, High					23	+2.7 / -4.2
4	12	All					23	+2.7 / -3.7
5	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
5	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
6	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
6	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
7	12	All					23	+2.7 / -3.7
8	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
8	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
9	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
9	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7

Table 6.2.4.5-7: UE Power Class test requirements (network signalled value "NS_07")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	13					23	+2.7 / -18.7
2	13					23	+2.7 / -13.7
3	13					23	+2.7 / -2.7
4	13					23	+2.7 / -19.7
5	13					23	+2.7 / -18.7
6	13					23	+2.7 / -20.7
7	13					23	+2.7 / -3.7
8	13					23	+2.7 / -2.7
9	13					23	+2.7 / -4.7
10	13					23	+2.7 / -12.7
11	13					23	+2.7 / -13.7
12	13					23	+2.7 / -2.7
13	13					23	+2.7 / -6.2
14	13					23	+2.7 / -19.7
15	13					23	+2.7 / -18.7
16	13					23	+2.7 / -20.7

Table 6.2.4.5-8: UE Power Class test requirements (network signalled value "NS_08")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	19					23	+2.7 / -2.7
2	19					23	+2.7 / -2.7
3	19					23	+2.7 / -3.7
4	19					23	+2.7 / -2.7
5	19					23	+2.7 / -2.7
6	19					23	+2.7 / -3.7
7	19					23	+2.7 / -8.2
8	19					23	+2.7 / -9.7
9	19					23	+2.7 / -2.7
10	19					23	+2.7 / -2.7
11	19					23	+2.7 / -3.7
12	19					23	+2.7 / -8.2
13	19					23	+2.7 / -9.7

Table 6.2.4.5-9: UE Power Class test requirements (network signalled value "NS_09")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	21					23	+2.7 / -2.7
2	21					23	+2.7 / -2.7
3	21					23	+2.7 / -3.7
4	21					23	+2.7 / -2.7
5	21					23	+2.7 / -2.7
6	21					23	+2.7 / -3.7
7	21					23	+2.7 / -4.7
8	21					23	+2.7 / -6.2
9	21					23	+2.7 / -2.7
19	21					23	+2.7 / -2.7
11	21					23	+2.7 / -3.7
12	21					23	+2.7 / -4.7
13	21					23	+2.7 / -6.2
14	21					23	+2.7 / -8.2

Table 6.2.4.5-10: UE Power Class test requirements (network signalled value "NS_10")

Void, not tested

Table 6.2.4.5-11: UE Power Class test requirements (network signalled value "NS_11 for Band 23")

Configuration ID	EUTRA Band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1a	23	2001.5 MHz					23	+ 2.7 / -11.7
1b	23	2004.5 MHz					23	+ 2.7 / -4.7
2a	23	2001.5 MHz					23	+ 2.7 / -11.7
2b	23	2004.5 MHz					23	+ 2.7 / -4.7
3a	23	2001.5 MHz					23	+ 2.7 / -12.7
3b	23	2004.5 MHz					23	+ 2.7 / -6.2
4a	23	2001.5 MHz					23	+ 2.7 / -12.7
4b	23	2004.5 MHz					23	+ 2.7 / -6.2
5a	23	2002.5 MHz					23	+ 2.7 / -12.7
5b	23	2004.5 MHz					23	+ 2.7 / -8.2
5c	23	2007.5 MHz					23	+ 2.7 / -2.7
6a	23	2002.5 MHz					23	+ 2.7 / -12.7
6b	23	2004.5 MHz					23	+ 2.7 / -2.7
6c	23	2007.5 MHz					23	+ 2.7 / -3.7
7a	23	2002.5 MHz					23	+ 2.7 / -13.7
7b	23	2004.5 MHz					23	+ 2.7 / -9.7
7c	23	2007.5 MHz					23	+ 2.7 / -4.7
8a	23	2002.5 MHz					23	+ 2.7 / -13.7
8b	23	2004.5 MHz					23	+ 2.7 / -3.7
8c	23	2007.5 MHz					23	+ 2.7 / -4.7
9a	23	2002.5 MHz					23	+ 2.7 / -14.7
9b	23	2004.5 MHz					23	+ 2.7 / -11.7
9c	23	2007.5 MHz					23	+ 2.7 / -6.2
10a	23	2005 MHz					23	+ 2.7 / -17.7
10b	23	2005.5 MHz					23	+ 2.7 /

Configuration ID	EUTRA Band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
								-17.7
10c	23	2015 MHz					23	+ 2.7 / -2.7
11a	23	2005 MHz					23	+ 2.7 / -17.7
11b	23	2005.5 MHz					23	+ 2.7 / -17.7
11c	23	2015 MHz					23	+ 2.7 / -2.7
12a	23	2005 MHz					23	+ 2.7 / -18.7
12b	23	2005.5 MHz					23	+ 2.7 / -18.7
12c	23	2015 MHz					23	+ 2.7 / -3.7
13a	23	2005 MHz					23	+ 2.7 / -18.7
13b	23	2005.5 MHz					23	+ 2.7 / -18.7
13c	23	2015 MHz					23	+ 2.7 / -3.7
14a	23	2005 MHz					23	+ 2.7 / -20.7
14b	23	2005.5 MHz					23	+ 2.7 / -20.7
14c	23	2015 MHz					23	+ 2.7 / -4.7
15a	23	2007.5 MHz					23	+ 2.7 / -21.7
15b	23	2012.5 MHz					23	+ 2.7 / -16.7
16a	23	2007.5 MHz					23	+ 2.7 / -13.7
16b (Note 1)	23	2012.5 MHz					23	+ 2.7 / -13.2
16b (Note 2)	23	2012.5 MHz					23	+ 2.7 / -12.2
17a	23	2007.5 MHz					23	+ 2.7 / -3.7
17b	23	2012.5 MHz					23	+ 2.7 / -3.7
18a	23	2007.5 MHz					23	+ 2.7 / -12.7
18b	23	2012.5 MHz					23	+ 2.7 / -12.7
19a	23	2007.5 MHz					23	+ 2.7 / -16.7
19b	23	2012.5 MHz					23	+ 2.7 / -8.7
20a	23	2007.5 MHz					23	+ 2.7 / -13.7
20b (Note 1)	23	2012.5 MHz					23	+ 2.7 / -13.2
20b (Note 2)	23	2012.5 MHz					23	+ 2.7 / -13.2
21a	23	2007.5 MHz					23	+ 2.7 / -4.7
21b	23	2012.5 MHz					23	+ 2.7 / -3.7
22a	23	2007.5 MHz					23	+ 2.7 / -13.7

Configuration ID	EUTRA Band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
22b	23	2012.5 MHz					23	+ 2.7 / -13.7
23a	23	2007.5 MHz					23	+ 2.7 / -17.7
23b	23	2012.5 MHz					23	+ 2.7 / -9.7
24	23	2010 MHz					23	+ 2.7 / -20.7
25	23	2010 MHz					23	+ 2.7 / -2.7
26	23	2010 MHz					23	+ 2.7 / -13.7
27	23	2010 MHz					23	+ 2.7 / -16.7
28	23	2010 MHz					23	+ 2.7 / -3.7
29	23	2010 MHz					23	+ 2.7 / -14.7
30	23	2010 MHz					23	+ 2.7 / -17.7
Note 1: RB_{start} = RB# 0 Note 2: RB_{start} = RB# (max +1 - RB allocation)								

Table 6.2.4.5-12: UE Power Class 3 test requirements (network signalled value "NS_12")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	3	1.5	18.5	4	25.7	13.8
2	1	4	1.5	16.5	5	25.7	10.8
3	0	0	1.5	21.5	2	25.7	18.8
4	0	3	1.5	18.5	4	25.7	13.8
5	2	4	1.5	15.5	5	25.7	9.8
6	0	4	1.5	17.5	5	25.7	11.8
7	1	3	1.5	17.5	5	25.7	11.8
8	0	0	1.5	21.5	2	25.7	18.8
9	1	3	1.5	17.5	5	25.7	11.8
10	2	4	1.5	15.5	5	25.7	9.8
11	0	4	1.5	17.5	5	25.7	11.8
12	1	3	1.5	17.5	5	25.7	11.8
13	0	0	1.5	21.5	2	25.7	18.8
14	1	3	0	19	3,5	25.7	14.8
15	2	3	0	18	4	25.7	13.3
16	1	4	1.5	16.5	5	25.7	10.8
17	1	0	0	22	2	25.7	19.3
18	2	2	0	19	2	25.7	16.3
19	1	4	0	18	4	25.7	13.3
20	1	0	0	22	2	25.7	19.3
21	2	3	0	18	4	25.7	13.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4.5-13: UE Power Class 3 test requirements (network signalled value "NS_13")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	1	0	0	22	2	25.7	19.3
2	1	0	0	22	2	25.7	19.3
3	0	3	0	20	2.5	25.7	16.8
4	1	2	0	20	2.5	25.7	16.8
5	1	0	0	22	2	25.7	19.3
6	1	0	0	22	2	25.7	19.3
7	2	2	0	19	3.5	25.7	14.8
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4.5-14: UE Power Class 3 test requirements (network signalled value "NS_14")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	3	0	20	2.5	25.7	16.8
2	1	0	0	22	2	25.7	19.3
3	1	1	0	21	2	25.7	18.3
4	1	0	0	22	2	25.7	19.3
5	2	1	0	20	2,5	25.7	16.8
6	0	3	0	20	2.5	25.7	16.8
7	1	0	0	22	2	25.7	19.3
8	1	1	0	21	2	25.7	18.3
9	1	0	0	22	2	25.7	19.3
10	2	1	0	20	2,5	25.7	16.8
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4.5-15: UE Power Class test requirements (network signalled value "NS_15")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	26					23	+2.7 / -4.2
2	26					23	+2.7 / -12.2
3	26					23	+2.7 / -5.7
4	26					23	+2.7 / -12.2
5	26					23	+2.7 / -19.2
6	26					23	+2.7 / -3.7
7	26					23	+2.7 / -4.2
8	26					23	+2.7 / -11.7
9	26					23	+2.7 / -17.7
10	26					23	+2.7 / -3.7
11	26					23	+2.7 / -6.2
12	26					23	+2.7 / -17.2
13	26					23	+2.7 / -8.2
14	26					23	+2.7 / -2.7
15	26					23	+2.7 / -3.7
16	26					23	+2.7 / -12.7
17	26					23	+2.7 / -15.7
18	26					23	+2.7 / -17.7
19	26					23	+2.7 / 3.7-
20	26					23	+2.7 / -9.7
21	26					23	+2.7 / -3.7
22	26					23	+2.7 / -3.7
23	26					23	+2.7 / -11.7
24	26					23	+2.7 / -17.7
25	26					23	+2.7 / -3.7
26	26					23	+2.7 / -11.7

Table 6.2.4.5-16A: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 807 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7/-2.7
2	27					23	+2.7/-3.7
3	27					23	+2.7-4.7
4	27					23	+2.7/-2.7
5	27					23	+2.7 / -4.7
6	27					23	+2.7 / -6.2
7	27					23	+2.7 / -8.2
8	27					23	+2.7 / -9.7
9	27					23	+2.7 / -4.7
10	27					23	+2.7 / -6.2
11	27					23	+2.7 / -11.7
12	27					23	+2.7 / -8.2
13	27					23	+2.7 / -11.7
14	27					23	+2.7 / -12.7
15	27					23	+2.7 / -9.7
16	27					23	+2.7/-2.7
17	27					23	+2.7 / -8.2
18	27					23	+2.7 / -4.7
19	27					23	+2.7 / -8.2
20	27					23	+2.7 / -13.7
21	27					23	+2.7 / -13.7
22	27					23	+2.7 / -14.7
23	27					23	+2.7 / -13.7
24	27					23	+2.7 / -13.7

Table 6.2.4.5-16B: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 808.5 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7/-2.7
2	27					23	+2.7/-3.7
3	27					23	+2.7/-5.2
4	27					23	+2.7/-2.7
5	27					23	+2.7 / -3.7
6	27					23	+2.7 / -3.7
7	27					23	+2.7 / -4.7
8	27					23	+2.7 / -2.7
9	27					23	+2.7 / -3.7
10	27					23	+2.7 / -4.7
11	27					23	+2.7 / -6.2
12	27					23	+2.7 / -6.2
13	27					23	+2.7 / -8.2
14	27					23	+2.7 / -9.7
15	27					23	+2.7 / -9.7
16	27					23	+2.7/-2.7
17	27					23	+2.7 / -6.2
18	27					23	+2.7 / -4.7
19	27					23	+2.7 / -4.7
20	27					23	+2.7 / -9.7
21	27					23	+2.7 / -11.7
22	27					23	+2.7 / -12.7
23	27					23	+2.7 / -11.7
24	27					23	+2.7 / -11.7

Table 6.2.4.5-16C: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 812 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7/-2.7
2	27					23	+2.7/-3.7
3	27					23	+2.7/-4.7
4	27					23	+2.7/-2.7
5	27					23	+2.7 / -3.7
6	27					23	+2.7 / -3.7
7	27					23	+2.7 / -4.7
8	27					23	+2.7 / -2.7
9	27					23	+2.7 / -3.7
10	27					23	+2.7 / -3.7
11	27					23	+2.7 / -3.7
12	27					23	+2.7 / -3.7
13	27					23	+2.7 / -3.7
14	27					23	+2.7 / -4.7
15	27					23	+2.7 / -2.7
16						23	+2.7/-2.7
17	27					23	+2.7 / -3.7
18	27					23	+2.7 / -3.7
19	27					23	+2.7 / -3.7
20	27					23	+2.7 / -4.7
21	27					23	+2.7 / -8.2
22	27					23	+2.7 / -9.7
23	27					23	+2.7 / -6.2
24	27					23	+2.7 / -4.7

Table 6.2.4.5-17: UE Power Class test requirements (network signalled value "NS_17")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	28					23	+2.7 / -3.2
2	28					23	+2.7 / -3.2
3	28					23	+2.7 / -4.2
4	28					23	+2.7 / -5.2
5	28					23	+2.7 / -3.2
6	28					23	+2.7 / -3.2
7	28					23	+2.7 / -4.2
8	28					23	+2.7 / -5.2

Table 6.2.4.5-18: UE Power Class test requirements (network signalled value "NS_18")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)

1	28					23	+2.7 / -3.2
2	28					23	+2.7 / -4.2
3	28					23	+2.7 / -5.2
4	28					23	+2.7 / -6.2
5	28					23	+2.7 / -7.2
6	28					23	+2.7 / -7.2
7	28					23	+ 2.7 / -8.7
8	28					23	+2.7 / -9.2
9	28					23	+2.7 / -7.2
10	28					23	+2.7 / -7.2
11	28					23	+2.7 / -8.7
12	28					23	+2.7 / -9.2
13	28					23	+2.7 / -7.2
14	28					23	+2.7 / -7.2
15	28					23	+2.7 / -8.7
16	28					23	+2.7 / -9.2

Table 6.2.4.5-19: UE Power Class test requirements (network signalled value "NS_19")

Configuration ID	Test Freq	RB location	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	Low	Full RB	1	0	1.5	20.5	2.5	25.7	17.3
2	Low	Full RB	2	0	1.5	19.5	3.5	25.7	15.3
3	Low	Low	1	1	0	21	2	25.7	18.3
3	Low	High	1	0	0	22	2	25.7	19.3
4	Low	Low	2	1	0	20	2.5	25.7	16.8
4	Low	High	2	0	0	21	2	25.7	18.3
5	Low	Low	0	2	1.5	19.5	3.5	25.7	15.3
5	Low	High	0	0	0	23	2	25.7	20.3
6	Low	Low	1	2	1.5	18.5	4	25.7	13.8
6	Low	High	1	0	0	22	2.5	25.7	18.8
7	Low	Low	1	3	0	19	3.5	25.7	14.8
7	Low	High	1	0	0	22	2	25.7	19.3
8	Low	Low	1	3	0	19	3.5	25.7	14.8
8	Low	High	1	0	0	22	2	25.7	19.3
9	Low	Low	2	3	0	18	4	25.7	13.3
9	Low	High	2	0	0	21	2	25.7	18.3
10	Low	Low	0	2	1.5	19.5	3.5	25.7	15.3
10	Low	High	0	0	0	23	2	25.7	20.3
11	Low	Low	1	2	0	20	2.5	25.7	16.8
11	Low	High	1	0	0	22	2	25.7	19.3
12	Low	Low	1	3	0	19	3.5	25.7	14.8
12	Low	High	1	0	0	22	2	25.7	19.3
13	Low	Low	1	3	0	19	3.5	25.7	14.8
13	Low	High	1	0	0	22	2	25.7	19.3

14	Low	Low	2	3	0	18	4	25.7	13.3
14	Low	High	2	0	0	21	2	25.7	18.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero, PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.									

Table 6.2.4.5-20: UE Power Class test requirements (network signalled value "NS_20 for Band 23")

Configuration ID	EUTRA Band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1a	23	2002.5 MHz					23	+ 2.7 / -24.7 (Note 1)
1b	23	2007.5 MHz					23	+ 2.7 / -2.7
1c	23	2012.5 MHz					23	+ 2.7 / -2.7
1d	23	2017.5 MHz					23	+ 2.7 / -2.7
2a	23	2002.5 MHz					23	+ 2.7 / -23.7 (Note 1)
2b	23	2007.5 MHz					23	+ 2.7 / -7.7
2c	23	2012.5 MHz					23	+ 2.7 / -7.7
2d	23	2017.5 MHz					23	+ 2.7 / -3.7
3a	23	2002.5 MHz					23	+ 2.7 / -23.7 (Note 1)
3b	23	2007.5 MHz					23	+ 2.7 / -11.7
3c	23	2012.5 MHz					23	+ 2.7 / -11.7
3d	23	2017.5 MHz					23	+ 2.7 / -3.7
4a	23	2002.5 MHz					23	+ 2.7 / -23.7 (Note 1)
4b	23	2007.5 MHz					23	+ 2.7 / -7.7
4c	23	2012.5 MHz					23	+ 2.7 / -7.7
4d	23	2017.5 MHz					23	+ 2.7 / -3.7
5a	23	2002.5 MHz					23	+ 2.7 / -23.7 (Note 1)
5b	23	2007.5 MHz					23	+ 2.7 / -11.7
5c	23	2012.5 MHz					23	+ 2.7 / -11.7
5d	23	2017.5 MHz					23	+ 2.7 / -3.7
6a	23	2005 MHz					23	+ 2.7 / -21.7 (Note 1)
6b	23	2015 MHz					23	+ 2.7 / -2.7
7a	23	2005 MHz					23	+ 2.7 / -7.7 (Note 1)

Configuration ID	EUTRA Band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
7b	23	2015 MHz					23	+ 2.7 / -2.7
8a	23	2005 MHz					23	+ 2.7 / -11.7 (Note 1)
8b	23	2015 MHz					23	+ 2.7 / -8.7
9a	23	2005 MHz					23	+ 2.7 / -8.7 (Note 1)
9b	23	2015 MHz					23	+ 2.7 / -3.7
10a	23	2005 MHz					23	+ 2.7 / -11.7 (Note 1)
10b	23	2005 MHz					23	+ 2.7 / -8.7
11	23	2012.5 MHz					23	+ 2.7 / -11.7
12	23	2012.5 MHz					23	+ 2.7 / -7.7
13	23	2012.5 MHz					23	+ 2.7 / -11.7
14	23	2012.5 MHz					23	+ 2.7 / -17.7
15	23	2012.5 MHz					23	+ 2.7 / -8.7
16	23	2012.5 MHz					23	+ 2.7 / -12.7
17	23	2012.5 MHz					23	+ 2.7 / -18.7
18	23	2010 MHz					23	+ 2.7 / -22.7
19	23	2010 MHz					23	+ 2.7 / -14.7
20	23	2010 MHz					23	+ 2.7 / -13.7 (Note 1)
21	23	2010 MHz					23	+ 2.7 / -8.7 (Note 1)
22	23	2010 MHz					23	+ 2.7 / -11.7 (Note 1)
23	23	2010 MHz					23	+ 2.7 / -15.7 (Note 1)
24	23	2010 MHz					23	+ 2.7 / -14.7 (Note 1)
25	23	2010 MHz					23	+ 2.7 / -19.7 (Note 1)
26	23	2010 MHz					23	+ 2.7 / -12.7 (Note 1)
Note 1: The output power within 2000-2005 MHz shall not be higher than 7.7 dBm								

Table 6.2.4.5-21: UE Power Class 3 test requirements (network signalled value "NS_21 for Band 30")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	2.0	25.7	20.3
2	1	0	0	22	2.0	25.7	19.3
3	0	4	0	19	3.5	25.7	14.8
4	0	4	0	19	3.5	25.7	14.8
5	1	0	0	22	2.0	25.7	19.3
6	0	3	0	20	2.5	25.7	16.8
7	1	3	0	19	3.5	25.7	14.8
8	2	3	0	18	4.0	25.7	13.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4.5-22: UE Power Class Test requirements (network signalled value "NS_22")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	2.0	25.7	20.3
2	1	0	0	22	2.0	25.7	19.3
3	0	0	0	23	2.0	25.7	20.3
4	1	0	0	22	2.0	25.7	19.3
5	1	0	0	22	2.0	25.7	19.3
6	1	4	0	18	4.0	25.7	13.3
7	1	3	0	19	3.5	25.7	14.8
8	0	3	0	20	2.5	25.7	16.8
9	0	3	0	20	2.5	25.7	16.8
10	1	3	0	19	3.5	25.7	14.8
11	1	3	0	19	3.5	25.7	14.8
12	1	5	0	17	5.0	25.7	11.3
13	1	4	0	18	4.0	25.7	13.3
14	0	3	0	20	2.5	25.7	16.8
15	0	3	0	20	2.5	25.7	16.8
16	1	3	0	19	3.5	25.7	14.8
17	1	3	0	19	3.5	25.7	14.8
18	1	5	0	17	5.0	25.7	11.3
19	1	4	0	18	4.0	25.7	13.3
20	0	3	0	20	2.5	25.7	16.8
21	0	3	0	20	2.5	25.7	16.8
22	1	3	0	19	3.5	25.7	14.8
23	1	3	0	19	3.5	25.7	14.8
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4.5-23: UE Power Class Test requirements (network signalled value "NS_23")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	2.0	25.7	20.3
2	0	0	0	23	2.0	25.7	20.3
3	1	0	0	22	2.0	25.7	19.3
4	1	0	0	22	2.0	25.7	19.3
5	1	0	0	22	2.0	25.7	19.3
6	1	0	0	22	2.0	25.7	19.3
7	1	0	0	22	2.0	25.7	19.3
8	1	0	0	22	2.0	25.7	19.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4.5-24: UE Power Class 3 test requirements (network signalled value "NS_24")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	10	0	13	5.0	25.7	7.3
2	0	10	0	13	5.0	25.7	7.3
3	1	10	0	12	6.0	25.7	5.3
4	2	10	0	11	6.0	25.7	4.3
5	0	0	0	23	2.0	25.7	20.3
6	0	2	0	21	2.0	25.7	18.3
7	2	2	0	19	3.5	25.7	14.8
8	1	2	0	20	2.5	25.7	16.8
9	1	1	0	21	2.0	25.7	18.3
10	0	3	0	20	2.5	25.7	16.8
11	0	1	0	22	2.0	25.7	19.3
12	1	1	0	21	2.0	25.7	18.3
13	0	0	0	23	2.0	25.7	20.3
14	0	0	0	23	2.0	25.7	20.3
15	0	9	0	14	5.0	25.7	8.3
16	0	9	0	14	5.0	25.7	8.3
17	1	9	0	13	5.0	25.7	7.3
18	0	17	0	6	7.0	25.7	-1.7
19	1	17	0	5	7.0	25.7	-2.7
20	2	17	0	4	7.0	25.7	-3.7
21	0	2	0	21	2.0	25.7	18.3
22	0	2	0	21	2.0	25.7	18.3
23	1	2	0	20	2.5	25.7	16.8
24	2	8	0	13	5.0	25.7	7.3
25	0	0	0	23	2.0	25.7	20.3
26	0	7	0	16	5.0	25.7	10.3
27	1	7	0	15	5.0	25.7	9.3
28	0	0	0	23	2.0	25.7	20.3
29	0	17	0	6	7.0	25.7	-1.7
30	0	17	0	6	7.0	25.7	-1.7
31	1	17	0	5	7.0	25.7	-2.7
32	2	17	0	4	7.0	25.7	-3.7
33	0	17	0	6	7.0	25.7	-1.7
34	0	17	0	6	7.0	25.7	-1.7
35	1	17	0	5	7.0	25.7	-2.7
36	2	17	0	4	7.0	25.7	-3.7

Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.

Table 6.2.4.5-25: UE Power Class 3 test requirements (network signalled value "NS_25")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	1	5	0	17	5.0	25.7	11.3
2	2	5	0	16	5.0	25.7	10.3
3	0	0	0	23	2.0	25.7	20.3
4	0	2	0	21	2.0	25.7	18.3
5	0	2	0	21	2.0	25.7	18.3
6	1	2	0	20	2.5	25.7	16.8
7	0	2	0	21	2.0	25.7	18.3
8	2	2	0	19	3.5	25.7	14.8
9	1	2	0	20	2.5	25.7	16.8
10	1	1	0	21	2.0	25.7	18.3
11	0	3	0	20	2.5	25.7	16.8
12	0	1	0	22	2.0	25.7	19.3
13	0	1	0	22	2.0	25.7	19.3
14	1	1	0	21	2.0	25.7	18.3
15	1	5	0	17	5.0	25.7	11.3
16	2	1	0	20	2.5	25.7	16.8
17	1	5	0	17	5.0	25.7	11.3
18	1	1	0	21	2.0	25.7	18.3
19	2	1	0	20	2.5	25.7	16.8
20	0	0	0	23	2.0	25.7	20.3
21	0	10	0	13	5.0	25.7	7.3
22	0	10	0	13	5.0	25.7	7.3
23	1	10	0	12	6.0	25.7	5.3
24	2	10	0	11	6.0	25.7	4.3
25	1	7	0	15	5.0	25.7	9.3
26	2	7	0	14	5.0	25.7	8.3
27	1	11	0	11	6.0	25.7	4.3
28	2	11	0	10	6.0	25.7	3.3
29	0	0	0	23	2.0	25.7	20.3
30	0	4	0	19	3.5	25.7	14.8
31	1	4	0	18	4.0	25.7	13.3
32	1	3	0	19	3.5	25.7	14.8
33	2	1	0	20	2.5	25.7	16.8
34	0	1	0	22	2.0	25.7	19.3
35	0	1	0	22	2.0	25.7	19.3
36	0	0	0	23	2.0	25.7	20.3
37	0	13	0	10	6.0	25.7	3.3
38	0	13	0	10	6.0	25.7	3.3
39	1	13	0	9	6.0	25.7	2.3
40	2	13	0	8	6.0	25.7	1.3
41	0	11	0	12	6.0	25.7	5.3
42	0	11	0	12	6.0	25.7	5.3
43	2	11	0	10	6.0	25.7	3.3
44	1	11	0	11	6.0	25.7	4.3
45	0	13	0	10	6.0	25.7	3.3
46	2	13	0	8	6.0	25.7	1.3

47	0	0	0	23	2.0	25.7	20.3
48	0	13	0	10	6.0	25.7	3.3
49	0	13	0	10	6.0	25.7	3.3
50	1	13	0	9	6.0	25.7	2.3
51	2	13	0	8	6.0	25.7	1.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4.5-26: Reserved

Table 6.2.4.5-27: UE Power Class 3 test requirements (network signalled value "NS_27")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	2	25.7	20.3
2	0	0	0	23	2	25.7	20.3
3	1	0	0	22	2	25.7	19.3
4	2	0	0	21	2	25.7	18.3
5	0	0	0	23	2	25.7	20.3
6	0	0	0	23	2	25.7	20.3
7	1	0	0	22	2	25.7	19.3
8	2	0	0	21	2	25.7	18.3
9	0	4	0	19	3.5	25.7	14.8
10	0	0	0	23	2.0	25.7	20.3
11	0	0	0	23	2.0	25.7	20.3
12	0	4	0	19	3.5	25.7	14.8
13	0	0	0	23	2.0	25.7	20.3
14	0	0	0	23	2.0	25.7	20.3
15	1	2	0	20	2.5	25.7	16.8
16	2	2	0	19	3.5	25.7	14.8
17	0	4	0	19	3.5	25.7	14.8
18	0	1	0	22	2.0	25.7	19.3
19	0	0	0	23	2.0	25.7	20.3
20	1	0	0	22	2.0	25.7	19.3
21	0	4	0	19	3.5	25.7	14.8
22	0	1	0	22	2.0	25.7	19.3
23	0	0	0	23	2.0	25.7	20.3
24	1	0	0	22	2.0	25.7	19.3
25	1	2	0	20	2.0	25.7	17.3
26	2	2	0	19	3.5	25.7	14.8
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

6.2.4_1 Additional Maximum Power Reduction (A-MPR) for HPUE

6.2.4_1.1 Test purpose

Same test purpose as in clause 6.2.4.1 with the follow exception:

- Instead of Table 6.2.2.3-1 → use Table 6.2.2_1.3-1

6.2.4_1.2 Test applicability

The requirements of this test apply in test case 6.6.2.2 Additional Spectrum Emission Mask for network signalled values NS_06 and NS_04, to all types of E-UTRA Power Class 1 or Power Class 2 UE release 10 and forward.

NOTE: As a result TC 6.2.4_1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4_1.3 Minimum conformance requirements

For UE Power Class 1 or Power Class 2 the specific requirements and identified sub-clauses are specified in Table 6.2.4_1.3-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified in Table 6.2.4_1.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3_1. For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2.5_1 apply.

The normative reference for this requirement is TS 36.101 clause 6.2.4.

Table 6.2.4_1.3-1: Additional Maximum Power Reduction (A-MPR) / Spectrum Emission requirements

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_04	6.6.2.2.3.2, 6.6.3.3.3.1	41	5,10,15,20	Table 6.2.4_1.3-2	
NS_06	6.6.2.2.3.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.4.2-1	N/A

Table 6.2.4_1.3-2: A-MPR requirements for "NS_04" for Power Class 2 UE

Channel bandwidth [MHz]	Parameters					
5	Fc [MHz]	≤ 2500.5				> 2500.5
	RB_{start}	0 - 8			9 - 24	0 - 24
	L_{CRB} [RBs]	> 0			> 0	> 0
	A-MPR [dB]	≤ 3			0	0
10	Fc [MHz]	≤ 2504				> 2504
	RB_{start}	0 – 8			9 - 35	36 - 49	0 - 49
	L_{CRB} [RBs]	≤ 15	> 15 and < 25	≥ 25	N/A	> 0	> 0
	$RB_{start} + L_{CRB}$ [RBs]	N/A	N/A	N/A	≥ 45	N/A	N/A
	A-MPR [dB]	≤ 5	≤ 2	≤ 3	≤ 1	0	0
15	Fc [MHz]	≤ 2510.8				> 2510.8
	RB_{start}	0 – 13			14 – 59	60 – 74	0 - 74
	L_{CRB} [RBs]	≤ 18	> 18 and < 36	≥ 36	N/A	> 0	> 0
	$RB_{start} + L_{CRB}$ [RBs]	N/A	N/A	N/A	≥ 62	N/A	N/A
	A-MPR [dB]	≤ 5	≤ 2	≤ 4	≤ 3	0	0
20	Fc [MHz]	≤ 2517.5				> 2517.5
	RB_{start}	0 – 22			23 – 76	77 – 99	0 - 99
	L_{CRB} [RBs]	≤ 18	> 18 and < 40	≥ 40	N/A	> 0	> 0
	$RB_{start} + L_{CRB}$ [RBs]	N/A	N/A	N/A	≥ 86	N/A	N/A
	A-MPR [dB]	≤ 5	≤ 2	≤ 4	≤ 3	0	0

NOTE 1: RB_{start} indicates the lowest RB index of transmitted resource blocks
NOTE 2: L_{CRB} is the length of a contiguous resource block allocation
NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis
NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe

For a power class 2 capable UE operating in Band 41, A-MPR according to Table 6.2.4.3-2, Table 6.2.4.3-3, or Table 6.2.4.3-4 for power class 3 is allowed when an IE *P-max* as defined in [5] of 23 dBm or lower is indicated in the cell or if the uplink/downlink configuration is 0 or 6.

6.2.4_1.4 Test description

Same test description as in clause 6.2.4.4 with the following exceptions:

Instead of Table 6.2.4.4.1-4 → use Table 6.2.4_1.4-1 or Table 6.2.4_1.4-2.Table 6.2.4_1.4-1: Test Configuration Table (network signalled value "NS_04")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range Additional test frequencies: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_05 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1 (Note 1)	5MHz	N/A for A-MPR testing		QPSK	1	0
2 (Note 1)	5MHz			QPSK	16	9
3 (Note 2)	5MHz			QPSK	25	0
4 (Note 1)	5MHz			16QAM	16	9
5 (Note 2)	5MHz			16QAM	25	0
6 (Note 1)	10MHz			QPSK	1	0
7 (Note 1)	10MHz			QPSK	1	49
8 (Note 1)	10MHz			QPSK	24	0
9 (Note 1)	10MHz			QPSK	40	10
10	10MHz			QPSK	50	0
11	10MHz			16QAM	50	0
12 (Note 1)	15MHz			QPSK	1	0
13 (Note 1)	15MHz			QPSK	1	74
14 (Note 1)	15MHz			QPSK	32	0
15 (Note 1)	15MHz			QPSK	60	15
16	15MHz			QPSK	75	0
17	15MHz			16QAM	75	0
18 (Note 1)	20MHz			QPSK	1	0
19 (Note 1)	20MHz			QPSK	1	99
20 (Note 1)	20MHz			QPSK	36	0
21 (Note 1)	20MHz			QPSK	75	25
22	20MHz			QPSK	100	0
23	20MHz			16QAM	100	0
Note 1: Only applicable for Low Range. Note 2: Only applicable for Mid, High Range and additional test frequencies.						

Table 6.2.4_1.4-2: Test Configuration Table (network signalled value "NS_06")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest	
Test Parameters for NS_06 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	5MHz	N/A for A-MPR testing		QPSK	25
2	5MHz			QPSK	8
3	5MHz			16QAM	8
4	10MHz			QPSK	50
5	10MHz			QPSK	12
6	10MHz			16QAM	12
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE. Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

6.2.4_1.5 Test requirements

The maximum output power, derived in step 2 of clause 6.2.4_1.4.2 shall be within the range prescribed by the nominal maximum output power and tolerance in Table 6.2.4_1.5-1 and 6.2.4_1.5-2. The allowed A-MPR values specified in Table 6.2.4_1.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3_1. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5_1.3-1 apply.

Table 6.2.4_1.5-1: HPUE Power Class 1 test requirements (network signalled value "NS_06")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)
1	14	31	+2.7 / -4.7
2	14	31	+2.7 / -3.7
3	14	31	+2.7 / -4.7
4	14	31	+2.7 / -4.7
5	14	31	+2.7 / -3.7
6	14	31	+2.7 / -4.7

Table 6.2.4_1.5-2: UE Power Class 2 test requirements (network signalled value "NS_04")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	3	1.5	21.5	2.0	28.7	18.8
2	1	0	0	25	2.0	28.7	22.3
3	1	0	0	25	2.0	28.7	22.3
4	2	0	0	24	2.0	28.7	21.3
5	2	0	0	24	2.0	28.7	21.3
6	0	5	1.5	19.5	3.5	28.7	15.3
7	0	0	0	26	2.0	28.7	23.3
8	1	2	0	23	2.0	28.7	20.3
9	1	1	0	24	2.0	28.7	21.3
10 (Low Range)	1	3	0	22	2.0	28.7	19.3
10 (Mid, High Range, 2504.1 MHz)	1	0	0	25	2.0	28.7	22.3
11 (Low Range)	2	3	0	24	2.0	28.7	18.3
11 (Mid, High Range, 2504.1 MHz)	2	0	0	24	2.0	28.7	21.3
12	0	5	1.5	19.5	3.5	28.7	15.3
13	0	0	0	26	2.0	28.7	23.3
14	1	2	0	23	2.0	28.7	20.3
15	1	3	0	22	2.0	28.7	19.3
16 (Low Range)	1	4	0	21	2.0	28.7	18.3
16 (Mid, High Range, 2510.9 MHz)	1	0	0	25	2.0	28.7	22.3
17 (Low Range)	2	4	0	24	2.5	28.7	16.8
17 (Mid, High Range, 2510.9 MHz)	2	0	0	25	2.0	28.7	21.3
18	0	5	1.5	19.5	3.5	28.7	15.3
19	0	0	0	26	2.0	28.7	23.3
20	1	2	0	23	2.0	28.7	20.3
21	1	3	0	22	2.0	28.7	19.3
22 (Low Range)	1	4	0	21	2.0	28.7	18.3
22 (Mid, High Range, 2517.6 MHz)	1	0	0	25	2.0	28.7	22.3
23 (Low Range)	2	4	0	20	2.5	28.7	16.8
23 (Mid, High Range, 2517.6 MHz)	2	0	0	24	2.0	28.7	21.3

Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.

6.2.4_2 Additional Maximum Power Reduction (A-MPR) for UL 64QAM

Editor's note:

- Test requirements values in this section need to be reviewed in order to take into account notes in Table 6.2.5.3-2: $\Delta T_{IB,c}$ regarding $\Delta T_{IB,c}$ and asymmetric lower tolerances in table 6.2.2.3-1.

6.2.4_2.1 Test purpose

Same test purpose as in clause 6.2.4.1

6.2.4_2.2 Test applicability

The requirements of this test apply in test case 6.6.2.2_1 Additional Spectrum Emission Mask for network signalled values NS_03, NS_04, NS_06, NS_07, NS_11, NS_20, NS_21 and NS_27 to all types of E-UTRA UE from release 13 and forward that support UL 64QAM.

The requirements of this test apply in test case 6.6.3.3_1 Additional Spurious Emissions for network signalled values NS_04, NS_05, NS_07, NS_08, NS_09, NS_11, NS_12, NS_13, NS_14, NS_15, NS_16, NS_17, NS_18, NS_19, NS_20, NS_21, NS_22, NS_23, NS_24, NS_25, NS_27 to all types of E-UTRA UE from release 13 and forward that support UL 64QAM.

NOTE: As a result TC 6.2.4_2 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4_2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.4.3

6.2.4_2.4 Test description

6.2.4_2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.4_2.4.1-1 through table 6.2.4_2.4.1-25. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4_2.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					Lowest, 5MHz, 10MHz, Highest		
Test Parameters for NS_03 A-MPR							
		Downlink Configuration			**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
			FDD	**TDD**		**FDD**	**TDD**
1	1.4MHz	N/A for A-MPR testing			64QAM	5	5
2	3MHz				64QAM	15	15
3	3MHz				64QAM	4	4
4	5MHz				64QAM	25	25
5	5MHz				64QAM	8	8
6	10MHz				64QAM	50	50
7	10MHz				64QAM	12	12
8	15MHz				64QAM	75	75
9	15MHz				64QAM	16	16
10	20MHz				64QAM	100	100
11	20MHz				64QAM	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_2.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Note 4: For band 23, above table only applies to mid and high range test frequencies. Low range test frequencies will be covered by NS_11 test configuration table.

Table 6.2.4_2.4.1-2: Test Configuration Table (network signalled value "NS_04")

<table>
<tr><th colspan="7">Initial Conditions</th></tr>
<tr><td colspan="3">Test Environment
(as specified in TS 36.508 [7] subclause 4.1)</td><td colspan="4">Normal</td></tr>
<tr><td colspan="3">Test Frequencies
(as specified in TS 36.508 [7] subclause 4.3.1)</td><td colspan="4">Low Range, Mid Range, High Range
Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0:

For 5 MHz bandwidth:
2499.6 MHz, N_{UL}= 39696

For 10 MHz bandwidth:
2504.1 MHz, N_{UL}= 39731

For 15 MHz bandwidth:
2510.9 MHz, N_{UL}= 39799

For 20 MHz bandwidth:
2517.6 MHz, N_{UL}= 39866

Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1:

For 5 MHz bandwidth:
2500.6 MHz, N_{UL}= 39686

For 10 MHz bandwidth:
2504.1 MHz, N_{UL}= 39731

For 15 MHz bandwidth:
2510.9 MHz, N_{UL}= 39799

For 20 MHz bandwidth:
2517.6 MHz, N_{UL}= 39866</td></tr>
<tr><td colspan="3">Test Channel Bandwidths
(as specified in TS 36.508 [7] subclause 4.3.1)</td><td colspan="4">5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><th colspan="7">Test Parameters for NS_04 A-MPR</th></tr>
<tr><th></th><th></th><th colspan="2">Downlink Configuration</th><th colspan="3">Uplink Configuration</th></tr>
<tr><th>Configuration ID</th><th>Ch BW</th><th>Mod'n</th><th>RB allocation FDD</th><th>Mod'n</th><th>RB allocation FDD</th><th>RB_{start} FDD</th></tr>
<tr><td>1 (Note 1)</td><td>5MHz</td><td colspan="2" rowspan="5">N/A for A-MPR testing</td><td>64QAM</td><td>16</td><td>9</td></tr>
<tr><td>2 (Note 2)</td><td>5MHz</td><td>64QAM</td><td>25</td><td>0</td></tr>
<tr><td>3</td><td>10MHz</td><td>64QAM</td><td>50</td><td>0</td></tr>
<tr><td>4</td><td>15MHz</td><td>64QAM</td><td>75</td><td>0</td></tr>
<tr><td>5</td><td>20MHz</td><td>64QAM</td><td>100</td><td>0</td></tr>
<tr><td colspan="7">Note 1: Only applicable for Low Range.
Note 2: Only applicable for Mid, High Range and additional test frequencies.</td></tr>
</table>

Table 6.2.4_2.4.1-3: Test Configuration Table (network signalled value "NS_05")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range In case of Low range: - For 5 MHz Channel Bandwidth: 1927.2 MHz (NUL = 18072) - For 10 MHz Channel Bandwidth: 1934.7 MHz (NUL = 18147) - For 15 MHz Channel Bandwidth: 1932.5 MHz (NUL = 18125) - For 20 MHz Channel Bandwidth: 1930 MHz (NUL = 18100)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_05 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		64QAM	25
2	10MHz			64QAM	50 (Note 2)
3	15MHz			64QAM	75 (Note 2)
4	20MHz			64QAM	100 (Note 2)
5	10MHz			64QAM	50 (Note 3)
6	15MHz			64QAM	75 (Note 3)
7	20MHz			64QAM	100 (Note 3)
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_2.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: Applies only for Low Range. Note 3: Applies only for Mid Range.					

Table 6.2.4_2.4.1-4: Test Configuration Table (network signalled value "NS_06")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest	
Test Parameters for NS_06 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	1.4MHz	N/A for A-MPR testing		64QAM	5
2	3MHz			64QAM	4
3	5MHz			64QAM	8
4	10MHz			64QAM	12
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					
Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_2.5 as not all combinations are necessarily required based on the applicability of the UE.					
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

Table 6.2.4_2.4.1-5: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10MHz		
Test Parameters for NS_07 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	10MHz	N/A for A-MPR testing		64QAM	36	13
2	10MHz			64QAM	16	19
3	10MHz			64QAM	30	19
4	10MHz			64QAM	50	0
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_2.5 as not all combinations are necessarily required based on the applicability of the UE.						

Table 6.2.4_2.4.1-6: Test Configuration Table (network signalled value "NS_08")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz	
Test Parameters for NS_08 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	**5MHz**	N/A for A-MPR testing		**64QAM**	**25**
2	10MHz			64QAM	50
3	15MHz			64QAM	75
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_2.5 as not all combinations are necessarily required based on the applicability of the UE.					

Table 6.2.4_2.4.1-7: Test Configuration Table (network signalled value "NS_09")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	**5MHz**	N/A for A-MPR testing		**64QAM**	**25**
2	10MHz			64QAM	50
3	15MHz			64QAM	75
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_2.5 as not all combinations are necessarily required based on the applicability of the UE.					

Table 6.2.4_2.4.1-8: Test Configuration Table (network signalled value "NS_10")

Void, not tested

Table 6.2.4_2.4.1-9: Test Configuration Table (network signalled value "NS_11")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 3 MHz Channel Bandwidth: a. 2001.5 MHz (N_{UL} = 25515) b. 2004.5 MHz (N_{UL} = 25545) For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2004.5 MHz (N_{UL} = 25545) c. 2007.5 MHz (N_{UL} = 25575) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2005.5 MHz (N_{UL} = 25555) c. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2007.5 MHz (N_{UL} = 25575) b. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				3MHz, 5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_11 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	3MHz	N/A for A-MPR testing		64QAM	6
2	3MHz			64QAM	15
3	5MHz			64QAM	8
4	5MHz			64QAM	25
5	10MHz			64QAM	12
6	10MHz			64QAM	50
7	15MHz			64QAM	8
8	15MHz			64QAM	25
9	15MHz			64QAM	30
10	15MHz			64QAM	75
11	20MHz			64QAM	10
12	20MHz			64QAM	25
13	20MHz			64QAM	100
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_2.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

Table 6.2.4_2.4.1-10: Test Configuration Table (network signalled value "NS_12")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: UL 814.9 MHz (N_{UL} = 26699) For 5 MHz Channel Bandwidth: UL 816.7 MHz (N_{UL} = 26717) For 10 MHz Channel Bandwidth: UL 819.2 MHz (N_{UL} = 26742) For 15 MHz Channel Bandwidth: UL 821.7 MHz (N_{UL} = 26767)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 5 MHz, 10 MHz and 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for A-MPR testing		64QAM	6	0
2	5 MHz			64QAM	25	0
3	10 MHz			64QAM	50	0
4	15 MHz			64QAM	75	0

Table 6.2.4_2.4.1-11: Test Configuration Table (network signalled value "NS_13")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 5 MHz Channel Bandwidth: UL 821.5 MHz (N_{UL} = 26765)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	5 MHz	N/A for A-MPR testing		64QAM	25	0

Table 6.2.4_2.4.1-12: Test Configuration Table (network signalled value "NS_14")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 10 MHz Channel Bandwidth: UL 829 MHz (N_{UL} = 26840) For 15 MHz Channel Bandwidth: Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10 MHz, 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	10 MHz	N/A for A-MPR testing		64QAM	50	0
2	15 MHz			64QAM	75	0

Table 6.2.4_2.4.1-13: Test Configuration Table (network signalled value "NS_15")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: High range For 3 MHz Channel Bandwidth: UL 843.5 MHz (N_{UL} = 26985) or High range For 5 MHz Channel Bandwidth: UL 842.5 MHz (N_{UL} = 26975) or High range For 10 MHz Channel Bandwidth: UL 840 MHz (N_{UL} = 26950) or High range For 15 MHz Channel Bandwidth: UL 837.5 MHz (N_{UL} = 26925) or High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 1)	1.4 MHz	N/A for A-MPR testing		64QAM	6	0
2 (note 1)	3 MHz			64QAM	15	0
3 (note 1)	5 MHz			64QAM	25	0
4 (note 1)	10 MHz			64QAM	50	0
5 (note 1)	15 MHz			64QAM	75	0
Note 1: Applicable only to high range frequency testing.						

Table 6.2.4_2.4.1-14: Test Configuration Table (network signalled value "NS_16")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: Low range For 3 MHz Channel Bandwidth: Low range, 810 MHz (N_{UL}= 27070) For 5 MHz Channel Bandwidth: Low range, 811 MHz (N_{UL}= 27080), 814.5 MHz (N_{UL}= 27115) For 10 MHz Channel Bandwidth: Low range, 813.5 MHz (N_{UL}= 27105), 817 MHz (N_{UL}= 27140)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for A-MPR testing		64QAM	6	0
2	3 MHz			64QAM	15	0
3	5 MHz			64QAM	25	0
4	10 MHz			64QAM	50	0
Note 1: Applies only for 10 MHz channel for Low Range, and 813.5 MHz Note 2: Applies only for 10 MHz channel for 817 MHz range						

Table 6.2.4_2.4.1-15: Test Configuration Table (network signalled value "NS_17")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		64QAM	25
2	10MHz			64QAM	50

Table 6.2.4_2.4.1-16: Test Configuration Table (network signalled value "NS_18")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		64QAM	25
2	10MHz			64QAM	50
3	15MHz			64QAM	75
4	20MHz			64QAM	100

Table 6.2.4_2.4.1-17: Test Configuration Table (network signalled value "NS_19")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				3MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	3MHz	N/A for A-MPR testing		64QAM	15
2	10MHz			64QAM	40
3	15MHz			64QAM	45
4	20MHz			64QAM	50
Note 1: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

Table 6.2.4_2.4.1-18: Test Configuration Table (network signalled value "NS_20")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2007.5 MHz (N_{UL} = 25575) c. 2012.5 MHz (N_{UL} = 25625) d. 2017.5 MHz (N_{UL} = 25675) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_20 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		64QAM	15
2	5MHz			64QAM	25
3	10MHz			64QAM	12
4	10MHz			64QAM	50
5	15MHz			64QAM	25
6	15MHz			64QAM	36
7	15MHz			64QAM	75
8	20MHz			64QAM	18
9	20MHz			64QAM	25
10	20MHz			64QAM	75
11	20MHz			64QAM	100
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_2.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

Table 6.2.4_2.4.1-19: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC					
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Low range or High range					
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	10 MHz					
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 1)	10 MHz	N/A for A-MPR testing		64QAM	50	0
Note 1: Applicable only to high range frequency testing.						

Table 6.2.4_2.4.1-20: Test Configuration Table (network signalled value "NS_22")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal					
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Low Range, Mid Range, High Range					
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz					
Test Parameters for NS_22 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		64QAM	1	0
2	5MHz			64QAM	1	24
3	10MHz			64QAM	1	0
4	10MHz			64QAM	1	49
5	15MHz			64QAM	1	0
6	15MHz			64QAM	1	74
7	20MHz			64QAM	1	0
8	20MHz			64QAM	1	99

Table 6.2.4_2.4.1-21: Test Configuration Table (network signalled value "NS_23")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal					
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Low Range, Mid Range, High Range					
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz					
Test Parameters for NS_23 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		64QAM	1	0
2	5MHz			64QAM	1	24

Table 6.2.4_2.4.1-22: Test Configuration Table (network signalled value "NS_24")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to F_{UL} in test parameters with following: 10 and 15 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_24 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	High	5MHz	N/A for A-MPR testing		64QAM	25	0
2	1980	10MHz			64QAM	50	0
3	1990	10MHz			64QAM	50	0
4	1980	15MHz			64QAM	75	0
5	High	20MHz			64QAM	100	0

Table 6.2.4_2.4.1-23: Test Configuration Table (network signalled value "NS_25")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to F_{UL} in test parameters with following: 10 and 15 MHz CH BW: - 1980 MHz (N_{UL} = 132672) - 1990 MHz (N_{UL} = 132772)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_25 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	High	5MHz	N/A for A-MPR testing		64QAM	25	0
2	1980	10MHz			64QAM	50	0
3	1990	10MHz			64QAM	50	0
4	1980	15MHz			64QAM	75	0
5	1980	20MHz			64QAM	100	0
6	High	20MHz			64QAM	100	0

Table 6.2.4_2.4.1-24: Reserved

Table 6.2.4_2.4.1-25: Test Configuration Table (network signalled value "NS_27")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to Frequency column in test parameters		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid/High	5MHz			64QAM	25	0
2	Low/Mid/High	10MHz			64QAM	50	0
3	Low/Mid/High	15MHz			64QAM	75	0
4	Low/Mid/High	20MHz			64QAM	100	0

Editor's note: The following lines belong at the end of section 6.2.4_2.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to the applicable table from Table 6.2.4_2.4.1-1 to Table 6.2.4_2.4.1-25.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4_2.4.3.

6.2.4_2.4.2 Test procedure

Same test procedure as in clause 6.2.4.4.2 with the following exceptions:

- Instead of Table 6.2.4.4.1-1 to 6.2.4.4.1-24 → use Table 6.2.4_2.4.1-1 to 6.2.4_2.4.1-25

6.2.4_2.4.3 Message contents

Same message contents as in clause 6.2.4.4.3 except table numbers.

6.2.4_2.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4_2.5-1 to Table 6.2.4_2.5-27. The allowed A-MPR values specified in Table 6.2.4_2.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5.3-1 apply.

Table 6.2.4_2.5-1: UE Power Class test requirements (network signalled value "NS_03") (for Bands 4, 10, 23, 35, 36, 66, and 70)

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	2	0	0	21	2	25.7	18.3
2	3	1	0	19	3.5	25.7	14.8
3	2	0	0	21	2	25.7	18.3
4	3	1	0	19	3.5	25.7	14.8
5	2	1	0	20	2.5	25.7	16.8
6	3	1	0	19	3.5	25.7	14.8
7	2	1	0	20	2.5	25.7	16.8
8	3	1	0	19	3.5	25.7	14.8
9	2	1	0	20	2.5	25.7	16.8
10	3	1	0	19	3.5	25.7	14.8
11	2	1	0	20	2.5	25.7	16.8

Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.

Table 6.2.4_2.5-2: UE Power Class test requirements (network signalled value "NS_03") (for Bands 2 and 25)

Configuration ID	EUTRA band	Test Freq.	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	2, 25	Mid					23	+2.7 / -4.7
1	2, 25	Low, High					23	+2.7 / -6.7
2	2, 25	Mid					23	+2.7 / -7.2
2	2, 25	Low, High					23	+2.7 / -10.2
3	2, 25	Mid					23	+2.7 / -4.7
3	2, 25	Low, High					23	+2.7 / -6.7
4	2, 25	All					23	+2.7 / -7.7
5	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -5.7
5	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -8.7
6	2, 25	All					23	+2.7 / -7.7
7	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -5.7
7	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -8.7
8	2, 25	All					23	+2.7 / -7.7
9	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -5.7
9	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -8.7
10	2, 25	All					23	+2.7 / -7.7
11	2, 25	All					23	+2.7 / -5.7

Table 6.2.4_2.5-3: UE Power Class test requirements (network signalled value "NS_04")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	3	0	0	20	2.5	25.7	16.8
2	3	0	0	20	2.5	25.7	16.8
3 (Low Range)	3	2	0	18	4.0	25.7	13.3
3 (Mid, High Range, 2504.1 MHz)	3	0	0	20	2.5	25.7	16.8
4 (Low Range)	3	3	0	17	5.0	25.7	11.3
4 (Mid, High Range, 2510.9 MHz)	3	0	0	20	2.5	25.7	16.8
5 (Low Range)	1	3	3	0	17	5.0	25.7
5 (Mid, High Range, 2517.6 MHz)	1	3	0	0	20	2.5	25.7
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-4: UE Power Class test requirements (network signalled value "NS_05")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	3	0	0	20	2.5	25.7	16.8
2	3	1	0	19	3.5	25.7	14.8
3	3	11	0	9	6.0	25.7	2.3
4	3	11	0	9	6.0	25.7	2.3
5	3	0	0	20	2.5	25.7	16.8
6	3	0	0	20	2.5	25.7	16.8
7	3	1	0	19	3.5	25.7	14.8
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-5: UE Power Class test requirements (network signalled value "NS_06") (for Bands 13, 14, and 17)

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	13,14,17					23	+2.7 / -3.7
2	13,14,17					23	+2.7 / -4.7
3	13,14,17					23	+2.7 / -4.7
4	13,14,17					23	+2.7 / -4.7

Table 6.2.4_2.5-6: UE Power Class test requirements (network signalled value "NS_06") (for Band 12)

Configuration ID	EUTRA band	Test Freq.	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	12	Mid					23	+2.7 / -3.7
1	12	Low, High					23	+2.7 / -5.2
2	12	Mid					23	+2.7 / -4.7
2	12	Low, High					23	+2.7 / -6.7
3	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
3	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -6.7
4	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
4	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -6.7

Table 6.2.4_2.5-7: UE Power Class test requirements (network signalled value "NS_07")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	13					23	+2.7 / -21.7
2	13					23	+2.7 / -5.7
3	13					23	+2.7 / -14.7
4	13					23	+2.7 / -22.2

Table 6.2.4_2.5-8: UE Power Class test requirements (network signalled value "NS_08")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	3	0	0	20	2.5	25.7	16.8
2	3	3	0	17	5.0	25.7	11.3
3	3	3	0	17	5.0	25.7	11.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-9: UE Power Class test requirements (network signalled value "NS_09")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	3	0	0	20	2.5	25.7	16.8
2	3	1	0	19	3.5	25.7	14.8
3	3	2	0	18	4.0	25.7	13.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-10: UE Power Class test requirements (network signalled value "NS_10")

Void, not tested

Table 6.2.4_2.5-11: UE Power Class test requirements (network signalled value "NS_11 for Band 23")

Configuration ID	EUTRA Band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1a	23	2001.5 MHz					23	+ 2.7 / -13.7
1b	23	2004.5 MHz					23	+ 2.7 / -7.2
2a	23	2001.5 MHz					23	+ 2.7 / -14.2
2b	23	2004.5 MHz					23	+ 2.7 / -7.7
3a	23	2002.5 MHz					23	+ 2.7 / -14.7
3b	23	2004.5 MHz					23	+ 2.7 / -4.7
3c	23	2007.5 MHz					23	+ 2.7 / -5.7
4a	23	2002.5 MHz					23	+ 2.7 / -16.2
4b	23	2004.5 MHz					23	+ 2.7 / -13.2
4c	23	2007.5 MHz					23	+ 2.7 / -7.7
5a	23	2005 MHz					23	+ 2.7 / -19.7
5b	23	2005.5 MHz					23	+ 2.7 / -19.7
5c	23	2015 MHz					23	+ 2.7 / -4.7
6a	23	2005 MHz					23	+ 2.7 / -22.2
6b	23	2005.5 MHz					23	+ 2.7 / -22.2
6c	23	2015 MHz					23	+ 2.7 / -6.2
7a	23	2007.5 MHz					23	+ 2.7 / -14.7
8b (Note 1)	23	2012.5 MHz					23	+ 2.7 / -14.2
8b (Note 2)	23	2012.5 MHz					23	+ 2.7 / -14.2
9a	23	2007.5 MHz					23	+ 2.7 / -5.7
9b	23	2012.5 MHz					23	+ 2.7 / -4.7
10a	23	2007.5 MHz					23	+ 2.7 / -15.2
10b	23	2012.5 MHz					23	+ 2.7 / -15.2
11a	23	2007.5 MHz					23	+ 2.7 / -18.7
11b	23	2012.5 MHz					23	+ 2.7 / -10.7
12	23	2010 MHz					23	+ 2.7 / -4.7
13	23	2010 MHz					23	+ 2.7 / -16.2

Configuration ID	EUTRA Band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
14	23	2010 MHz					23	+ 2.7 / -18.7
Note 1: RB_{start} = RB# 0 Note 2: RB_{start} = RB# (max +1 - RB allocation)								

Table 6.2.4_2.5-12: UE Power Class 3 test requirements (network signalled value "NS_12")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	2	4	1.5	15.5	5	25.7	9.3
2	2	4	1.5	15.5	5	25.7	9.3
3	2	2	0	19	2	25.7	15.8
4	2	3	0	18	4	25.7	12.8
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-13: UE Power Class 3 test requirements (network signalled value "NS_13")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	2	2	0	19	3.5	25.7	14.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-14: UE Power Class 3 test requirements (network signalled value "NS_14")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	2	1	0	20	2,5	25.7	16.3
2	2	1	0	20	2,5	25.7	16.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-15: UE Power Class test requirements (network signalled value "NS_15")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	26					23	+2.7 / -13.7
2	26					23	+2.7 / -20.7
3	26					23	+2.7 / -19.2
4	26					23	+2.7 / -19.2
5	26					23	+2.7 / -19.2

Table 6.2.4_2.5-16A: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 807 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7/-6.2
2	27					23	+2.7 / -9.7
3	27					23	+2.7 / -14.2
4	27					23	+2.7 / -16.2

Table 6.2.4_2.5-16B: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 808.5 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7/-6.7
2	27					23	+2.7 / -6.2
3	27					23	+2.7 / -11.2
4	27					23	+2.7 / -14.2

Table 6.2.4_2.5-16C: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 812 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7/-6.2
2	27					23	+2.7 / -6.2
3	27					23	+2.7 / -6.2
4	27					23	+2.7 / -11.2

Table 6.2.4_2.5-17: UE Power Class test requirements (network signalled value "NS_17")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	28					23	+2.7 / -6.7
2	28					23	+2.7 / -6.7

Table 6.2.4_2.5-18: UE Power Class test requirements (network signalled value "NS_18")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	28					23	+2.7 / -7.7
2	28					23	+2.7 / -10.7
3	28					23	+2.7 / -10.7
4	28					23	+2.7 / -10.7

Table 6.2.4_2.5-19: UE Power Class test requirements (network signalled value "NS_19")

Configuration ID	Test Freq	RB location	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	Low	Full RB	2	0	1.5	19.5	3.5	25.7	15.3

2	Low	Low	2	1	0	20	2.5	25.7	16.8
2	Low	High	2	0	0	21	2	25.7	18.3
3	Low	Low	2	3	0	18	4	25.7	13.3
3	Low	High	2	0	0	21	2	25.7	18.3
4	Low	Low	2	3	0	18	4	25.7	13.3
4	Low	High	2	0	0	21	2	25.7	18.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero, PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.									

Table 6.2.4_2.5-20: UE Power Class test requirements (network signalled value "NS_20 for Band 23")

Configuration ID	EUTRA Band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1a	23	2002.5 MHz					23	+ 2.7 / -24.7 (Note 1)
1b	23	2007.5 MHz					23	+ 2.7 / -8.7
1c	23	2012.5 MHz					23	+ 2.7 / -8.7
1d	23	2017.5 MHz					23	+ 2.7 / -4.7
2a	23	2002.5 MHz					23	+ 2.7 / -25.2 (Note 1)
2b	23	2007.5 MHz					23	+ 2.7 / -13.2
2c	23	2012.5 MHz					23	+ 2.7 / -13.2
2d	23	2017.5 MHz					23	+ 2.7 / -5.2
3a	23	2005 MHz					23	+ 2.7 / -9.7 (Note 1)
3b	23	2015 MHz					23	+ 2.7 / -4.7
4a	23	2005 MHz					23	+ 2.7 / -13.2 (Note 1)
4b	23	2005 MHz					23	+ 2.7 / -10.2
5	23	2012.5 MHz					23	+ 2.7 / -9.7
6	23	2012.5 MHz					23	+ 2.7 / -13.7
7	23	2012.5 MHz					23	+ 2.7 / -20.2
8	23	2010 MHz					23	+ 2.7 / -16.7 (Note 1)
9	23	2010 MHz					23	+ 2.7 / -15.7 (Note 1)
10	23	2010 MHz					23	+ 2.7 / -20.7 (Note 1)
11	23	2010 MHz					23	+ 2.7 / -14.2 (Note 1)
Note 1: The output power within 2000-2005 MHz shall not be higher than 7.7 dBm								

Table 6.2.4_2.5-21: UE Power Class 3 test requirements (network signalled value "NS_21 for Band 30")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	2	3	0	18	4.0	25.7	12.8
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-22: UE Power Class Test requirements (network signalled value "NS_22")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	2	0	0	21	2.0	25.7	18.3
2	2	0	0	22	2.0	25.7	19.3
3	2	3	0	19	3.5	25.7	16.3
4	2	3	0	18	4.0	25.7	13.3
5	2	3	0	19	3.5	25.7	16.3
6	2	3	0	18	4.0	25.7	13.3
7	2	3	0	19	3.5	25.7	16.3
8	2	3	0	18	4.0	25.7	13.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-23: UE Power Class Test requirements (network signalled value "NS_23")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	2	0	0	21	2.0	25.7	18.3
2	2	0	0	21	2.0	25.7	18.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-24: UE Power Class 3 test requirements (network signalled value "NS_24")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	3	10	0	10	2.0	25.7	7.3
2	3	2	0	18	2.0	25.7	15.3
3	3	9	0	11	2.0	25.7	8.3
4	3	8	0	12	2.0	25.7	9.3
5	3	17	0	3	2.5	25.7	-0.2
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-25: UE Power Class 3 test requirements (network signalled value "NS_25")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	3	5	0	15	2.0	25.7	12.3
2	3	1	0	19	2.0	25.7	16.3
3	3	5	0	15	2.0	25.7	12.3
4	3	4	0	16	2.0	25.7	13.3
5	3	11	0	9	2.0	25.7	6.3
6	3	13	0	7	2.0	25.7	4.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4_2.5-26: Reserved

Table 6.2.4_2.5-27: UE Power Class 3 test requirements (network signalled value "NS_27")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	3	0	0	20	2.5	25.7	16.8
2	3	0	0	20	2.5	25.7	16.8
3	3	2	0	18	4.0	25.7	13.3
4	3	2	0	18	4.0	25.7	13.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

6.2.4_3 Additional Maximum Power Reduction (A-MPR) with PUSCH frequency hopping

Following aspects missing or not yet determined:

- Emissions test cases covering this test is missing
- HARQ configuration for re-transmissions is missing

6.2.4_3.1 Test purpose

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction A-MPR is allowed for the output power as specified in Table 6.2.2.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used. When PUSCH inter-subframe frequency hopping is configured the UE will use different resource blocks for HARQ retransmissions compared to the previous transmission resulting in potentially different A-MPR.

The purpose of this test is to ensure the UE is using A-MPR in a correct way fulfilling emissions requirements also when PUSCH frequency hopping is enabled.

6.2.4_3.2 Test applicability

The requirements of this test apply in test case 6.6.2.2_2 Additional Spectrum Emission Mask for network signalled values NS_07, NS_11 and NS_20 to all types of E-UTRA UE release 8 and forward.

The requirements of this test apply in test case TBD Additional Spurious Emissions for network signalled values NS_07, NS_11, NS_12, NS_13, NS_14, NS_15, NS_16, NS_19 and NS_20 to all types of E-UTRA UE release 8 and forward.

NOTE: As a result TC 6.2.4_3 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4_3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.4.3

6.2.4_3.4 Test description

6.2.4_3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.4_3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4_3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					Test dependant	
Test Parameters						
			Downlink Configuration		**Uplink Configuration**	
Configuration ID	NS-value	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	NS_07	10 MHz	N/A for A-MPR testing		QPSK	1
2	NS_10	20 MHz			QPSK	1
3 (Note 3)	NS_11	15 MHz			QPSK	1
4	NS_12	5 MHz			QPSK	1
5	NS_13	5 MHz			QPSK	1
6	NS_14	15 MHz			QPSK	1
7 (Note 4)	NS_15	15 MHz			QPSK	1
8 (Note 4)	NS_16	10 MHz			QPSK	1
9	NS_19	20 MHz			QPSK	1
10 (Note 4)	NS_20	10 MHz			QPSK	1
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_3.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: The RB_{start} of partial RB allocation shall be RB# 0 of the channel bandwidth. Note 3: High range test frequency to be used. Note 4: Low range test frequency to be used.						

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to the applicable table from Table 6.2.4_3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4.4.3.

6.2.4_3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 with hopping bit(s) set to 1 (PUSCH type 2 hopping) for C_RNTI to schedule the UL RMC according to the applicable Table 6.2.4_3.4.1-1. SS sends always NACK on PHICH to trigger UE retransmissions needed for mirroring of RBs. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode in a TTI. The period of measurement shall be one sub-frame (1ms) excluding the 20 us transient periods in beginning and end of the subframe.

4. Measure the mean power of the UE in the channel bandwidth of the radio access mode in the next TTI of the same HARQ process. The period of measurement shall be one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.4_3.4.3 Message contents

Same message contents as in 6.2.4.4.2

6.2.4_3.5 Test requirements

The maximum output power, derived in step 3 and 4 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table 6.2.4_3.5-1 and 6.2.4_3.5-2. The allowed A-MPR values specified in Table 6.2.4.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5.3-1 apply.

Table 6.2.4_3.5-1: UE Power Class 3 test requirements (for TTI where CURRENT_TX_NB mod2=0 hence without mirroring)

Configuration ID	NS-value	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	NS_07	0	12	0	11	6	25.7	4.3
2	NS_10	0	5	0	18	4	25.7	13.3
3	NS_11	0	10	0	13	5	25.7	7.3
4	NS_12	0	5	0	18	4	25.7	13.3
5	NS_13	0	3	0	20	2,5	25.7	16.8
6	NS_14	0	3	0	20	2,5	25.7	16.8
7	NS_15	0	4	1.5	17.5	5	25.7	11.8
8	NS_16	0	5	0	18	4	25.7	13.3
9	NS_19	0	2	0	21	2	25.7	18.3
10	NS_20	0	16	0	7	7	25.7	-0.7
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.								

Table 6.2.4_3.5-2: UE Power Class 3 test requirements (for TTI where CURRENT_TX_NB mod2=1 hence with mirroring)

Configuration ID	NS-value	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	NS_07	0	3	0	20	6	25.7	13.3
2	NS_10	0	0	0	23	4	25.7	18.3
3	NS_11	0	6.5	0	16.5	5	25.7	10.8
4	NS_12	0	0	0	23	4	25.7	18.3
5	NS_13	0	0	0	23	2.5	25.7	19.8
6	NS_14	0	0	0	23	2.5	25.7	19.8
7	NS_15	0	9	0	14	5	25.7	8.3
8	NS_16	0	0	0	23	4	25.7	18.3
9	NS_19	0	0	0	23	2	25.7	20.3
10	NS_20	0	6	0	17	7	25.7	9.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.								

6.2.4A Additional Maximum Power Reduction (A-MPR) for CA

6.2.4A.1 Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA)

6.2.4A.1.1 Test purpose

Additional ACLR, spectrum emission and spurious emission requirements for carrier aggregation can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the CA Power Class as specified in Table 6.2.2A.0-2.

6.2.4A.1.2 Test applicability

The requirements of this test apply in test case 6.6.2.2A.1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA) for network signalled value CA_NS_04 to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA but do not support UL 64QAM.

The requirements of this test apply in test case 6.6.3.3A.1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA) for network signalled values CA_NS_01, CA_NS_02 and CA_NS_03, CA_NS_05, CA_NS_06, CA_NS_07 to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

NOTE: As a result TC 6.2.4A.1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4A.1.3 Minimum conformance requirements

Additional ACLR, spectrum emission and spurious emission requirements for carrier aggregation can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the CA Power Class as specified in Table 6.2.2A.0-2.

If for intra-band carrier aggregation the UE is configured for transmissions on a single serving cell, then subclauses 6.2.3 and 6.2 4 apply with the Network Signalling value indicated by the field *additionalSpectrumEmission*.

For intra-band contiguous aggregation with the UE configured for transmissions on two serving cells, the maximum output power reduction specified in Table 6.2.4A.1.3-1 is allowed for all serving cells of the applicable uplink CA configurations according to the CA network signalling value indicated by the field *additionalSpectrumEmissionSCell-*

r10. Then clause 6.2.3A.1.3 does not apply, i.e. the carrier aggregation MPR = 0 dB, unless the value indicated is CA_NS_31.

For the UE maximum output power modified by A-MPR specified in table 6.2.4A.1.3-1, the power limits specified in subclause 6.2.5A.1.3 apply.

Table 6.2.4A.1.3-1: Additional Maximum Power Reduction (A-MPR) for intra-band contiguous CA

CA Network Signalling value	Requirements (subclause)	Uplink CA Configuration	A-MPR [dB] (subclause)
CA_NS_01	6.6.3.3A.1.3.1	CA_1C	6.2.4A.1.3.1
CA_NS_02	6.6.3.3A.1.3.2	CA_1C	6.2.4A.1.3.2
CA_NS_03	6.6.3.3A.1.3.3	CA_1C	6.2.4A.1.3.3
CA_NS_04	6.6.2.2A.1.3.1	CA_41C	6.2.4A.1.3.4
CA_NS_05	6.6.3.3A.1.3.4	CA_38C	6.2.4A.1.3.5
CA_NS_06	6.6.3.3A.1.3.5	CA_7C	6.2.4A.1.3.6
CA_NS_07	6.6.3.3A.1.3.6	CA_39C	6.2.4A.1.3.7
…			
CA_NS_31	NOTE 1	Table 5.4.2A.1-1 (NOTE 1)	N/A
CA_NS_32	Reserved		

NOTE 1: Applicable for uplink CA configurations listed in Table 5.4.2A.1-1 for which none of the additional requirements in subclauses 6.6.3.3A or 6.6.2.2A apply.
NOTE 2: The index of the sequence CA_NS corresponds to the value of *additionalSpectrumEmissionSCell-r10*.

For PUCCH and SRS transmissions, the allowed A-MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For intra-band carrier aggregation, the A-MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot; the maximum A-MPR over the two slots is then applied for the entire subframe.

6.2.4A.1.3.1 A-MPR for CA_NS_01 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_01 the allowed maximum output power reduction applied to transmissions on the PCC and the SCC for contiguously aggregated signals is specified in table 6.2.4A.1.3.1-1.

Table 6.2.4A.1.3.1-1: Contiguous allocation A-MPR for CA_NS_01

CA_1C: CA_NS_01	RB_{start}	L_{CRB} [RBs]	$RB_{start} + L_{CRB}$ [RBs]	A-MPR for QPSK and 16-QAM [dB]
100 RB / 100 RB	0 – 23 and 176 - 199	> 0	N/A	≤ 12.0
	24 – 105	> 64	N/A	≤ 6.0
	106 – 175	N/A	> 175	≤ 5.0
75 RB / 75 RB	0 – 6 and 143 – 149	$0 < L_{CRB} \leq 10$	N/A	≤ 11.0
		> 10	N/A	≤ 6.0
	7 – 90	> 44	N/A	≤ 5.0
	91 – 142	N/A	> 142	≤ 2.0

NOTE 1: RB_start indicates the lowest RB index of transmitted resource blocks
NOTE 2: L_CRB is the length of a contiguous resource block allocation
NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis
NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe

If the UE is configured to CA_1C and it receives IE CA_NS_01 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$A\text{-}MPR = CEIL\ \{M_A, 0.5\}$$

Where M_A is defined as follows:

$$M_A = -22.5\ A + 17 \quad ; 0 \leq A < 0.20$$

$$-11.0\ A + 14.7 \quad ; 0.20 \leq A < 0.70$$

$$-1.7\ A + 8.2 \quad ; 0.70 \leq A \leq 1$$

Where $A = N_{RB_alloc} / N_{RB_agg}$

The normative reference for requirement is in TS 36.101 [2] clause 6.2.4A

6.2.4A.1.3.2 A-MPR for CA_NS_02 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_02 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1.3.2-1.

Table 6.2.4A.1.3.2-1: Contiguous allocation A-MPR for CA_NS_02

CA_1C: CA_NS_02	RB_{end}	L_{CRB} [RBs]	A-MPR for QPSK and 16 -QAM [dB]
100 RB / 100 RB	0 –20	> 0	≤ 4 dB
	21 – 46	> 0	≤ 3 dB
	47 – 99	> RB_{end} – 20	≤ 3 dB
	100 – 184	> 75	≤ 6 dB
	185 – 199	> 0	≤ 10 dB
75 RB / 75 RB	0 – 48	> 0	≤ 2 dB
	49 – 80	> RB_{end} – 20	≤ 3 dB
	81 – 129	> 60	≤ 5 dB
	130 – 149	> 85	≤ 6 dB
	130 – 149	1 – 84	≤ 2 dB

If the UE is configured to CA_1C and it receives IE CA_NS_02 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

$$A\text{-}MPR = CEIL\ \{M_A, 0.5\}$$

Where M_A is defined as follows

$$[M_A = -22.5\ A + 17 \quad ; 0 \leq A < 0.20$$

$$-11.0\ A + 14.7 \quad ; 0.20 \leq A < 0.70$$

$$-1.7\ A + 8.2 \quad ; 0.70 \leq A \leq 1]$$

Where $A = N_{RB_alloc} / N_{RB_agg}$.

6.2.4A.1.3.3 A-MPR for CA_NS_03 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_03 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1.3.3-1.

Table 6.2.4A.1.3.3-1: Contiguous allocation A-MPR for CA_NS_03

CA_1C: CA_NS_03	RB_{end}	L_{CRB} [RBs]	A-MPR for QPSK and 16-QAM [dB]
100 RB / 100 RB	0 – 26	> 0	≤ 10 dB
	27 – 63	≥ RB_{end} – 27	≤ 6 dB
	27 – 63	< RB_{end} – 27	≤ 1 dB
	64 – 100	> RB_{end} – 20	≤ 4 dB
	101 – 171	> 68	≤ 7 dB
	172 – 199	> 0	≤ 10 dB
75 RB / 75 RB	0 – 20	> 0	≤ 10 dB
	21 – 45	> 0	≤ 4 dB
	46 – 75	> RB_{end} – 13	≤ 2 dB
	76 – 95	> 45	≤ 5 dB
	96 – 149	> 43	≤ 8 dB
	120 – 149	1 – 43	≤ 6 dB

If the UE is configured to CA_1C and it receives IE CA_NS_03 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

$$\text{A-MPR} = \text{CEIL}\{M_A, 0.5\}$$

Where M_A is defined as follows

$$[M_A = -23.33A + 17.5 \quad ; 0 \leq A < 0.15$$

$$-7.65A + 15.15 \quad ; 0.15 \leq A \leq 1]$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.1.3.4 A-MPR for CA_NS_04 for CA_41C

If the UE is configured to CA_41C and it receives IE CA_NS_04 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1.3.4-1.

Table 6.2.4A.1.3.4-1: Contiguous Allocation A-MPR for CA_NS_04

CA Bandwidth Class C	RB_{Start}	L_{CRB} [RBs]	$RB_{start} + L_{CRB}$ [RBs]	A-MPR for QPSK [dB]	A-MPR for 16QAM [dB]
50RB / 100 RB	0 – 44 and 105 – 149	>0	N/A	≤4dB	≤4dB
	45 – 104	N/A	>105	≤3dB	≤4dB
75 RB / 75 RB	0 – 44 and 105 – 149	>0	N/A	≤4dB	≤4dB
	45 – 104	N/A	>105	≤4dB	≤4dB
100 RB / 75 RB	0 – 49 and 125 – 174	>0	N/A	≤4dB	≤4dB
	50 - 124	N/A	>125	≤3dB	≤4dB
100 RB / 100 RB	0 – 59 and 140 – 199	>0	N/A	≤3dB	≤4dB
	60– 139	N/A	>140	≤3dB	≤4dB

NOTE 1: RB_{start} indicates the lowest RB index of transmitted resource blocks
NOTE 2: L_{CRB} is the length of a contiguous resource block allocation
NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis
NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe

If the UE is configured to CA_41C and it receives IE CA_NS_04 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$A\text{-}MPR = CEIL\ \{M_A, 0.5\}$$

Where M_A is defined as follows

$$M_A = 10.5, \quad 0 \le A < 0.05$$
$$= -50.0A + 13.00, \quad 0.05 \le A < 0.15$$
$$= -4.0A + 6.10, \quad 0.15 \le A < 0.40$$
$$= -0.83A + 4.83, \quad 0.40 \le A \le 1$$

Where $A = N_{RB_alloc} / N_{RB_agg}$.

6.2.4A.1.3.5 A-MPR for CA_NS_05 for CA_38C

If the UE is configured to CA_38C and it receives IE CA_NS_05 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1.3.5-1.

Table 6.2.4A.1.3.5-1: Contiguous Allocation A-MPR for CA_NS_05

CA_38C	RB_{end}	L_{CRB} [RBs]	A-MPR for QPSK and 16-QAM [dB]
100RB/100RB	0 – 12	>0	≤ 5 dB
	13 – 79	> RB_{end} – 13	≤ 2 dB
	80 – 180	>60	≤ 6 dB
	181 – 199	> 0	≤ 11 dB
75RB/75RB	0 – 70	> max(0, RB_{end} -10)	≤ 2 dB
	71- 108	> 60	≤ 5 dB
	109 – 140	>0	≤ 5 dB
	140 – 149	≤ 70	≤ 2 dB
	140 – 149	>70	≤ 6 dB
NOTE 1: RB_{end} indicates the highest RB index of transmitted resource blocks NOTE 2: L_{CRB} is the length of a contiguous resource block allocation NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe			

If the UE is configured to CA_38C and it receives IE CA_NS_05 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$A\text{-}MPR = CEIL\ \{M_A, 0.5\}$$

Where MA is defined as follows

$$M_A = -14.17\ A + 16.50 \quad ; 0 \le A < 0.60$$
$$-2.50\ A + 9.50 \quad ; 0.60 \le A \le 1$$

Where $A = N_{RB_alloc} / N_{RB_agg}$.

6.2.4A.1.3.6 A-MPR for CA_NS_06 for CA_7C

If the UE is configured to CA_7C and it receives IE CA_NS_06 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1.3.6-1.

Table 6.2.4A.1.3.6-1: Contiguous Allocation A-MPR for CA_NS_06

CA Bandwidth Class C	$RB_{_end}$	L_{CRB} [RBs]	A-MPR for QPSK and 16-QAM [dB]
100RB/100RB	[0 –22]	>[0]	≤ [4] dB
	[23 – 33]	> [RB_{end} – 10]	≤ [2] dB
	[106 – 142]	> [75]	≤ [3] dB
	[143 – 178]	>[70]	≤ [5] dB
	[179 – 199]	> [0]	≤ [10] dB
75RB/75RB	[0 – 7]	>[0]	≤ [5] dB
	[20- 75]	> [RB_{end} – 10]	≤ [2] dB
	[75 – 110]	>[64]	≤ [2] dB
	[110 – 144]	>[35]	≤ [6] dB
	[145 – 149]	>[0]	≤ [10] dB

If the UE is configured to CA_7C and it receives IE CA_NS_06 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

$$\text{A-MPR} = \text{CEIL}\ \{M_{A,}\ 0.5\}$$

Where M_A is defined as follows

$$M_A = [-23.33A + 17.5;\ 0 \leq A < 0.15$$

$$-7.65A + 15.15;\ 0.15 \leq A \leq 1]$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.1.3.7 A-MPR for CA_NS_07 for CA_39C

If the UE is configured to CA_39C and it receives IE CA_NS_07 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1.3.7-1.

Table 6.2.4A.1.3.7-1: Contiguous Allocation A-MPR for CA_NS_07

CA_39C: CA_NS_07	RB_{Start}	L_{CRB} [RBs]	A-MPR for QPSK and 16-QAM[dB]
75 RB / 100 RB and 100 RB / 75 RB	0 – 13	> 0	≤ 11
	14 – 50	≤ 60	≤ 3
	14 – 100	> 60	≤ 7
	101 – 155	> max(155 - RBstart , 0)	≤ 2
	156 – 174	> 0	≤ 5
50 RB / 100 RB and 100 RB / 50 RB	0 – 5	> 0	≤ 11
	6 – 42	≤ 25	≤ 3
		> 25	≤ 6
	43 – 80	> 50	≤ 5
	81 – 138	> 20	≤ 2
	139 – 149	> 0	≤ 5
25 RB / 100 RB and 100 RB / 25 RB	0 – 32	≥ 84	≤ 6
		< 84	≤ 4
	33 – 60	> 50	≤ 3
	61 – 124	> 20	≤ 3

If the UE is configured to CA_39C and it receives IE CA_NS_07 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$\text{A-MPR} = \text{CEIL}\ \{M_{A,}\ 0.5\}$$

Where M_A is defined as follows:

$$M_A = -16.25A + 21 \quad ; 0 \leq A < 0.80$$

$$-2.50\ A + 10.00 \quad ; 0.80 \leq A \leq 1$$

Where $A = N_{RB_alloc} / N_{RB_agg}$

6.2.4A.1.4 Test description

6.2.4A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.2.4A.1.4.1-1 to 6.2.4A.1.4.1-7. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4A.1.4.1-1: Test Configuration Table (network signalled value "CA_NS_01")

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			C: Low and High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			As in Table 6.2.4A.1.3.1-1						
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	QPSK	1	P_1@0	S_0@0		
2	75	75		QPSK	150	P_75@0	S_75@0		
3	75	75		QPSK	45	P_45@7	S_0@0		
4	75	75		QPSK	8	P_0@0	S_8@67		
5	75	75		QPSK	129	P_75@0	S_54@0		
6	75	75		QPSK	2	P_1@0	S_1@74		
7	100	100		QPSK	200	P_100@0	S_100@0		
8	100	100		QPSK	1	P_1@0	S_0@0		
9	100	100		QPSK	175	P_75@25	S_100@0		
10	100	100		QPSK	25	P_0@0	S_25@75		
11	100	100		QPSK	64	P_64@24	S_0@0		
12	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1.4.1-2: Test Configuration Table (network signalled value "CA_NS_02")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	As in Table 6.2.4A.1.3.2-1

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	QPSK	1	P_1@0	S_0@0		
2	75	75		QPSK	75	P_75@0	S_0@0		
3	75	75		QPSK	129	P_75@0	S_54@0		
4	75	75		QPSK	129	P_54@21	S_75@0		
5	75	75		QPSK	1	P_0@0	S_1@74		
6	75	75		QPSK	1	P_0@0	S_1@54		
7	75	75		QPSK	2	P_1@0	S_1@74		
8	100	100		QPSK	1	P_1@0	S_0@0		
9	100	100		QPSK	1	P_1@21	S_0@0		
10	100	100		QPSK	90	P_90@0	S_0@0		
11	100	100		QPSK	180	P_100@0	S_80@0		
12	100	100		QPSK	1	P_0@0	S_1@99		
13	100	100		QPSK	1	P_0@0	S_1@83		
14	100	100		QPSK	2	P_1@0	S_1@99		

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Table 6.2.4A.1.4.1-3: Test Configuration Table (network signalled value "CA_NS_03")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	As in Table 6.2.4A.1.3.3-1

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	QPSK	1	P_1@0	S_0@0		
2	75	75		QPSK	1	P_1@21	S_0@0		
3	75	75		QPSK	75	P_75@0	S_0@0		
4	75	75		QPSK	90	P_75@0	S_15@0		
5	75	75		QPSK	150	P_75@0	S_75@0		
6	75	75		QPSK	1	P_0@0	S_1@74		
7	75	75		QPSK	1	P_0@0	S_1@44		
8	75	75		QPSK	2	P_1@0	S_1@74		
9	100	100		QPSK	1	P_1@0	S_0@0		
10	100	100		QPSK	60	P_60@0	S_0@0		
11	100	100		QPSK	1	P_1@63	S_0@0		
12	100	100		QPSK	90	P_90@0	S_0@0		

13	100	100		QPSK	164	P_100@0	S_64@0		
14	100	100		QPSK	1	P_0@0	S_1@99		
15	100	100		QPSK	1	P_0@0	S_1@70		
16	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1.4.1-4: Test Configuration Table (network signalled value "CA_NS_04")

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			C: Low and High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			As in Table 6.2.4A.1.3.4-1						
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	100	50	N/A	QPSK	10	P_10@20	S_0@0		
2	100	50		QPSK	60	P_50@50	S_10@0		
3	100	50		16QAM	15	P_0@0	S_15@0		
4	100	50		QPSK	2	P_1@0	S_1@49		
5	75	75		QPSK	10	P_10@20	S_0@0		
6	75	75		QPSK	75	P_30@45	S_45@0		
7	75	75		QPSK	2	P_1@0	S_1@74		
8	100	75		QPSK	10	P_10@20	S_0@0		
9	100	75		QPSK	80	P_50@50	S_30@0		
10	100	75		16QAM	20	P_0@0	S_20@15		
11	100	75		QPSK	2	P_1@0	S_1@74		
12	100	100		QPSK	10	P_10@25	S_0@0		
13	100	100		QPSK	90	P_40@60	S_50@0		
14	100	100		16QAM	15	P_0@0	S_15@40		
15	100	100		16QAM	20	P_0@0	S_20@30		
16	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1.4.1-5: Test Configuration Table (network signalled value "CA_NS_05")

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			C: Low and High range			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			As in Table 6.2.4A.1.3.5-1			
Test Parameters for CA Configurations						
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**

1	75	75	N/A	QPSK	40	P_40@0	S_0@0		
2	75	75		QPSK	80	P_50@25	S_30@0		
3	75	75		QPSK	60	P_10@65	S_50@0		
4	75	75		QPSK	65	P_1@74	S_64@0		
5	75	75		QPSK	92	P_20@55	S_72@0		
6	75	75		QPSK	2	P_1@0	S_1@74		
7	100	100		QPSK	8	P_8@0	S_0@0		
8	100	100		QPSK	40	P_40@0	S_0@0		
9	100	100		QPSK	80	P_50@50	S_30@0		
10	100	100		QPSK	150	P_60@40	S_90@0		
11	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1.4.1-6: Test Configuration Table (network signalled value "CA_NS_06")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	As in Table 6.2.4A.1.3.6-1

Test Parameters for CA Configurations

ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	QPSK	5	P_5@0	S_0@0		
2	75	75		QPSK	45	P_45@0	S_0@0		
3	75	75		QPSK	75	P_60@15	S_15@0		
4	75	75		QPSK	60	P_10@65	S_50@0		
5	75	75		QPSK	90	P_18@57	S_72@0		
6	75	75		QPSK	2	P_1@0	S_1@74		
7	100	100		QPSK	10	P_10@0	S_0@0		
8	100	100		QPSK	30	P_30@0	S_0@0		
9	100	100		QPSK	100	P_75@25	S_25@0		
10	100	100		QPSK	90	P_40@60	S_50@0		
11	100	100		QPSK	96	P_15@85	S_81@0		
12	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1.4.1-7: Test Configuration Table (network signalled value "CA_NS_07")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	As in Table 6.2.4A.1.3.7-1

Test Parameters for CA Configurations

ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**

1	100	25	N/A	QPSK	1	P_1@0	S_0@0		
2	100	25		QPSK	85	P_80@20	S_5@0		
3	100	25		QPSK	65	P_60@40	S_5@0		
4	100	25		QPSK	35	P_30@70	S_5@0		
5	100	25		QPSK	2	P_1@0	S_1@24		
6	100	50		QPSK	1	P_1@1	S_0@0		
7	100	50		QPSK	10	P_10@30	S_0@0		
8	100	50		QPSK	30	P_30@30	S_0@0		
9	100	50		QPSK	60	P_40@60	S_20@0		
10	100	50		QPSK	30	P_10@90	S_20@0		
11	100	50		QPSK	5	P_0@0	S_5@45		
12	100	50		QPSK	2	P_1@0	S_1@49		
13	100	75		QPSK	1	P_1@1	S_0@0		
14	100	75		QPSK	40	P_40@20	S_0@0		
15	100	75		QPSK	85	P_80@20	S_5@0		
16	100	75		QPSK	40	P_0@0	S_40@20		
17	100	75		QPSK	15	P_0@0	S_15@60		
18	100	75		QPSK	2	P_1@0	S_1@74		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to the applicable table from Table 6.2.4A.1.4.1-1 to 6.2.4A.1.4.1-7.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4A.1.4.3.

6.2.4A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.4A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to the applicable from Table 6.2.4A.1.4.1-1 to Table 6.2.4A.1.4.1-7 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.
6. Measure the mean transmitted power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.4A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.The following exceptions apply for each network signalled value.

6.2.4A.1.4.3.1 Message contents exceptions (network signalled value "CA_NS_01")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_01. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.1-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_01"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	1 (CA_NS_01)		

6.2.4A.1.4.3.2 Message contents exceptions (network signalled value "CA_NS_02")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_02. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.2-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_02"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	2 (CA_NS_02)		

6.2.4A.1.4.3.3 Message contents exceptions (network signalled value "CA_NS_03")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_03. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.3-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_03"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	3 (CA_NS_03)		

6.2.4A.1.4.3.4 Message contents exceptions (network signalled value "CA_NS_04")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_04. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.4-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_04"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	4 (CA_NS_04)		

6.2.4A.1.4.3.5 Message contents exceptions (network signalled value "CA_NS_05")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_05. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.5-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_05"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	5 (CA_NS_05)		

6.2.4A.1.4.3.6 Message contents exceptions (network signalled value "CA_NS_06")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_06. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.6-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_06"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	6 (CA_NS_06)		

6.2.4A.1.4.3.7 Message contents exceptions (network signalled value "CA_NS_07")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_07. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.2.4A.1.4.3.7-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_07"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	7 (CA_NS_07)		

6.2.4A.1.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4A.1.5-1 to Table 6.2.4A.1.5-7. The allowed maximum output power reduction is specified in Table 6.2.4A.1.3-1 and clause 6.2.3A.1 does not apply, i.e. carrier aggregation MPR = 0. For the UE maximum output power modified by A-MPR specified in table 6.2.4A.1.3-1, the power limits specified in Table 6.2.5A.1.3-1 apply.

Table 6.2.4A.1.5-1: Test requirement (network signalled value "CA_NS_01")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -17.7
2					23	+2.7 / -11.7
3					23	+2.7 / -9.7
4					23	+2.7 / -4.7
5					23	+2.7 / -11.7
6					23	+2.7 / -24.7
7					23	+2.7 / -18.7
8					23	+2.7 / -18.7
9					23	+2.7 / -11.7
10					23	+2.7 / -9.7
11					23	+2.7 / -2.7
12					23	+2.7 / -24.7
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

Table 6.2.4A.1.5-2: Test requirement (network signalled value "CA_NS_02")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -4.7
2					23	+2.7 / -6.2
3					23	+2.7 / -9.7
4					23	+2.7 / -11.7
5					23	+2.7 / -4.7
6					23	+2.7 / -2.7
7					23	+2.7/-24.7
8					23	+2.7 / -8.2
9					23	+2.7 / -6.2
10					23	+2.7 / -6.2
11					23	+2.7 / -11.7
12					23	+2.7 / -15.7
13					23	+2.7 / -2.7
14					23	+2.7/-24.7

Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.

Table 6.2.4A.1.5-3: Test requirement (network signalled value "CA_NS_03")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -15.7
2					23	+2.7 / -8.2
3					23	+2.7 / -4.7
4					23	+2.7 / -9.7
5					23	+2.7 / -13.7
6					23	+2.7 / -11.7
7					23	+2.7 / -2.7
8					23	+2.7/-25.2
9					23	+2.7 / -15.7
10					23	+2.7 / -11.7
11					23	+2.7 / -3.7
12					23	+2.7 / -8.2
13					23	+2.7 / -12.7
14					23	+2.7 / -15.7
15					23	+2.7 / -2.7
16					23	+2.7/-25.2

Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.

Table 6.2.4A.1.5-4: Test requirement (network signalled value "CA_NS_04")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -8.2
2					23	+2.7 / -6.2
3					23	+2.7 / -8.2
4					23	+2.7 / -18.7
5					23	+2.7 / -8.2
6					23	+2.7 / -8.2
7					23	+2.7 / -18.7
8					23	+2.7 / -8.2
9					23	+2.7 / -6.2
10					23	+2.7 / -8.2
11					23	+2.7 / -18.7
12					23	+2.7 / -6.2
13					23	+2.7 / -6.2
14					23	+2.7 / -8.2
15					23	+2.7 / -8.2
16					23	+2.7 / -18.7

Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.

Table 6.2.4A.1.5-5: Test requirement (network signalled value "CA_NS_05")

Configuration ID	Test Freq.	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	Low, High					23	+2.7 / -4.7
2	Low, High					23	+2.7 / -9.7
3	Low, High					23	+2.7 / -9.7
4	Low, High					23	+2.7 / -9.7
5	Low, High					23	+2.7 / -11.7
6	Low, High					23	+2.7 / -24.2
7	Low, High					23	+2.7 / -9.7
8	Low, High					23	+2.7 / -4.7
9	Low, High					23	+2.7 / -11.7
10	Low, High					23	+2.7 / -17.7
11	Low, High					23	+2.7 / -24.2

Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.

Table 6.2.4A.1.5-6: Test requirement (network signalled value "CA_NS_06")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -12.2
2					23	+2.7 / -4.7
3					23	+2.7 / -4.7
4					23	+2.7 / -11.7
5					23	+2.7 / -15.7
6					23	+2.7 / -26.7
7					23	+2.7 / -11.2
8					23	+2.7 / -4.7
9					23	+2.7 / -6.2
10					23	+2.7 / -9.7
11					23	+2.7 / -15.7
12					23	+2.7 / -26.7

Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.

Table 6.2.4A.1.5-7: Test requirement (network signalled value "CA_NS_07")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -8.2
2					23	+2.7 / -11.7
3					23	+2.7 / -6.2
4					23	+2.7 / -6.2
5					23	+2.7 / -28.7
6					23	+2.7 / -17.7
7					23	+2.7 / -6.2
8					23	+2.7 / -11.7
9					23	+2.7 / -9.7
10					23	+2.7 / -4.7
11					23	+2.7 / -9.7
12					23	+2.7 / -28.7
13					23	+2.7 / -17.7
14					23	+2.7 / -6.2
15					23	+2.7 / -12.7
16					23	+2.7 / -4.7
17					23	+2.7 / -9.7
18					23	+2.7 / -28.7
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

6.2.4A.1_1 Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM

Editor's notes:

- Minimum requirement for CA_NS_08 for this test case is undefined in TS 36.101.

6.2.4A.1_1.1 Test purpose

Same test purpose as in clause 6.2.4A.1.1.

6.2.4A.1_1.2 Test applicability

The requirements of this test apply in test case 6.6.2.2A.1_1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA) for network signalled value CA_NS_04 to all types of E-UTRA UE from release 13 and forward that support intra-band contiguous DL CA, UL CA and UL 64QAM.

The requirements of this test apply in test case 6.6.3.3A.1_1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA) for network signalled values CA_NS_01, CA_NS_02 and CA_NS_03, CA_NS_05,

CA_NS_06, CA_NS_07, CA_NS_08 to all types of E-UTRA UE from release 13 and forward that support intra-band contiguous DL CA, UL CA and UL 64QAM.

NOTE: As a result TC 6.2.4A.1_1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4A.1_1.3 Minimum conformance requirements

Additional ACLR, spectrum emission and spurious emission requirements for carrier aggregation can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the CA Power Class as specified in Table 6.2.2A.0-2.

If for intra-band carrier aggregation the UE is configured for transmissions on a single serving cell, then subclauses 6.2.3 and 6.2 4 apply with the Network Signalling value indicated by the field *additionalSpectrumEmission*.

For intra-band contiguous aggregation with the UE configured for transmissions on two serving cells, the maximum output power reduction specified in Table 6.2.4A.1_1.3-1 is allowed for all serving cells of the applicable uplink CA configurations according to the CA network signalling value indicated by the field *additionalSpectrumEmissionSCell-r10*. Then clause 6.2.3A.1.3 does not apply, i.e. the carrier aggregation MPR = 0 dB, unless the value indicated is CA_NS_31. For uplink 64QAM, the applied maximum output power reduction is obtained by taking the maximum value of MPR requirements specified in Table 6.2.3A.1_1.3-1 and A-MPR requirements specified in Table 6.2.4A.1_1.3-1.

For the UE maximum output power modified by A-MPR specified in table 6.2.4A.1_1.3-1, the power limits specified in subclause 6.2.5A.1.3 apply.

Table 6.2.4A.1_1.3-1: Additional Maximum Power Reduction (A-MPR) for intra-band contiguous CA

CA Network Signalling value	Requirements (subclause)	Uplink CA Configuration	A-MPR [dB] (subclause)
CA_NS_01	6.6.3.3A.1.3.1	CA_1C	6.2.4A.1_1.3.1
CA_NS_02	6.6.3.3A.1.3.2	CA_1C	6.2.4A.1_1.3.2
CA_NS_03	6.6.3.3A.1.3.3	CA_1C	6.2.4A.1_1.3.3
CA_NS_04	6.6.2.2A.1.3.1	CA_41C	6.2.4A.1_1.3.4
CA_NS_05	6.6.3.3A.1.3.4	CA_38C	6.2.4A.1_1.3.5
CA_NS_06	6.6.3.3A.1.3.5	CA_7C	6.2.4A.1_1.3.6
CA_NS_07	6.6.3.3A.1.3.6	CA_39C	6.2.4A.1_1.3.7
CA_NS_08	6.6.3.3A.1.3.7	CA_42C	6.2.4A.1_1.3.8
…			
CA_NS_31	NOTE 1	Table 5.4.2A.1-1 (NOTE 1)	N/A
CA_NS_32	Reserved		

NOTE 1: Applicable for uplink CA configurations listed in Table 5.4.2A.1-1 for which none of the additional requirements in subclauses 6.6.3.3A or 6.6.2.2A apply.
NOTE 2: The index of the sequence CA_NS corresponds to the value of *additionalSpectrumEmissionSCell-r10*.

For PUCCH and SRS transmissions, the allowed A-MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For intra-band carrier aggregation, the A-MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot; the maximum A-MPR over the two slots is then applied for the entire subframe.

6.2.4A.1_1.3.1 A-MPR for CA_NS_01 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_01 the allowed maximum output power reduction applied to transmissions on the PCC and the SCC for contiguously aggregated signals is specified in table 6.2.4A.1_1.3.1-1.

Table 6.2.4A.1_1.3.1-1: Contiguous allocation A-MPR for CA_NS_01

CA_1C: CA_NS_01	RB_{start}	L_{CRB} [RBs]	$RB_{start} + L_{CRB}$ [RBs]	A-MPR for 64-QAM [dB]
100 RB / 100 RB	0 – 23 and 176 - 199	> 0	N/A	≤ 12.0
	24 – 105	> 64	N/A	≤ 6.0
	106 – 175	N/A	> 175	≤ 5.0
75 RB / 75 RB	0 – 6 and 143 – 149	$0 < L_{CRB} \leq 10$	N/A	≤ 11.0
		> 10	N/A	≤ 6.0
	7 – 90	> 44	N/A	≤ 5.0
	91 – 142	N/A	> 142	≤ 2.0

NOTE 1: RB_start indicates the lowest RB index of transmitted resource blocks
NOTE 2: L_CRB is the length of a contiguous resource block allocation
NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis
NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe

If the UE is configured to CA_1C and it receives IE CA_NS_01 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$\text{A-MPR} = \text{CEIL}\{M_A, 0.5\}$$

Where M_A is defined as follows:

$$M_A = -22.5\,A + 17 \quad ; 0 \leq A < 0.20$$

$$-11.0\,A + 14.7 \quad ; 0.20 \leq A < 0.70$$

$$-1.7\,A + 8.2 \quad ; 0.70 \leq A \leq 1$$

Where $A = N_{RB_alloc} / N_{RB_agg}$

The normative reference for requirement is in TS 36.101 [2] clause 6.2.4A.

6.2.4A.1_1.3.2 A-MPR for CA_NS_02 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_02 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1_1.3.2-1.

Table 6.2.4A.1_1.3.2-1: Contiguous allocation A-MPR for CA_NS_02

CA_1C: CA_NS_02	RB_{end}	L_{CRB} [RBs]	A-MPR for 64-QAM [dB]
100 RB / 100 RB	0 –20	> 0	≤ 4 dB
	21 – 46	> 0	≤ 3 dB
	47 – 99	> RB_{end} – 20	≤ 3 dB
	100 – 184	> 75	≤ 6 dB
	185 – 199	> 0	≤ 10 dB
75 RB / 75 RB	0 – 48	> 0	≤ 2 dB
	49 – 80	> RB_{end} – 20	≤ 3 dB
	81 – 129	> 60	≤ 5 dB
	130 – 149	> 85	≤ 6 dB
	130 – 149	1 – 84	≤ 2 dB

If the UE is configured to CA_1C and it receives IE CA_NS_02 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

$$\text{A-MPR} = \text{CEIL}\{M_A, 0.5\}$$

Where M_A is defined as follows

$$[M_A = -22.5\,A + 17 \quad ; 0 \le A < 0.20$$

$$-11.0\,A + 14.7 \quad ; 0.20 \le A < 0.70$$

$$-1.7\,A + 8.2 \quad ; 0.70 \le A \le 1]$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.1_1.3.3 A-MPR for CA_NS_03 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_03 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1_1.3.3-1.

Table 6.2.4A.1_1.3.3-1: Contiguous allocation A-MPR for CA_NS_03

CA_1C: CA_NS_03	RB_{end}	L_{CRB} [RBs]	A-MPR for 64-QAM [dB]
100 RB / 100 RB	0 – 26	> 0	≤ 10 dB
	27 – 63	≥ RB_{end} – 27	≤ 6 dB
	27 – 63	< RB_{end} – 27	≤ 1 dB
	64 – 100	> RB_{end} – 20	≤ 4 dB
	101 – 171	> 68	≤ 7 dB
	172 – 199	> 0	≤ 10 dB
75 RB / 75 RB	0 – 20	> 0	≤ 10 dB
	21 – 45	> 0	≤ 4 dB
	46 – 75	> RB_{end} – 13	≤ 2 dB
	76 – 95	> 45	≤ 5 dB
	96 – 149	> 43	≤ 8 dB
	120 – 149	1 – 43	≤ 6 dB

If the UE is configured to CA_1C and it receives IE CA_NS_03 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

$$A\text{-}MPR = CEIL\ \{M_{A,}\ 0.5\}$$

Where M_A is defined as follows

$$[M_A = -23.33A + 17.5 \quad ; 0 \leq A < 0.15$$

$$-7.65A + 15.15 \quad ; 0.15 \leq A \leq 1]$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.1_1.3.4 A-MPR for CA_NS_04 for CA_41C

If the UE is configured to CA_41C and it receives IE CA_NS_04 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1_1.3.4-1.

Table 6.2.4A.1.3.4-1: Contiguous Allocation A-MPR for CA_NS_04

CA Bandwidth Class C	RB_{Start}	L_{CRB} [RBs]	$RB_{start} + L_{CRB}$ [RBs]	A-MPR for 64-QAM [dB]
50RB / 100 RB	0 – 44 and 105 – 149	>0	N/A	≤4dB
	45 – 104	N/A	>105	≤4dB
75 RB / 75 RB	0 – 44 and 105 – 149	>0	N/A	≤4dB
	45 – 104	N/A	>105	≤4dB
100 RB / 75 RB	0 – 49 and 125 – 174	>0	N/A	≤4dB
	50 - 124	N/A	>125	≤4dB
100 RB / 100 RB	0 – 59 and 140 – 199	>0	N/A	≤4dB
	60– 139	N/A	>140	≤4dB
NOTE 1: RBstart indicates the lowest RB index of transmitted resource blocks NOTE 2: LCRB is the length of a contiguous resource block allocation NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe				

If the UE is configured to CA_41C and it receives IE CA_NS_04 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$A\text{-}MPR = CEIL\ \{M_{A,}\ 0.5\}$$

Where M_A is defined as follows

$$M_A = 10.5, \quad 0 \leq A < 0.05$$

$$= -50.0A + 13.00, \quad 0.05 \leq A < 0.15$$

$$= -4.0A + 6.10, \quad 0.15 \leq A < 0.40$$

$$= -0.83A + 4.83, \quad 0.40 \leq A \leq 1$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.1_1.3.5 A-MPR for CA_NS_05 for CA_38C

If the UE is configured to CA_38C and it receives IE CA_NS_05 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1_1.3.5-1.

Table 6.2.4A.1_1.3.5-1: Contiguous Allocation A-MPR for CA_NS_05

CA_38C	RB_{end}	L_{CRB} [RBs]	A-MPR for 64-QAM [dB]
100RB/100RB	0 – 12	>0	≤ 5 dB
	13 – 79	> RB_{end} – 13	≤ 2 dB
	80 – 180	>60	≤ 6 dB
	181 – 199	> 0	≤ 11 dB
75RB/75RB	0 – 70	> max(0, RB_{end} -10)	≤ 2 dB
	71- 108	> 60	≤ 5 dB
	109 – 140	>0	≤ 5 dB
	140 – 149	≤ 70	≤ 2 dB
	140 – 149	>70	≤ 6 dB
NOTE 1: RB_{end} indicates the highest RB index of transmitted resource blocks NOTE 2: L_{CRB} is the length of a contiguous resource block allocation NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe			

If the UE is configured to CA_38C and it receives IE CA_NS_05 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$\text{A-MPR} = \text{CEIL}\ \{M_{A,}\ 0.5\}$$

Where MA is defined as follows

$$M_A = -14.17\ A + 16.50 \quad ;\ 0 \leq A < 0.60$$

$$-2.50\ A + 9.50 \quad ;\ 0.60 \leq A \leq 1$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.1_1.3.6 A-MPR for CA_NS_06 for CA_7C

If the UE is configured to CA_7C and it receives IE CA_NS_06 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1_1.3.6-1.

Table 6.2.4A.1_1.3.6-1: Contiguous Allocation A-MPR for CA_NS_06

CA Bandwidth Class C	RB_{end}	L_{CRB} [RBs]	A-MPR for 64-QAM [dB]
100RB/100RB	0 –22	>0	≤ 4 dB
	23 – 99	> max(0,RB_{end} – 25)	≤ 2 dB
	100 – 142	> 75	≤ 3 dB
	143 – 177	>70	≤ 5 dB
	178 – 199	> 0	≤ 10 dB
75RB/75RB	0 – 7	>0	≤ 5 dB
	8- 74	> max(0,RB_{end} – 10)	≤ 2 dB
	75 – 109	>64	≤ 2 dB
	110 – 144	>35	≤ 6 dB
	145 – 149	>0	≤ 10 dB
50RB/100RB and 100RB/50RB	0 – 10	> 0	≤ 5 dB
	11 – 75	> max(0, RB_End – 25)	≤ 2 dB
	76 – 103	> 50	≤ 3 dB
	104 – 144	> 25	≤ 6 dB
	145 – 149	> 0	≤ 10 dB
75RB/100RB and 100RB/75RB	0 – 15	> 0	≤ 5 dB
	16 – 75	> max(0, RB_End – 15)	≤ 2 dB
	76 – 120	> 50	≤ 3 dB
	121 – 160	> 50	≤ 6 dB
	161 – 174	> 0	≤ 10 dB

If the UE is configured to CA_7C and it receives IE CA_NS_06 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

$$\text{A-MPR} = \text{CEIL}\{M_A, 0.5\}$$

Where M_A is defined as follows

$$M_A = \begin{cases} -23.33A + 17.5 & ; 0 \le A < 0.15 \\ -7.65A + 15.15 & ; 0.15 \le A \le 1 \end{cases}$$

Where $A = N_{RB_alloc} / N_{RB_agg}$.

6.2.4A.1_1.3.7 A-MPR for CA_NS_07 for CA_39C

If the UE is configured to CA_39C and it receives IE CA_NS_07 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1_1.3.7-1.

Table 6.2.4A.1_1.3.7-1: Contiguous Allocation A-MPR for CA_NS_07

CA_39C: CA_NS_07	RB_{Start}	L_{CRB} [RBs]	A-MPR for 64-QAM [dB]
75 RB / 100 RB and 100 RB / 75 RB	0 – 13	> 0	≤ 11
	14 – 50	≤ 60	≤ 3
	14 – 100	> 60	≤ 7
	101 – 155	> max(155 - RBstart , 0)	≤ 2
	156 – 174	> 0	≤ 5
50 RB / 100 RB and 100 RB / 50 RB	0 – 5	> 0	≤ 11
	6 – 42	≤ 25	≤ 3
		> 25	≤ 6

	43 – 80	> 50	≤ 5
	81 – 138	> 20	≤ 2
	139 – 149	> 0	≤ 5
25 RB / 100 RB and 100 RB / 25 RB	0 – 32	≥ 84	≤ 6
		< 84	≤ 4
	33 – 60	> 50	≤ 3
	61 – 124	> 20	≤ 3

If the UE is configured to CA_39C and it receives IE CA_NS_07 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$A\text{-}MPR = CEIL\ \{M_A, 0.5\}$$

Where M_A is defined as follows

$$M_A = -16.25A + 21 \quad ; 0 \leq A < 0.80$$

$$-2.50\ A + 10.00 \quad ; 0.80 \leq A \leq 1$$

Where $A = N_{RB_alloc} / N_{RB_agg}$

6.2.4A.1_1.3.8 A-MPR for CA_NS_08 for CA_42C

If the UE is configured to CA_42C and it receives IE CA_NS_08 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.1_1.3.8-1.

Table 6.2.4A.1_1.3.8-1: Contiguous Allocation A-MPR for CA_NS_08

CA_42C: CA_NS_08	RB_{Start}	L_{CRB} [RBs]	A-MPR for 64-QAM[dB]
100RB/100RB	-	-	TBD
75 RB / 100 RB and 100 RB / 75 RB	-	-	TBD
50 RB / 100 RB and 100 RB / 50 RB	-	-	TBD
25 RB / 100 RB and 100 RB / 25 RB	-	-	TBD

6.2.4A.1_1.4 Test description

6.2.4A.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.2.4A.1_1.4.1-1 to 6.2.4A.1_1.4.1-7. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4A.1_1.4.1-1: Test Configuration Table (network signalled value "CA_NS_01")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	As in Table 6.2.4A.1_1.3.1-1

Test Parameters for CA Configurations

ID	CA Configuration / N_{RB_agg}		DL Allocation (PDCCH on PCC)	CC MOD	UL Allocation				
	PCC N_{RB}	SCCs N_{RB}	PCC & SCC RB allocation		N_{RB_alloc}	PCC & SCC RB allocations (L_{CRB} @ RB_{start})			
1	75	75	N/A	64QAM	1	P_1@0	S_0@0		
2	75	75		64QAM	150	P_75@0	S_75@0		
3	75	75		64QAM	45	P_45@7	S_0@0		
4	75	75		64QAM	8	P_0@0	S_8@67		
5	75	75		64QAM	129	P_75@0	S_54@0		
6	75	75		64QAM	2	P_1@0	S_1@74		
7	100	100		64QAM	200	P_100@0	S_100@0		
8	100	100		64QAM	1	P_1@0	S_0@0		
9	100	100		64QAM	175	P_75@25	S_100@0		
10	100	100		64QAM	25	P_0@0	S_25@75		
11	100	100		64QAM	64	P_64@24	S_0@0		
12	100	100		64QAM	2	P_1@0	S_1@99		

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Table 6.2.4A.1_1.4.1-2: Test Configuration Table (network signalled value "CA_NS_02")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	As in Table 6.2.4A.1_1.3.2-1

Test Parameters for CA Configurations

ID	CA Configuration / N_{RB_agg}		DL Allocation (PDCCH on PCC)	CC MOD	UL Allocation				
	PCC N_{RB}	SCCs N_{RB}	PCC & SCC RB allocation		N_{RB_alloc}	PCC & SCC RB allocations (L_{CRB} @ RB_{start})			
1	75	75	N/A	64QAM	1	P_1@0	S_0@0		
2	75	75		64QAM	75	P_75@0	S_0@0		
3	75	75		64QAM	129	P_75@0	S_54@0		
4	75	75		64QAM	129	P_54@21	S_75@0		
5	75	75		64QAM	1	P_0@0	S_1@74		
6	75	75		64QAM	1	P_0@0	S_1@54		
7	75	75		64QAM	2	P_1@0	S_1@74		
8	100	100		64QAM	1	P_1@0	S_0@0		
9	100	100		64QAM	1	P_1@21	S_0@0		
10	100	100		64QAM	90	P_90@0	S_0@0		
11	100	100		64QAM	180	P_100@0	S_80@0		
12	100	100		64QAM	1	P_0@0	S_1@99		
13	100	100		64QAM	1	P_0@0	S_1@83		
14	100	100		64QAM	2	P_1@0	S_1@99		

Note 1:	CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Table 6.2.4A.1_1.4.1-3: Test Configuration Table (network signalled value "CA_NS_03")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	As in Table 6.2.4A.1_1.3.3-1

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	64QAM	1	P_1@0	S_0@0		
2	75	75		64QAM	1	P_1@21	S_0@0		
3	75	75		64QAM	75	P_75@0	S_0@0		
4	75	75		64QAM	90	P_75@0	S_15@0		
5	75	75		64QAM	150	P_75@0	S_75@0		
6	75	75		64QAM	1	P_0@0	S_1@74		
7	75	75		64QAM	1	P_0@0	S_1@44		
8	75	75		64QAM	2	P_1@0	S_1@74		
9	100	100		64QAM	1	P_1@0	S_0@0		
10	100	100		64QAM	60	P_60@0	S_0@0		
11	100	100		64QAM	1	P_1@63	S_0@0		
12	100	100		64QAM	90	P_90@0	S_0@0		
13	100	100		64QAM	164	P_100@0	S_64@0		
14	100	100		64QAM	1	P_0@0	S_1@99		
15	100	100		64QAM	1	P_0@0	S_1@70		
16	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1_1.4.1-4: Test Configuration Table (network signalled value "CA_NS_04")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	As in Table 6.2.4A.1_1.3.4-1

Test Parameters for CA Configurations						
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**

1	100	50	N/A	64QAM	10	P_10@20	S_0@0		
2	100	50		64QAM	60	P_50@50	S_10@0		
3	100	50		64QAM	15	P_0@0	S_15@0		
4	100	50		64QAM	2	P_1@0	S_1@49		
5	75	75		64QAM	10	P_10@20	S_0@0		
6	75	75		64QAM	75	P_30@45	S_45@0		
7	75	75		64QAM	2	P_1@0	S_1@74		
8	100	75		64QAM	10	P_10@20	S_0@0		
9	100	75		64QAM	80	P_50@50	S_30@0		
10	100	75		64QAM	20	P_0@0	S_20@15		
11	100	75		64QAM	2	P_1@0	S_1@74		
12	100	100		64QAM	10	P_10@25	S_0@0		
13	100	100		64QAM	90	P_40@60	S_50@0		
14	100	100		64QAM	15	P_0@0	S_15@40		
15	100	100		64QAM	20	P_0@0	S_20@30		
16	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1_1.4.1-5: Test Configuration Table (network signalled value "CA_NS_05")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	As in Table 6.2.4A.1_1.3.5-1

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	64QAM	40	P_40@0	S_0@0		
2	75	75		64QAM	80	P_50@25	S_30@0		
3	75	75		64QAM	60	P_10@65	S_50@0		
4	75	75		64QAM	65	P_1@74	S_64@0		
5	75	75		64QAM	92	P_20@55	S_72@0		
6	75	75		64QAM	2	P_1@0	S_1@74		
7	100	100		64QAM	8	P_8@0	S_0@0		
8	100	100		64QAM	40	P_40@0	S_0@0		
9	100	100		64QAM	80	P_50@50	S_30@0		
10	100	100		64QAM	150	P_60@40	S_90@0		
11	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1_1.4.1-6: Test Configuration Table (network signalled value "CA_NS_06")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	As in Table 6.2.4A.1_1.3.6-1

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	64QAM	5	P_5@0	S_0@0		
2	75	75		64QAM	45	P_45@0	S_0@0		
3	75	75		64QAM	75	P_60@15	S_15@0		
4	75	75		64QAM	60	P_10@65	S_50@0		
5	75	75		64QAM	90	P_18@57	S_72@0		
6	75	75		64QAM	2	P_1@0	S_1@74		
7	100	100		64QAM	10	P_10@0	S_0@0		
8	100	100		64QAM	30	P_30@0	S_0@0		
9	100	100		64QAM	100	P_75@25	S_25@0		
10	100	100		64QAM	90	P_40@60	S_50@0		
11	100	100		64QAM	96	P_15@85	S_81@0		
12	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.2.4A.1_1.4.1-7: Test Configuration Table (network signalled value "CA_NS_07")

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	As in Table 6.2.4A.1_1.3.7-1

Test Parameters for CA Configurations						
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**

1	100	25	N/A	64QAM	1	P_1@0	S_0@0		
2	100	25		64QAM	85	P_80@20	S_5@0		
3	100	25		64QAM	65	P_60@40	S_5@0		
4	100	25		64QAM	35	P_30@70	S_5@0		
5	100	25		64QAM	2	P_1@0	S_1@24		
6	100	50		64QAM	1	P_1@1	S_0@0		
7	100	50		64QAM	10	P_10@30	S_0@0		
8	100	50		64QAM	30	P_30@30	S_0@0		
9	100	50		64QAM	60	P_40@60	S_20@0		
10	100	50		64QAM	30	P_10@90	S_20@0		
11	100	50		64QAM	5	P_0@0	S_5@45		
12	100	50		64QAM	2	P_1@0	S_1@49		
13	100	75		64QAM	1	P_1@1	S_0@0		
14	100	75		64QAM	40	P_40@20	S_0@0		
15	100	75		64QAM	85	P_80@20	S_5@0		
16	100	75		64QAM	40	P_0@0	S_40@20		
17	100	75		64QAM	15	P_0@0	S_15@60		
18	100	75		64QAM	2	P_1@0	S_1@74		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

Table 6.2.4A.1_1.4.1-8: Test Configuration Table (network signalled value "CA_NS_08")

[Table 6.2.4A.1_1.4.1-8 TBD]

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to the applicable table from Table 6.2.4A.1_1.4.1-1 to 6.2.4A.1_1.4.1-7.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4A.1_1.4.3.

6.2.4A.1_1.4.2 Test procedure

Same test procedure as in clause 6.2.4A.1.4.2

6.2.4A.1_1.4.3 Message contents

Same message contents as in clause 6.2.4A.1.4.3.

6.2.4A.1_1.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4A.1_1.5-1 to Table 6.2.4A.1_1.5-7. For uplink QPSK or 16QAM, the allowed maximum output power reduction is specified in Table 6.2.4A.1_1.3-1 and clause 6.2.3A.1 does not apply, i.e. carrier aggregation MPR = 0. For uplink 64QAM, the applied maximum output power reduction is obtained by taking the maximum value of MPR requirements specified in Table 6.2.3A.1_1.3-1 and A-MPR requirements specified in Table 6.2.4A.1_1.3-1. For the UE maximum output power modified by MPR specified in Table 6.2.3A.1_1.3-1 or A-MPR specified in Table 6.2.4A.1_1.3-1, the power limits specified in Table 6.2.5A.1.3-1 apply.

Table 6.2.4A.1_1.5-1: Test requirement (network signalled value "CA_NS_01")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -17.7
2					23	+2.7 / -11.7
3					23	+2.7 / -9.7
4					23	+2.7 / -4.7
5					23	+2.7 / -11.7
6					23	+2.7 / -24.7
7					23	+2.7 / -18.7
8					23	+2.7 / -18.7
9					23	+2.7 / -11.7
10					23	+2.7 / -9.7
11					23	+2.7 / -6.2
12					23	+2.7 / -23.7
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

Table 6.2.4A.1_1.5-2: Test requirement (network signalled value "CA_NS_02")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -4.7
2					23	+2.7 / -6.2
3					23	+2.7 / -9.7
4					23	+2.7 / -11.7
5					23	+2.7 / -4.7
6					23	+2.7 / -4.7
7					23	+2.7 / -24.7
8					23	+2.7 / -8.2
9					23	+2.7 / -6.2
10					23	+2.7 / -6.2
11					23	+2.7 / -11.7
12					23	+2.7 / -15.7
13					23	+2.7 / -4.7
14					23	+2.7 / -24.7
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

Table 6.2.4A.1_1.5-3: Test requirement (network signalled value "CA_NS_03")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -15.7
2					23	+2.7 / -8.2
3					23	+2.7 / -6.2
4					23	+2.7 / -9.7
5					23	+2.7 / -13.7
6					23	+2.7 / -11.7
7					23	+2.7 / -4.7
8					23	+2.7 / -25.2
9					23	+2.7 / -15.7
10					23	+2.7 / -11.7
11					23	+2.7 / -4.7
12					23	+2.7 / -8.2
13					23	+2.7 / -12.7
14					23	+2.7 / -15.7
15					23	+2.7 / -4.7
16					23	+2.7 / -25.2

Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.

Table 6.2.4A.1_1.5-4: Test requirement (network signalled value "CA_NS_04")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -8.2
2					23	+2.7 / -8.2
3					23	+2.7 / -8.2
4					23	+2.7 / -18.7
5					23	+2.7 / -8.2
6					23	+2.7 / -8.2
7					23	+2.7 / -18.7
8					23	+2.7 / -8.2
9					23	+2.7 / -8.2
10					23	+2.7 / -8.2
11					23	+2.7 / -18.7
12					23	+2.7 / -8.2
13					23	+2.7 / -8.2
14					23	+2.7 / -8.2
15					23	+2.7 / -8.2
16					23	+2.7 / -18.7

Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.

Table 6.2.4A.1_1.5-5: Test requirement (network signalled value "CA_NS_05")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -6.2
2					23	+2.7 / -9.7
3					23	+2.7 / -9.7
4					23	+2.7 / -9.7
5					23	+2.7 / -11.7
6					23	+2.7 / -24.2
7					23	+2.7 / -9.7
8					23	+2.7 / -6.2
9					23	+2.7 / -11.7
10					23	+2.7 / -17.7
11					23	+2.7 / -24.2
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

Table 6.2.4A.1_1.5-6: Test requirement (network signalled value "CA_NS_06")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -12.2
2					23	+2.7 / -6.2
3					23	+2.7 / -6.2
4					23	+2.7 / -11.7
5					23	+2.7 / -15.7
6					23	+2.7 / -26.7
7					23	+2.7 / -11.2
8					23	+2.7 / -6.2
9					23	+2.7 / -6.2
10					23	+2.7 / -9.7
11					23	+2.7 / -15.7
12					23	+2.7 / -26.7
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

Table 6.2.4A.1_1.5-7: Test requirement (network signalled value "CA_NS_07")

Configuration ID	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1					23	+2.7 / -8.2
2					23	+2.7 / -11.7
3					23	+2.7 / -6.2
4					23	+2.7 / -6.2
5					23	+2.7 / -28.7
6					23	+2.7 / -17.7
7					23	+2.7 / -6.2
8					23	+2.7 / -11.7
9					23	+2.7 / -9.7
10					23	+2.7 / -6.2
11					23	+2.7 / -9.7
12					23	+2.7 / -28.7
13					23	+2.7 / -17.7
14					23	+2.7 / -6.2
15					23	+2.7 / -12.7
16					23	+2.7 / -6.2
17					23	+2.7 / -9.7
18					23	+2.7 / -28.7
Note 1: Lower limit is assuming $\Delta T_{IB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5A.1.3-1.						

6.2.4A.2 Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA)

Editor's note: For a transition period until RAN5#73, this test case in version 13.1.0 of 36.521-1 shall be used. This is to ensure no test coverage is lost before the UL 64QAM test case becomes available.Based on analysis for CA_3A-19A in TR 36.905 [19] no requirements in additional spurious emissions are required so A-MPR requirements are not tested for this CA configuration in any test case.

6.2.4A.2.1 Test purpose

Additional ACLR, spectrum emission and spurious emission requirements for carrier aggregation can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the CA Power Class as specified in Table 6.2.2A.0-1.

6.2.4A.2.2 Test applicability

The requirements of this test apply in test case 6.6.2.2A.2 Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA) for network signalled value NS_01/NS_03, NS_03/NS_03, NS_03/NS_06, NS_03/NS_07, NS_03/NS_01, NS_01/NS_06, NS_01/NS_21, NS_03/NS_21, NS_06/NS_21 to all types of E-UTRA UE release 11 and forward but do not support UL 64QAM.

The requirements of this test apply in test case 6.6.3.3A.2 Additional spurious emissions for CA (inter-band DL CA and UL CA) for network signalled values NS_05/NS_01, NS_03/NS_07, NS_01/NS_12 and NS_01/NS15, NS_01/NS_21, NS_03/NS_21, NS_06/NS_21 to all types of E-UTRA UE release 11 and forward but do not support UL 64QAM.

NOTE: As a result TC 6.2.4A.2 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4A.2.3 Minimum conformance requirements

If for inter-band carrier aggregation the UE is configured for transmissions on a single serving cell, then subclauses 6.2.3 and 6.2 4 apply with the Network Signalling value indicated by the field additionalSpectrumEmission.

For inter-band carrier aggregation with the UE configured for transmissions on two serving cells the maximum output power reduction specified in Table 6.2.4-1 is allowed for each serving cell of the applicable uplink CA configuration according to the Network Signalling value indicated by the field additionalSprectrumEmission for the PCC and the CA network signalling value indicated by the field additionalSpectrumEmissionSCell-r10 for the SCC. The value of additionalSpectrumEmissionSCell-r10 is equal to that of additionalSprectrumEmission configured on the SCC. MPR as specified in subclause 6.2.3A is allowed in addition.

For PUCCH and SRS transmissions, the allowed A-MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.The normative reference for this requirement is in TS 36.101 [2] clause 6.2.4A.

6.2.4A.2.4 Test description

6.2.4A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. For the UE maximum output power modified by A-MPR specified in table 6.2.4A.2.4.1-1, the power limits specified in subclause 6.2.5A.2.3 apply.

Table 6.2.4A.2.4.1-1: Additional Maximum Power Reduction (A-MPR) for inter-band CA

Uplink CA Configuration	NS-value per CC (in same order as UL CA Configuration column)		Applicable emissions requirements (in same order as UL CA Configuration column)	
CA_1A-3A CA_1A-5A CA_1A-7A CA_1A-8A CA_1A-18A CA_1A-26A CA_1A-42A	NS_05	NS_01	Table 6.6.3.3.5.2-1	N/A
CA_1A-19A	NS_05	NS_08	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.4-1 (Note 5)
CA_1A-21A	NS_05	NS_09	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.5-1 (Note 5)
CA_2A-4A, CA_2A-66A	NS_03	NS_03	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.1-1
CA_2A-12A, CA_2A-13A, CA_4A-12A, CA_4A-13A, CA_4A-17A	NS_03	NS_06	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1
CA_2A-13A, CA_4A-13A	NS_03	NS_07	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1 Table 6.6.3.3.3.3-1
CA_2A-30A	NS_03	NS_21	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.1-1 Table 6.6.3.3.5.16-1
CA_3A-5A CA_3A-7A CA_3A-8A CA_5A-7A CA_39A-41A	NS_01	NS_01	N/A	N/A
CA_3A-19A	NS_01	NS_08	N/A	Table 6.6.3.3.5.4-1
CA_3A-20A CA_7A-20A	NS_01	NS_10	N/A	N/A
CA_3A-26A	NS_01	NS_12	N/A	Table 6.6.3.3.3.7-1 (Note 5)
CA_3A-26A	NS_01	NS_13	N/A	Table 6.6.3.3.3.8-1 (Note 5)
CA_3A-26A	NS_01	NS_14	N/A	Table 6.6.3.3.3.9-1 (Note 5)
CA_3A-26A	NS_01	NS_15	N/A	Table 6.6.3.3.3.10-1
CA_2A-5A CA_2A-7A CA_4A-5A CA_4A-7A	NS_03	NS_01	Table 6.6.2.2.3.1-1	N/A
CA_5A-66A[Note 7]	NS_01	NS_03	N/A	Table 6.6.2.2.3.1-1
CA_5A-12A CA_5A-17A	NS_01	NS_06	N/A	Table 6.6.2.2.3.3-1
CA_5A-30A	NS_01	NS_21	N/A	Table 6.6.2.2.3.1-1 Table 6.6.3.3.5.16-1
CA_7A-28A CA_18A-28A	NS_01	NS_17	N/A	Table 6.6.3.3.5.12-1
CA_7A-28A	NS_01	NS_18	N/A	N/A
CA_12A-30A	NS_06	NS_21	Table 6.6.2.2.3.3-1	Table 6.6.2.2.3.3-1 Table 6.6.3.3.5.16-1
CA_19A-21A	NS_08	NS_09	Table 6.6.3.3.5.4-1 (Note 5)	Table 6.6.3.3.5.5-1 (Note 5)
CA_1A-28A	NS_05	NS_17	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.12-1

Note 1: For CCs with NS_01, there are no additional requirements defined in 36.101. Only CCs with NS-value different than NS_01 needs to be tested.
Note 2: A-MPR values for NS-values in this table are the same as in section 6.2.4.3.

Note 3:	Selection of CA configurations and NS-values to test is derived in TR 36.905 [19]
Note 4:	For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column
Note 5:	No test required since only A-Spur requirements apply, and the frequency range to test is unaffected by intermodulation products as described in section 4.3 in TR 36.905 [19].
Note 6:	No test required since no A_SEM and/or A-Spur requirements apply
Note 7:	As an exception to note 4, PCC is mapped to the second band of the combination as listed in Uplink CA Configuration column.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.2.4A.2.4.1-2 to 6.2.4A.1.4.1-13. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4A.2.4.1-2: Test Configuration Table (network signalled value NS_01/NS_06)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_06)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	15	15	N/A for this test	QPSK	QPSK	6	6
2	15	15		16QAM	16QAM	25	9
3	15	15		QPSK	16QAM	6	9
4	50	50		QPSK	QPSK	12	12
5	50	50		16QAM	16QAM	50	15
6	50	50		QPSK	16QAM	12	15
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.							
Note 2: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4A.2.4.1-3: Test Configuration Table (network signalled value NS_01/NS_12)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for PCC SCC: (Note 3) For 5 MHz Channel Bandwidth: UL 816.7 MHz (N_{UL} = 26717) For 10 MHz Channel Bandwidth: UL 819.2 MHz (N_{UL} = 26742) For 15 MHz Channel Bandwidth: UL 821.7 MHz (N_{UL} = 26767)	
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest and Highest N_{RBagg}(Note 2)	
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_12)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})(Note 4)**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	8	8@7
2	25	25		16QAM	16QAM	10	8
3	25	25		QPSK	16QAM	8	8
4	50	50		QPSK	QPSK	12	12@16
5	50	50		16QAM	16QAM	15	18
6	50	50		QPSK	16QAM	12	18
7	100	75		QPSK	QPSK	15	16@31
8	100	75		16QAM	16QAM	20	30
9	100	75		QPSK	16QAM	15	30

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2.4.1-1

Note 4: Test point with max A-MPR in B26 selected in region A with largest allocation giving max A-MPR at RBstart0; test point with min A-MPR in B26 selected in region A with same allocation but with shifted RBstart to give A-MPR=0;

Table 6.2.4A.2.4.1-4: Test Configuration Table (network signalled value NS_01/NS_15)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					High range for both PCC and SCC(Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01) NRB	**SCC (NS_15) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})(Note 4)**	
1	25	25	N/A for this test	QPSK	QPSK	8	6@14
2	25	25		16QAM	16QAM	10	10@15
3	25	25		QPSK	16QAM	8	10@15
4	50	50		QPSK	QPSK	12	12@25
5	50	50		16QAM	16QAM	15	15@35
6	50	50		QPSK	16QAM	12	15@35
7	100	75		QPSK	QPSK	18	18@19
8	100	75		16QAM	16QAM	20	20@55
9	100	75		QPSK	16QAM	18	20@55

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2.4.1-1.

Note 4: Test point with max A-MPR in B26 selected in region C with allocation giving max MPR+A-MPR+deltaTc at max RBend; Test point with min A-MPR in B26 selected in region B with max allocation and RBend giving A-MPR=0.

Table 6.2.4A.2.4.1-5: Test Configuration Table (network signalled value NS_01/NS_17)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_17)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	5	5	N/A for this test	QPSK	QPSK	6	6
2	5	5		16QAM	16QAM	25	25
3	5	5		16QAM	QPSK	25	6
4	5	10		QPSK	QPSK	6	15
5	5	10		16QAM	16QAM	25	25
6	5	10		16QAM	QPSK	25	15
7	10	10		QPSK	QPSK	15	15
8	10	10		16QAM	16QAM	50	25
9	10	10		16QAM	QPSK	50	15
10	15	10		QPSK	QPSK	16	15
11	15	10		16QAM	16QAM	50	25
12	15	10		16QAM	QPSK	50	15
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.							
Note 2: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4A.2.4.1-6: Test Configuration Table (network signalled value NS_01/NS_21)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_21)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	8	8
2	25	25		16QAM	16QAM	25	25
3	25	25		QPSK	16QAM	8	25
4 (Note 4)	50	50		QPSK	QPSK	12	12@7
5 (Note 5)	50	50		QPSK	QPSK	12	12@31
6	50	50		16QAM	16QAM	50	1
7	50	50		QPSK	16QAM	12	1
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.							
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2.4.1-1.							
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							
Note 4: Applicable only to Low range frequency testing.							
Note 5: Applicable only to High range frequency testing.							

Table 6.2.4A.2.4.1-7: Test Configuration Table (network signalled value NS_03/NS_01 or network signalled value NS_01/NS_03)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and high range for PCC Mid range for SCC(Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	NS_03 CC	**NS_01 CC**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	6	8
2	25	25		16QAM	16QAM	25	25
3	25	25		16QAM	QPSK	25	8
4	50	50		QPSK	QPSK	6	12
5	50	50		16QAM	16QAM	50	50
6	50	50		16QAM	QPSK	50	12
7	50	100		QPSK	QPSK	6	18
8	50	100		16QAM	16QAM	50	100
9	50	100		16QAM	QPSK	50	18
10	100	50		QPSK	QPSK	10	12
11	100	50		16QAM	16QAM	100	50
12	100	50		16QAM	QPSK	100	12
13	100	100		QPSK	QPSK	10	18
14	100	100		16QAM	16QAM	100	100
15	100	100		16QAM	QPSK	100	18

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: Mapping of NS-value per CC and PCC/SCC selection are specified in Table 6.2.4A.2.4.1-1.

Table 6.2.4A.2.4.1-8: Test Configuration Table (network signalled value NS_03/NS_03)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes			Low and High range for both PCC and SCC (Note 3)				
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest and Highest N_{RBagg} (Note 2)				
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03) NRB	**SCC (NS_03) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	15	25	N/A for this test	QPSK	QPSK	4	6
2	15	25		16QAM	16QAM	15	25
3	15	25		16QAM	QPSK	15	6
4	25	25		QPSK	QPSK	6	6
5	25	25		16QAM	16QAM	25	25
6	25	25		16QAM	QPSK	25	6
7	50	50		QPSK	QPSK	6	6
8	50	50		16QAM	16QAM	50	50
9	50	50		16QAM	QPSK	50	6
10	100	100		QPSK	QPSK	10	10
11	100	100		16QAM	16QAM	100	100
12	100	100		16QAM	QPSK	100	10

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.2.4A.2.4.1-9: Test Configuration Table (network signalled value NS_03/NS_06)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03) NRB	**SCC (NS_06) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	15	25	N/A for this test	QPSK	QPSK	4	8
2	15	25		16QAM	16QAM	15	25
3	15	25		16QAM	QPSK	15	8
4	25	15		QPSK	QPSK	6	4
5	25	15		16QAM	16QAM	25	15
6	25	15		16QAM	QPSK	25	4
7	25	25		QPSK	QPSK	6	8
8	25	25		16QAM	16QAM	25	25
9	25	25		16QAM	QPSK	25	8
10	25	50		QPSK	QPSK	6	12
11	25	50		16QAM	16QAM	25	50
12	25	50		16QAM	QPSK	25	12
13	50	50		QPSK	QPSK	6	12
14	50	50		16QAM	16QAM	50	50
15	50	50		16QAM	QPSK	50	12
16	100	50		QPSK	QPSK	10	12
17	100	50		16QAM	16QAM	100	50
18	100	50		16QAM	QPSK	100	12

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested, according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.2.4A.2.4.1-10: Test Configuration Table (network signalled value NS_03/NS_07)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes			Low and High range for both PCC and SCC (Note 3)				
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest and Highest N_{RBagg}(Note 2)				
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03) NRB	**SCC (NS_07) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	25	50	N/A for this test	QPSK	QPSK	6	4
2	25	50		16QAM	16QAM	25	50
3	25	50		QPSK	16QAM	6	50
4	50	50		QPSK	QPSK	6	4
5	50	50		16QAM	16QAM	50	50
6	50	50		QPSK	16QAM	6	50
7	100	50		QPSK	QPSK	10	4
8	100	50		16QAM	16QAM	100	50
9	100	50		QPSK	16QAM	10	50
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list. Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.2.4A.2.4.1-11: Test Configuration Table (network signalled value NS_03/NS_21)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_21)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	6	8
2	25	25		16QAM	16QAM	25	25
3	25	25		16QAM	QPSK	25	8
4 (Note 4)	100	50		QPSK	QPSK	10	12@7
5 (Note 5)	100	50		QPSK	QPSK	10	12@31
6	100	50		16QAM	16QAM	100	1
7	100	50		QPSK	16QAM	10	1
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2.4.1-1. Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$. Note 4: Applicable only to Low range frequency testing. Note 5: Applicable only to High range frequency testing.							

Table 6.2.4A.2.4.1-12: Test Configuration Table (network signalled value NS_05/NS_01)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low range, Mid range for PCC In case of Low range: - For 5MHz Channel Bandwidth: 1927.2MHz (NUL = 18072) - For 10 MHz Channel Bandwidth: 1934.7 MHz (NUL = 18147) - For 20 MHz Channel Bandwidth: 1930 MHz (NUL = 18100) Mid range for SCC(Note 3)
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg} (Note 2)

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_05)	**SCC (NS_01)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	15	N/A for this test	QPSK	QPSK	6	4
2	25	15		16QAM	16QAM	25	6
3	25	15		16QAM	QPSK	25	4
4	25	25		QPSK	QPSK	6	6
5	25	25		16QAM	16QAM	25	25
6	25	25		16QAM	QPSK	25	6
7	25	50		QPSK	QPSK	6	15
8	25	50		16QAM	16QAM	25	25
9	25	50		16QAM	QPSK	25	15
10	50	50		QPSK	QPSK	15	15
11	50	50		16QAM	16QAM	50	25
12	50	50		16QAM	QPSK	50	15
13	100	50		QPSK	QPSK	18	15
14	100	50		16QAM	16QAM	50	25
15	100	50		16QAM	QPSK	50	15
16	100	100		QPSK	QPSK	18	18
17	100	100		16QAM	16QAM	50	25
18	100	100		16QAM	QPSK	50	18

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.2.4A.2.4.1-13: Test Configuration Table (network signalled value NS_06/NS_21)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and High range for both PCC and SCC
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_06) NRB	**SCC (NS_21) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	25	25	N/A for this test	QPSK	QPSK	8	8
2	25	25		16QAM	16QAM	25	25
3	25	25		16QAM	QPSK	25	8
4 (Note 4)	50	50		QPSK	QPSK	12	12@7
5 (Note 5)	50	50		QPSK	QPSK	12	12@31
6	50	50		16QAM	16QAM	50	1
7	50	50		QPSK	16QAM	12	1

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2.4.1-1.
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Applicable only to Low range frequency testing.
Note 5: Applicable only to High range frequency testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to the applicable table from Table 6.2.4A.2.4.1-2 to 6.2.4A.2.4.1-13.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4A.2.4.3.

6.2.4A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.4A.2.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to the applicable from Table 6.2.4A.2.4.1-2 to Table 6.2.4A.2.4.1-13 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach P_{UMAX} level.

6. Measure the mean transmitted power over all component carriers in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.4A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.The following exceptions apply for each network signalled value.

6.2.4A.2.4.3.1 Message contents exceptions (network signalled value " NS_03" on PCC)

1. Information element additionalSpectrumEmission is set to NS_03 for PCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.2.4A.2.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03" on PCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

6.2.4A.2.4.3.2 Message contents exceptions (network signalled value " NS_03" on SCC)

1. Information element additionalSpectrumEmission is set to NS_03 for SCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.2.4A.2.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03" on SCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

2. Information element additionalSpectrumEmissionSCell-r10 is set to NS_03 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.2.4A.2.4.3.2-2: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_03" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	3 (NS_03)		

6.2.4A.2.4.3.3 Message contents exceptions (network signalled value " NS_05" on PCC)

1. Information element additionalSpectrumEmission is set to NS_05 for PCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.2.4A.2.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_05" on PCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	5 (NS_05)		

6.2.4A.2.4.3.4 Message contents exceptions (network signalled value " NS_06" on SCC)

1. Information element additionalSpectrumEmission is set to NS_06 for SCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.2.4A.2.4.3.4-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_06" on SCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

2. Information element additionalSpectrumEmissionSCell-r10 is set to NS_06 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.2.4A.2.4.3.4-2: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_06" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	6 (NS_06)		

6.2.4A.2.4.3.5 Message contents exceptions (network signalled value " NS_07" on SCC)

1. Information element additionalSpectrumEmission is set to NS_07 for SCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.2.4A.2.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_07" on SCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	7 (NS_07)		

2. Information element additionalSpectrumEmissionSCell-r10 is set to NS_07 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.2.4A.2.4.3.5-2: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_07" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	7 (NS_07)		

6.2.4A.2.4.3.6 Message contents exceptions (network signalled value " NS_12" on SCC)

1. Information element additionalSpectrumEmission is set to NS_12 for SCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.2.4A.2.4.3.6-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_12" on SCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	12 (NS_12)		

2. Information element additionalSpectrumEmissionSCell-r10 is set to NS_12 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.2.4A.2.4.3.6-2: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_12" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	12 (NS_12)		

6.2.4A.2.4.3.7 Message contents exceptions (network signalled value " NS_15" on SCC)

1. Information element additionalSpectrumEmission is set to NS_15 for SCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.2.4A.2.4.3.7-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_15" on SCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	15 (NS_15)		

2. Information element additionalSpectrumEmissionSCell-r10 is set to NS_15 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.2.4A.2.4.3.7-2: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_15" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	15 (NS_15)		

6.2.4A.2.4.3.8 Message contents exceptions (network signalled value " NS_21" on SCC)

1. Information element additionalSpectrumEmission is set to NS_21 for SCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.2.4A.2.4.3.8-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_21" on SCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	21 (NS_21)		

2. Information element additionalSpectrumEmissionSCell-r10 is set to NS_21 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.2.4A.2.4.3.8-2: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_21" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	21 (NS_21)		

6.2.4A.2.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4A.2.5-1 to Table 6.2.4A.2.5-12. For the UE maximum output power modified by A-MPR specified in sub-clause 6.2.4A.2.3, the power limits specified in Table 6.2.5A.3.3-1 apply.

Table 6.2.4A.2.5-1: Test requirement (network signalled value NS_01/NS_03 or network signalled value NS_03/NS_01)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
2	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
3	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
6	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
7	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
8	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
9	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
10	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
11	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
12	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
13	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
14	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
15	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												
Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points												

Table 6.2.4A.2.5-2: Test requirement (network signalled value NS_01/NS_06)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	0	1.5	23	21.5	23.0	3	25.7	19.3
2	2	2	0	0	0	1.5	21	19.5	23.0	3	25.7	19.3
3	0	2	0	0	0	1.5	23	19.5	23.0	3	25.7	19.3
4	0	0	0	0	0	1.5	23	21.5	23.0	3	25.7	19.3
5	2	2	0	0	0	1.5	21	19.5	23.0	3	25.7	19.3
6	0	2	0	0	0	1.5	23	19.5	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2.5-3: Test requirement (network signalled value NS_01/NS_12)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
CA_2A-13A												
1	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
2	2	1	0	5	1.5	1.5	19.5	15.5	21.0	5	25.7	15.3
3	0	1	0	5	1.5	1.5	21.5	15.5	22.5	5	25.7	16.8
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	2	2	0	4	1.5	1.5	19.5	15.5	21.0	5	25.7	15.3
6	0	2	0	4	1.5	1.5	21.5	15.5	22.5	5	25.7	16.8
7	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
8	2	2	0	4	0	0	21	17	22.5	5	25.7	16.8
9	0	2	0	4	1.5	0	21.5	17	22.8	5	25.7	17.1
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2.5-4: Test requirement (network signalled value NS_01/NS_15)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
CA_2A-13A												
1	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
2	2	2	0	9	1.5	1.5	19.5	10.5	20.0	6	25.7	13.3
3	0	2	0	9	1.5	1.5	21.5	10.5	21.8	5	25.7	16.1
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	2	2	0	9	1.5	1.5	19.5	10.5	20.0	6	25.7	13.3
6	0	2	0	9	1.5	1.5	21.5	10.5	21.8	5	25.7	16.1
7	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
8	2	2	0	9	0	0	21	12	21.5	5	25.7	15.8
9	0	2	0	9	0	0	21.5	12	23	5	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2.5-5: Test requirement (network signalled value NS_01/NS_17)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
2	2	2	0	0	0	0	21	21	23.0	3	25.7	19.3
3	2	0	0	0	0	0	21	23	23.0	3	25.7	19.3
4	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
5	2	2	0	0	0	0	21	21	23.0	3	25.7	19.3
6	2	0	0	0	0	0	21	23	23.0	3	25.7	19.3
7	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
8	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
9	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
10	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3

11	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
12	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2.5-6: Test requirement (network signalled value NS_01/NS_21)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	0	0	23	23	23.0	3.0	25.7	19.3
2	2	2	0	0	0	0	21	21	23.0	3.0	25.7	19.3
3	0	2	0	0	0	0	23	21	23.0	3.0	25.7	19.3
4	0	0	0	0	0	0	23	23	23.0	3.0	25.7	19.3
5	0	0	0	0	0	0	23	23	23.0	3.0	25.7	19.3
6	2	1	0	4	0	0	21	18	22.8	5.0	25.7	17.1
7	0	1	0	4	0	0	23	18	23.0	3.0	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2.5-7: Test requirement (network signalled value NS_03/NS_03)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
2	2	2	1	1	1.5	0	18.5	20	22.3	5	25.7	16.6
3	2	0	1	0	1.5	0	18.5	23	23.0	3	25.7	19.3
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	2	2	1	1	1.5	0	18.5	20	22.3	5	25.7	16.6
6	2	0	1	0	1.5	0	18.5	23	23.0	3	25.7	19.3
7	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
8	2	2	1	1	0	0	20	20	23.0	3	25.7	19.3
9	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
10	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
11	2	2	1	1	0	0	20	20	23.0	3	25.7	19.3
12	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1. Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points												

Table 6.2.4A.2.5-8: Test requirement (network signalled value NS_03/NS_06)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
2	2	2	1	0	1.5	0	18.5	21	22.9	5	25.7	17.2
3	2	0	1	0	1.5	1.5	18.5	21.5	23.0	3	25.7	19.3
4	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
5	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3

6	2	0	1	0	0	1.5	20	21.5	23.0	3	25.7	19.3
7	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
8	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
9	2	0	1	0	0	1.5	20	21.5	23.0	3	25.7	19.3
10	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
11	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
12	2	0	1	0	0	1.5	20	21.5	23.0	3	25.7	19.3
13	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
14	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
15	2	0	1	0	0	1.5	20	21.5	23.0	3	25.7	19.3
16	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
17	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
18	2	0	1	0	0	1.5	20	21.5	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1. Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points												

Table 6.2.4A.2.5-9: Test requirement (network signalled value NS_03/NS_07)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
CA_2A-13A												
1	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
2	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
3	0	2	0	12	1.5	0	21.5	9	21.7	5	25.7	16.0
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
6	0	2	0	12	1.5	0	21.5	9	21.7	5	25.7	16.0
7	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
8	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
9	0	2	0	12	1.5	0	21.5	9	21.7	5	25.7	16.0
CA_4A-13A												
1	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
2	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
3	0	2	0	12	0	0	23	9	23.0	3	25.7	19.3
4	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
5	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
6	0	2	0	12	0	0	23	9	23.0	3	25.7	19.3
7	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
8	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
9	0	2	0	12	0	0	23	9	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1. Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points												

Table 6.2.4A.2.5-10: Test requirement (network signalled value NS_03/NS_21)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3

2	2	2	1	0	0	0	20	21	23.0	3.0	25.7	19.3
3	2	0	1	0	0	0	20	23	23.0	3.0	25.7	19.3
4	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
5	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
6	2	1	1	4	0	0	20	18	22.1	5.0	25.7	16.4
7	0	1	0	4	1.5	0	21.5	18	23.0	3.0	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2.5-11: Test requirement (network signalled value NS_05/NS_01)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
2	2	2	0	0	0	0	21	21	23.0	3	25.7	19.3
3	2	0	0	0	0	0	21	23	23.0	3	25.7	19.3
4	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
5	2	2	0	0	0	0	21	21	23.0	3	25.7	19.3
6	2	0	0	0	0	0	21	23	23.0	3	25.7	19.3
7	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
8	2	2	0	0	0	0	21	21	23.0	3	25.7	19.3
9	2	0	0	0	0	0	21	23	23.0	3	25.7	19.3
10	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
11	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
12	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
13	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
14	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
15	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
16	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
17	2	2	1	0	0	0	20	21	23.0	3	25.7	19.3
18	2	0	1	0	0	0	20	23	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1. Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points.												

Table 6.2.4A.2.5-12: Test requirement (network signalled value NS_06/NS_21)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
2	2	2	0	0	0	0	21	21	23.0	3.0	25.7	19.3
3	2	0	0	0	0	0	21	23	23.0	3.0	25.7	19.3
4	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
5	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
6	2	1	0	4	0	0	21	18	22.8	5.0	25.7	17.1
7	0	1	0	4	1.5	0	21.5	18	23.0	3.0	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

6.2.4A.3 Additional Maximum Power Reduction (A-MPR) for CA (intra-band non-contiguous DL CA and UL CA)

NOTE: No test case details specified because the additional maximum power reduction cannot be verified for the intra-band non-contiguous UL CA case due to A-MPR is N/A in current non-contiguous Uplink CA configuration CA_4A-4A according to Table 6.2.4A-2 in TS 36.101.

6.2.4A.3.1 Minimum conformance requirements

For intra-band non-contiguous carrier aggregation with the UE configured for transmissions on two serving cells, the maximum output power reduction specified in Table 6.2.4A.3.1-1 is allowed for all serving cells of the applicable uplink CA configurations according to the CA network signalling value indicated by the field *additionalSpectrumEmissionSCell-r10*. MPR as specified in subclause 6.2.3A is not allowed in addition, unless A-MPR is N/A.

Table 6.2.4A.3.1-1: Additional Maximum Power Reduction (A-MPR) for intra-band non-contiguous CA

CA Network Signalling value	Additional requirements for sub-blocks in order of increasing uplink carrier frequency		Uplink CA Configuration	A-MPR for sub-blocks in order of increasing uplink carrier frequency
	Requirements (subclause)	Requirements (subclause)		A-MPR [dB] (subclause)
CA_NC_NS_01	6.6.2.2.3.1 (NS_03)	6.6.2.2.3.1 (NS_03)	CA_4A-4A	N/A
…				
CA_NC_NS_31	NOTE 1	NOTE 1	Table 5.6A.1-3 (NOTE 1)	N/A
CA_NC_NS_32	Reserved			

NOTE 1: Applicable for uplink CA configurations listed in Table 5.6A.1-3 for which the additional requirements in subclause 6.6.2.1.3 (indicated by NS_01) applies in each sub-block.
NOTE 2: The index of the sequence CA_NC_NS corresponds to the value of *additionalSpectrumEmissionSCell-r10*.

The normative reference for this requirement is TS 36.101 [2] subclause 6.2.4A.

6.2.4A.2_1 Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA) for UL 64QAM

6.2.4A.2_1.1 Test purpose

Additional ACLR, spectrum emission and spurious emission requirements for carrier aggregation can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the CA Power Class as specified in Table 6.2.2A.0-1.

6.2.4A.2_1.2 Test applicability

The requirements of this test apply in test case 6.6.2.2A.2_1 Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA) for network signalled value NS_03/NS_03, NS_03/NS_03, NS_03/NS_06, NS_03/NS_07, NS_03/NS_01, NS_01/NS_06 to all types of E-UTRA UE release 13 and forward that support inter-band DL CA and UL CA and UL 64QAM.

The requirements of this test apply in test case 6.6.3.3A.2_1 Additional spurious emissions for CA (inter-band DL CA and UL CA) for network signalled values NS_05/NS_01, NS_03/NS_07, NS_01/NS_12 and NS_01/NS15 to all types of E-UTRA UE release 13 and forward that support inter-band DL CA and UL CA and UL 64QAM.

NOTE: As a result TC 6.2.4A.2_1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4A.2_1.3 Minimum conformance requirements

If for inter-band carrier aggregation the UE is configured for transmissions on a single serving cell, then subclauses 6.2.3 and 6.2 4 apply with the Network Signalling value indicated by the field additionalSpectrumEmission.

For inter-band carrier aggregation with the UE configured for transmissions on two serving cells the maximum output power reduction specified in Table 6.2.4-1 is allowed for each serving cell of the applicable uplink CA configuration according to the Network Signalling value indicated by the field additionalSprectrumEmission for the PCC and the CA network signalling value indicated by the field additionalSpectrumEmissionSCell-r10 for the SCC. The value of additionalSpectrumEmissionSCell-r10 is equal to that of additionalSprectrumEmission configured on the SCC. MPR as specified in subclause 6.2.3A is allowed in addition.

For PUCCH and SRS transmissions, the allowed A-MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth. The normative reference for this requirement is in TS 36.101 [2] clause 6.2.4A.

6.2.4A.2_1.4 Test description

6.2.4A.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. For the UE maximum output power modified by A-MPR specified in table 6.2.4A.2_1.4.1-1, the power limits specified in subclause 6.2.5A.2.3 apply.

Table 6.2.4A.2_1.4.1-1: Additional Maximum Power Reduction (A-MPR) for inter-band CA

Uplink CA Configuration	NS-value per CC (in same order as UL CA Configuration column)		Applicable emissions requirements (in same order as UL CA Configuration column)	
CA_1A-3A CA_1A-5A CA_1A-7A CA_1A-8A CA_1A-18A CA_1A-26A CA_1A-42A	NS_05	NS_01	Table 6.6.3.3.5.2-1	N/A
CA_1A-19A	NS_05	NS_08	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.4-1
CA_1A-21A	NS_05	NS_09	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.5-1
CA_2A-4A, CA_2A-66A	NS_03	NS_03	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.1-1
CA_2A-12A CA_2A-13A, CA_4A-12A, CA_4A-13A, CA_4A-17A	NS_03	NS_06	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1
CA_2A-13A, CA_4A-13A	NS_03	NS_07	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1 Table 6.6.3.3.3.3-1
CA_3A-19A	NS_01	NS_08	N/A	Table 6.6.3.3.5.4-1
CA_2A-30A	NS_03	NS_21	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.1-1 Table 6.6.3.3.5.16-1
CA_3A-26A	NS_01	NS_12	N/A	Table 6.6.3.3.3.7-1
CA_3A-26A	NS_01	NS_15	N/A	Table 6.6.3.3.3.10-1
CA_2A-5A, CA_2A-7A, CA_4A-5A, CA_4A-7A	NS_03	NS_01	Table 6.6.2.2.3.1-1	N/A
CA_5A-66A[Note 5]	NS_01	NS_03	N/A	Table 6.6.2.2.3.1-1
CA_5A-12A	NS_01	NS_06	N/A	Table 6.6.2.2.3.3-1
CA_18A-28A	NS_01	NS_17	N/A	Table 6.6.3.3.5.12-1
CA_5A-30A	NS_01	NS_21	N/A	Table 6.6.2.2.3.1-1 Table 6.6.3.3.5.16-1
CA_12A-30A	NS_06	NS_21	Table 6.6.2.2.3.3-1	Table 6.6.2.2.3.3-1 Table 6.6.3.3.5.16-1
CA_19A-21A	NS_08	NS_09	Table 6.6.3.3.5.4-1	Table 6.6.3.3.5.5-1
CA_1A-28A	NS_05	NS_17	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.12-1

Note 1: For CCs with NS_01, there are no additional requirements defined in 36.101. Only CCs with NS-value different than NS_01 needs to be tested.
Note 2: A-MPR values for NS-values in this table are the same as in section 6.2.4.3.
Note 3: Selection of CA configurations and NS-values to test is derived in TR 36.905 [19].
Note 4: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column.
Note 5: As an exception to note 4, PCC is mapped to the second band of the combination as listed in Uplink CA Configuration column.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.2.4A.2_1.4.1-2 to 6.2.4A.2_1.4.1-12. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4A.2_1.4.1-2: Test Configuration Table (network signalled value NS_01/NS_03 or network signalled value NS_03/NS_01)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and high range for PCC Mid range for SCC(Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	NS_03 CC	**NS_01 CC**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	6	8
2	25	25		64QAM	64QAM	25	25
3	25	25		64QAM	QPSK	25	8
4	50	50		QPSK	QPSK	6	12
5	50	50		64QAM	64QAM	50	50
6	50	50		64QAM	QPSK	50	12
7	50	100		QPSK	QPSK	6	18
8	50	100		64QAM	64QAM	50	100
9	50	100		64QAM	QPSK	50	18
10	100	50		QPSK	QPSK	10	12
11	100	50		64QAM	64QAM	100	50
12	100	50		64QAM	QPSK	100	12
13	100	100		QPSK	QPSK	10	18
14	100	100		64QAM	64QAM	100	100
15	100	100		64QAM	QPSK	100	18
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list. Note 3: Mapping of NS-value per CC and PCC/SCC selection are specified in Table 6.2.4A.2_1.4.1-1.							

Table 6.2.4A.2_1.4.1-3: Test Configuration Table (network signalled value NS_01/NS_06)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_06)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	15	15	N/A for this test	QPSK	QPSK	6	6
2	15	15		64QAM	64QAM	25	9
3	15	15		QPSK	64QAM	6	9
4	50	50		QPSK	QPSK	12	12
5	50	50		64QAM	64QAM	50	15
6	50	50		QPSK	64QAM	12	15
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.							
Note 2: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4A.2_1.4.1-4: Test Configuration Table (network signalled value NS_01/NS_12)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for PCC SCC: (Note 3) For 5 MHz Channel Bandwidth: UL 816.7 MHz (N_{UL} = 26717) For 10 MHz Channel Bandwidth: UL 819.2 MHz (N_{UL} = 26742) For 15 MHz Channel Bandwidth: UL 821.7 MHz (N_{UL} = 26767)	
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest and Highest N_{RBagg}(Note 2)	
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_12)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})(Note 4)**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	8	8@7
2	25	25		64QAM	64QAM	10	8
3	25	25		QPSK	64QAM	8	8
4	50	50		QPSK	QPSK	12	12@16
5	50	50		64QAM	64QAM	15	18
6	50	50		QPSK	64QAM	12	18
7	100	75		QPSK	QPSK	15	31
8	100	75		64QAM	64QAM	20	30
9	100	75		QPSK	64QAM	15	30

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2.4.1-1.

Note 4: Test point with max A-MPR in B26 selected in region A with largest allocation giving max A-MPR at RBstart0; test point with min A-MPR in B26 selected in region A with same allocation but with shifted RBstart to give A-MPR=0.

Table 6.2.4A.2_1.4.1-5: Test Configuration Table (network signalled value NS_01/NS_15)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	High range for both PCC and SCC(Note 3)
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}(Note 2)

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01) NRB	**SCC (NS_15) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})(Note 4)**	
1	25	25	N/A for this test	QPSK	QPSK	8	6@14
2	25	25		64QAM	64QAM	10	10@15
3	25	25		QPSK	64QAM	8	10@15
4	50	50		QPSK	QPSK	12	12@25
5	50	50		64QAM	64QAM	15	15@35
6	50	50		QPSK	64QAM	12	15@35
7	100	75		QPSK	QPSK	18	18@19
8	100	75		64QAM	64QAM	20	20@55
9	100	75		QPSK	64QAM	18	20@55

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2.4.1-1.

Note 4: Test point with max A-MPR in B26 selected in region C with allocation giving max MPR+A-MPR+deltaTc at max RBend; Test point with min A-MPR in B26 selected in region B with max allocation and RBend giving A-MPR=0.

Table 6.2.4A.2_1.4.1-6: Test Configuration Table (network signalled value NS_01/NS_21)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and High range for both PCC and SCC
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01) NRB	**SCC (NS_21) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	25	25	N/A for this test	QPSK	QPSK	8	8
2	25	25		64QAM	64QAM	25	25
3	25	25		QPSK	64QAM	8	25
4 (Note 4)	50	50		QPSK	QPSK	12	12@7
5 (Note 5)	50	50		QPSK	QPSK	12	12@31
6	50	50		64QAM	64QAM	50	1
7	50	50		QPSK	64QAM	12	1

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2_1.4.1-1.
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Applicable only to Low range frequency testing.
Note 5: Applicable only to High range frequency testing.

Table 6.2.4A.2_1.4.1-7: Test Configuration Table (network signalled value NS_03/NS_03)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1				NC			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes				Low and High range for both PCC and SCC (Note 3)			
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Lowest and Highest N_{RBagg} (Note 2)			
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03) NRB	**SCC (NS_03) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	15	25	N/A for this test	QPSK	QPSK	4	6
2	15	25		64QAM	64QAM	15	25
3	15	25		64QAM	QPSK	15	6
4	25	25		QPSK	QPSK	6	6
5	25	25		64QAM	64QAM	25	25
6	25	25		64QAM	QPSK	25	6
7	50	50		QPSK	QPSK	6	6
8	50	50		64QAM	64QAM	50	50
9	50	50		64QAM	QPSK	50	6
10	100	100		QPSK	QPSK	10	10
11	100	100		64QAM	64QAM	100	100
12	100	100		64QAM	QPSK	100	10

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.2.4A.2_1.4.1-8: Test Configuration Table (network signalled value NS_03/NS_06)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and High range for both PCC and SCC (Note 3)
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}(Note 2)

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03) NRB	**SCC (NS_06) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	15	25	N/A for this test	QPSK	QPSK	4	8
2	15	25		64QAM	64QAM	15	25
3	15	25		64QAM	QPSK	15	8
4	25	15		QPSK	QPSK	6	4
5	25	15		64QAM	64QAM	25	25
6	25	15		64QAM	QPSK	25	4
7	25	25		QPSK	QPSK	6	8
8	25	25		64QAM	64QAM	25	25
9	25	25		64QAM	QPSK	25	8
10	25	50		QPSK	QPSK	6	12
11	25	50		64QAM	64QAM	25	50
12	25	50		64QAM	QPSK	25	12
13	50	50		QPSK	QPSK	6	12
14	50	50		64QAM	64QAM	50	50
15	50	50		64QAM	QPSK	50	12
16	100	50		QPSK	QPSK	10	12
17	100	50		64QAM	64QAM	100	50
18	100	50		64QAM	QPSK	100	12

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.2.4A.2_1.4.1-9: Test Configuration Table (network signalled value NS_03/NS_07)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for both PCC and SCC (Note 3)	
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest and Highest N_{RBagg}(Note 2)	
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_07)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	50	N/A for this test	QPSK	QPSK	6	4
2	25	50		64QAM	64QAM	25	50
3	25	50		QPSK	64QAM	6	50
4	50	50		QPSK	QPSK	6	4
5	50	50		64QAM	64QAM	50	50
6	50	50		QPSK	64QAM	6	50
7	100	50		QPSK	QPSK	10	4
8	100	50		64QAM	64QAM	100	50
9	100	50		QPSK	64QAM	10	50
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2							
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.							
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.2.4A.2_1.4.1-10: Test Configuration Table (network signalled value NS_03/NS_21)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and High range for both PCC and SCC
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}

Test Parameters for CA Configurations

Config ID	CA Configuration / NRB_agg		DL Allocation	CC MOD		UL Allocation	
	PCC (NS_03) NRB	SCC (NS_21) NRB	PCC & SCC RB allocation	PCC	SCC	PCC & SCC RB allocations	
1	25	25	N/A for this test	QPSK	QPSK	6	8
2	25	25		64QAM	64QAM	25	25
3	25	25		64QAM	QPSK	25	8
4 (Note 4)	100	50		QPSK	QPSK	10	12@7
5 (Note 5)	100	50		QPSK	QPSK	10	12@31
6	100	50		64QAM	64QAM	100	1
7	100	50		QPSK	64QAM	10	1

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2_1.4.1-1.
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Applicable only to Low range frequency testing.
Note 5: Applicable only to High range frequency testing.

Table 6.2.4A.2_1.4.1-11: Test Configuration Table (network signalled value NS_05/NS_01)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low range, Mid range for PCC In case of Low range: - For 5MHz Channel Bandwidth: 1927.2MHz (NUL = 18072) - For 10 MHz Channel Bandwidth: 1934.7 MHz (NUL = 18147) - For 20 MHz Channel Bandwidth: 1930 MHz (NUL = 18100) Mid range for SCC(Note 3)
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg} (Note 2)

Test Parameters for CA Configurations

Config ID	CA Configuration / NRB_agg		DL Allocation	CC MOD		UL Allocation	
	PCC (NS_05)	SCC (NS_01)	PCC & SCC RB allocation	PCC	SCC	PCC & SCC RB allocations	
	NRB	NRB					
1	25	15	N/A for this test	QPSK	QPSK	6	4
2	25	15		64QAM	64QAM	25	6
3	25	15		64QAM	QPSK	25	4
4	25	25		QPSK	QPSK	6	6
5	25	25		64QAM	64QAM	25	25
6	25	25		64QAM	QPSK	25	6
7	25	50		QPSK	QPSK	6	15
8	25	50		64QAM	64QAM	25	25
9	25	50		64QAM	QPSK	25	15
10	50	50		QPSK	QPSK	15	15
11	50	50		64QAM	64QAM	50	25
12	50	50		64QAM	QPSK	50	15
13	100	50		QPSK	QPSK	18	15
14	100	50		64QAM	64QAM	50	25
15	100	50		64QAM	QPSK	50	15
16	100	100		QPSK	QPSK	18	18
17	100	100		64QAM	64QAM	50	25
18	100	100		64QAM	QPSK	50	18

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.2.4A.2_1.4.1-12: Test Configuration Table (network signalled value NS_06/NS_21)

Initial Conditions							
Test Environment as specified in TS 36.508 [7] subclause 4.1				NC			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes				Low and High range for both PCC and SCC			
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Lowest and Highest N_{RBagg}			
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_06)	**SCC (NS_21)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	8	8
2	25	25		64QAM	64QAM	25	25
3	25	25		64QAM	QPSK	25	8
4 (Note 4)	50	50		QPSK	QPSK	12	12@7
5 (Note 5)	50	50		QPSK	QPSK	12	12@31
6	50	50		64QAM	64QAM	50	1
7	50	50		QPSK	64QAM	12	1
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.							
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.2.4A.2_1.4.1-1.							
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							
Note 4: Applicable only to Low range frequency testing.							
Note 5: Applicable only to High range frequency testing.							

Table 6.2.4A.2_1.4.1-13: Test Configuration Table (network signalled value NS_01/NS_17)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and High range for both PCC and SCC
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01) NRB	**SCC (NS_17) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	5	5	N/A for this test	QPSK	QPSK	6	6
2	5	5		64QAM	64QAM	25	25
3	5	5		64QAM	QPSK	25	6
4	5	10		QPSK	QPSK	6	15
5	5	10		64QAM	64QAM	25	25
6	5	10		64QAM	QPSK	25	15
7	10	10		QPSK	QPSK	15	15
8	10	10		64QAM	64QAM	50	25
9	10	10		64QAM	QPSK	50	15
10	15	10		QPSK	QPSK	16	15
11	15	10		64QAM	64QAM	50	25
12	15	10		64QAM	QPSK	50	15

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to the applicable table from Table 6.2.4A.2_1.4.1-2 to 6.2.4A.2_1.4.1-13.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4A.2_1.4.3.

6.2.4A.2_1.4.2 Test procedure

Same test procedure as defined in clause 6.2.4A.2.4.2 with the following exception:

- In Step 4, instead of Table 6.2.4A.2.4.1-2 to Table 6.2.4A.2.4.1-13 use Table 6.2.4A.2_1.4.1-2 to Table 6.2.4A.2_1.4.1-12

6.2.4A.2_1.4.3 Message contents

Same message contents as defined in clause 6.2.4A.2.4.3.

6.2.4A.2_1.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4A.2_1.5-1 to Table 6.2.4A.2_1.5-11. For the UE maximum output power modified by A-MPR specified in sub-clause 6.2.4A.2_1.3, the power limits specified in Table 6.2.5A.3.3-1 apply.

Table 6.2.4A.2_1.5-1: Test requirement (network signalled value NS_01/NS_03 or network signalled value NS_03/NS_01)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
2	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
3	3	0	1	0	0	0	19	23	23.0	3	25.7	19.3
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
6	3	0	1	0	0	0	19	23	23.0	3	25.7	19.3
7	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
8	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
9	3	0	1	0	0	0	19	23	23.0	3	25.7	19.3
10	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
11	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
12	3	0	1	0	0	0	19	23	23.0	3	25.7	19.3
13	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
14	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
15	3	0	1	0	0	0	19	23	23.0	3	25.7	19.3

Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.
Note 2: ΔTC,c does not apply in all bands.

Table 6.2.4A.2_1.5-2: Test requirement (network signalled value NS_01/NS_06)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	0	1.5	23	21.5	23.0	3	25.7	19.3
2	3	3	0	0	0	1.5	20	18.5	22.3	5	25.7	16.6
3	0	3	0	0	0	1.5	23	18.5	23.0	3	25.7	19.3
4	0	0	0	0	0	1.5	23	21.5	23.0	3	25.7	19.3
5	3	3	0	0	0	1.5	20	18.5	22.3	5	25.7	16.6
6	0	3	0	0	0	1.5	23	18.5	23.0	3	25.7	19.3

Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.

Table 6.2.4A.2_1.5-3: Test requirement (network signalled value NS_01/NS_12)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
CA_2A-13A												
1	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
2	3	2	0	5	1.5	1.5	18.5	14.5	20.0	6	25.7	13.3
3	0	2	0	5	1.5	1.5	21.5	14.5	22.3	5	25.7	16.6
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	3	3	0	4	1.5	1.5	18.5	14.5	20.0	6	25.7	13.3
6	0	3	0	4	1.5	1.5	21.5	14.5	22.3	5	25.7	16.6
7	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
8	3	3	0	4	0	0	20	16	21.5	5	25.7	15.8
9	0	3	0	4	1.5	0	21.5	16	22.6	5	25.7	16.9
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2_1.5-4: Test requirement (network signalled value NS_01/NS_15)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
CA_2A-13A												
1	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
2	3	3	0	9	1.5	1.5	18.5	9.5	19.0	5	25.7	13.3
3	0	3	0	9	1.5	1.5	21.5	9.5	21.8	5	25.7	16.1
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	3	3	0	9	1.5	1.5	18.5	9.5	19.0	5	25.7	13.3
6	0	3	0	9	1.5	1.5	21.5	9.5	21.8	5	25.7	16.1
7	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
8	3	3	0	9	0	0	20	11	20.5	6	25.7	13.8
9	0	3	0	9	0	0	23	11	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2_1.5-5: Test requirement (network signalled value NS_01/NS_21)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	0	0	23	23	23.0	3.0	25.7	19.3
2	3	3	0	0	0	0	20	20	23.0	3.0	25.7	19.3
3	0	3	0	0	0	0	23	20	23.0	3.0	25.7	19.3
4	0	0	0	0	0	0	23	23	23.0	3.0	25.7	19.3
5	0	0	0	0	0	0	23	23	23.0	3.0	25.7	19.3
6	3	2	0	4	0	0	20	17	21.8	5.0	25.7	16.1
7	0	2	0	4	0	0	23	17	23.0	3.0	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2_1.5-6: Test requirement (network signalled value NS_03/NS_03)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
2	3	3	1	1	1.5	0	17.5	19	21.3	5	25.7	15.6
3	3	0	1	0	1.5	0	17.5	23	23.0	3	25.7	19.3
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	3	3	1	1	0	0	19	19	22.0	5	25.7	16.3
6	3	0	1	0	0	0	19	23	23.0	3	25.7	19.3
7	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
8	3	3	1	1	0	0	19	19	22.0	5	25.7	16.3
9	3	0	1	0	0	0	20	23	23.0	3	25.7	19.3
10	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
11	3	3	1	1	0	0	19	19	22.0	3	25.7	16.3
12	3	0	1	0	0	0	20	23	23.0	3	25.7	19.3

Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.
Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points.

Table 6.2.4A.2_1.5-7: Test requirement (network signalled value NS_03/NS_06)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
2	3	3	1	0	1.5	0	17.5	20	21.9	5	25.7	16.2 Note 2
3	3	0	1	0	1.5	1.5	17.5	21.5	22.9	3	25.7	19.3
4	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
5	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
6	3	0	1	0	0	1.5	19	21.5	23.0	3	25.7	19.3
7	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
8	3	2	1	0	0	0	19	21	23.0	3	25.7	16.8
9	3	0	1	0	0	1.5	19	21.5	23.0	3	25.7	19.3
10	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
11	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
12	3	0	1	0	0	1.5	19	21.5	23.0	3	25.7	19.3
13	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
14	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
15	3	0	1	0	0	1.5	19	21.5	23.0	3	25.7	19.3
16	0	0	0	0	1.5	1.5	21.5	21.5	23.0	3	25.7	19.3
17	3	3	1	0	0	0	19	20	22.5	5	25.7	16.8
18	3	0	1	0	0	1.5	19	21.5	23.0	3	25.7	19.3

Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.
Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 16.8 dBm.

Table 6.2.4A.2_1.5-8: Test requirement (network signalled value NS_03/NS_07)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
CA_2A-13A												
1	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
2	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
3	0	2	0	12	1.5	0	21.5	9	21.7	5	25.7	16.0
4	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
5	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
6	0	2	0	12	1.5	0	21.5	9	21.7	5	25.7	16.0
7	0	0	0	0	1.5	0	21.5	23	23.0	3	25.7	19.3
8	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
9	0	2	0	12	1.5	0	21.5	9	21.7	5	25.7	16.0
CA_4A-13A												
1	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
2	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
3	0	2	0	12	0	0	23	9	23.0	3	25.7	19.3
4	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
5	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
6	0	2	0	12	0	0	23	9	23.0	3	25.7	19.3
7	0	0	0	0	0	0	23	23	23.0	3	25.7	19.3
8	2	2	1	12	0	0	20	9	20.3	6	25.7	13.6
9	0	2	0	12	0	0	23	9	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												
Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points.												

Table 6.2.4A.2_1.5-9: Test requirement (network signalled value NS_03/NS_21)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
2	3	3	1	0	0	0	19	20	22.5	5.0	25.7	16.8
3	3	0	1	0	0	0	19	23	23.0	3.0	25.7	19.3
4	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
5	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
6	3	2	1	4	0	0	19	17	21.1	5.0	25.7	15.4
7	0	2	0	4	1.5	0	21.5	17	22.8	5.0	25.7	17.1
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

Table 6.2.4A.2_1.5-10: Test requirement (network signalled value NS_05/NS_01)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	23	23	0	0	0	0	23	23	23.0	3	25.7	19.3
2	20	20	0	0	0	0	20	20	23.0	3	25.7	19.3
3	20	23	0	0	0	0	20	23	23.0	3	25.7	19.3
4	23	23	0	0	0	0	23	23	23.0	3	25.7	19.3
5	20	20	0	0	0	0	20	20	23.0	3	25.7	19.3
6	20	23	0	0	0	0	20	23	23.0	3	25.7	19.3
7	23	23	0	0	0	0	23	23	23.0	3	25.7	19.3
8	20	20	0	0	0	0	20	20	23.0	3	25.7	19.3
9	20	23	0	0	0	0	20	23	23.0	3	25.7	19.3
10	23	23	0	0	0	0	23	23	23.0	3	25.7	19.3
11	19	20	1	0	0	0	19	20	22.5	5	25.7	16.8
12	19	23	1	0	0	0	19	23	23.0	3	25.7	19.3
13	23	23	0	0	0	0	23	23	23.0	3	25.7	19.3
14	19	20	1	0	0	0	19	20	22.5	5	25.7	16.8
15	19	23	1	0	0	0	19	23	23.0	3	25.7	19.3
16	23	23	0	0	0	0	23	23	23.0	3	25.7	19.3
17	19	20	1	0	0	0	19	20	22.5	5	25.7	16.8
18	19	23	1	0	0	0	19	23	23.0	3	25.7	19.3
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												
Note 2: ΔTC,c does not apply in all bands. For bands without this lower limit is 19.3 dBm in all test points.												

Table 6.2.4A.2_1.5-11: Test requirement (network signalled value NS_06/NS_21)

Config ID	MPR_c (dB)		$A\text{-}MPR_c$ (dB)		$\Delta T_{C,c}$ (dB)		$P_{CMAX,c}$ (dBm)		P_{CMAX} (dBm)	$T_{LOW}(P_{CMAX})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC				
1	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
2	3	3	0	0	0	0	20	20	23.0	3.0	25.7	19.3
3	3	0	0	0	0	0	20	23	23.0	3.0	25.7	19.3
4	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
5	0	0	0	0	1.5	0	21.5	23	23.0	3.0	25.7	19.3
6	3	2	0	4	0	0	20	17	21.8	5.0	25.7	16.1
7	0	2	0	4	1.5	0	21.5	17	22.8	5.0	25.7	17.1
Note 1: Lower limit is assuming ΔTIB,c is zero. If non-zero. PCMAX,c will decrease and T(PCMAX_L,c) may be higher resulting in different test requirements according to Table 6.2.5.3-1.												

6.2.4B Additional Maximum Power Reduction (A-MPR) for UL-MIMO

6.2.4B.1 Test purpose

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction A-MPR is allowed for the sum output power at each antenna connector as specified in Table 6.2.2B.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2.4B.2 Test applicability

The requirements of this test apply in test case 6.6.2.2 B Additional Spectrum Emission Mask for network signalled values NS_03, NS_04, NS_06, NS_07, NS_11, NS_20, NS_21 and NS_27 to all types of E-UTRA UE release 10 and forward that support UL MIMO.

The requirements of this test apply in test case 6.6.3.3 B Additional Spurious Emissions for network signalled values NS_04, NS_05, NS_07, NS_08, NS_09, NS_12, NS_13, NS_14, NS_15, NS_16, NS_17, NS_18, NS_19, NS_21, NS_22, NS_23, NS_24, NS_25 and NS_27 to all types of E-UTRA UE release 10 and forward that support UL MIMO.

NOTE: As a result TC 6.2.4B has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4B.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2.4.3.

6.2.4B.4 Test description

6.2.4B.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.4B.4.1-1 through table 6.2.4B.4.1-21. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4B.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] clause 4.1)					NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)					Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)					Lowest, 5MHz, 10MHz, Highest		
Test Parameters for NS_03 A-MPR							
		Downlink Configuration			Uplink Configuration		
Configuration ID	Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
			FDD	TDD		FDD	TDD
1	1.4MHz	N/A for A-MPR testing.			QPSK	6	6
2	1.4MHz				QPSK	5	5
3	1.4MHz				16QAM	5	5
4	3MHz				QPSK	15	15
5	3MHz				QPSK	4	4
6	3MHz				16QAM	15	15
7	3MHz				16QAM	4	4
8	5MHz				QPSK	25	25
9	5MHz				QPSK	8	8
10	5MHz				QPSK	6	6
11	5MHz				16QAM	25	25
12	5MHz				16QAM	8	8
13	10MHz				QPSK	50	50
14	10MHz				QPSK	12	12
15	10MHz				QPSK	6	6
16	10MHz				16QAM	50	50
17	10MHz				16QAM	12	12
18	15MHz				QPSK	75	75
19	15MHz				QPSK	16	16
20	15MHz				QPSK	8	8
21	15MHz				16QAM	75	75
22	15MHz				16QAM	16	16
23	20MHz				QPSK	100	100
24	20MHz				QPSK	18	18
25	20MHz				QPSK	10	10
26	20MHz				16QAM	100	100
27	20MHz				16QAM	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Note 4: For band 23, above table only applies to mid and high range test frequencies. Low range test frequencies will be covered by NS_11 test configuration table.

Table 6.2.4B.4.1-2: Test Configuration Table (network signalled value "NS_04")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0: For 5 MHz bandwidth: 2499.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866 Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39686 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10 MHz, 15 MHz, 20MHz		
Test Parameters for NS_04 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation TDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1 (Note 6)	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Note 6)	5MHz			QPSK	8	Note 3
3(Note 6)	5MHz			QPSK	6	Note 3
4 (Note 6)	5MHz			16QAM (Note 5)	25	0
5 (Note 6)	5MHz			16QAM (Note 5)	8	Note 3
6 (Note 6)	10MHz			QPSK	1	0
7 (Note 6)	10MHz			QPSK	12	0
8 (Note 6)	10MHz			QPSK	50	0
9 Note 6)	10MHz			16QAM (Note 5)	50 (Note 4)	0
10 (Note 6)	10MHz			QPSK	24	13
11 (Note 6)	10MHz			16QAM (Note 5)	24	13
12 (Note 6)	10MHz			QPSK	36	13
13 (Note 6)	10MHz			QPSK	12	37
14 (Note 6)	10MHz			QPSK	1	49
15 (Note 6)	15MHz			QPSK	1	0
16 (Note 6)	15MHz			QPSK	16	0
17 (Note 6)	15MHz			QPSK	75	0

18 (Note 6)	15MHz		16QAM (Note 5)	75 (Note 4)	0
19 (Note 6)	15MHz		QPSK	36	19
20 (Note 6)	15MHz		16QAM (Note 5)	36 (Note 4)	19
21 (Note 6)	15MHz		QPSK	50	19
22 (Note 6)	15MHz		QPSK	18	56
23 (Note 6)	15MHz		QPSK	1	74
24 (Note 6)	20MHz		QPSK	1	0
25 (Note 6)	20MHz		QPSK	18	0
26 (Note 6)	20MHz		QPSK	100	0
27 (Note 6)	20MHz		16QAM (Note 5)	100 (Note 4)	0
28 (Note 6)	20MHz		QPSK	50	25
29 (Note 6)	20MHz		16QAM (Note 5)	50 (Note 4)	25
30 (Note 6)	20MHz		QPSK	75	25
31 (Note 6)	20MHz		QPSK	25	75
32 (Note 6)	20MHz		QPSK	1	99
33 (Note 8)	5MHz		QPSK	1	0
34 (Note 8)	5MHz		QPSK	16	9
35 (Note 9)	5MHz		QPSK	25	0
36 (Note 8)	5MHz		16QAM (Note 5)	16	9
37 (Note 9)	5MHz		16QAM (Note 5)	25	0
38 (Note 8)	10MHz		QPSK	1	0
39 (Note 8)	10MHz		QPSK	1	49
40 (Note 8)	10MHz		QPSK	24	0
41 (Note 8)	10MHz		QPSK	40	10
42 (Note 7)	10MHz		QPSK	50	0
43 (Note 7)	10MHz		16QAM (Note 5)	50	0
44 (Note 8)	15MHz		QPSK	1	0
45 (Note 8)	15MHz		QPSK	1	74
46 (Note 8)	15MHz		QPSK	32	0
47 (Note 8)	15MHz		QPSK	60	15
48 (Note 7)	15MHz		QPSK	75	0
49 (Note 7)	15MHz		16QAM (Note 5)	75	0
50 (Note 8)	20MHz		QPSK	1	0
51 (Note 8)	20MHz		QPSK	1	99
52 (Note 8)	20MHz		QPSK	36	0
53 (Note 8)	20MHz		QPSK	75	25
54 (Note 7)	20MHz		QPSK	100	0
55 (Note 7)	20MHz		16QAM (Note 5)	100	0

Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in subclause 6.2.4 as not all combinations are necessarily required based on the applicability of the UE.
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 4: Applies only for UE-Categories ≥2.
Note 5: Void.
Note 6: Applies only for Rel-11 and earlier.
Note 7: Applies only for Rel-12 and later.
Note 8: Applies only for Rel-12 and later and Low Range.
Note 9: Applies only for Rel-12 and later and Mid, High Range and additional test frequencies.

Table 6.2.4B.4.1-3: Test Configuration Table (network signalled value "NS_05")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range In case of Low range: - For 5MHz Channel Bandwidth: 1927.2MHz (NUL = 18072) - For 10 MHz Channel Bandwidth: 1934.7 MHz (NUL = 18147) - For 15 MHz Channel Bandwidth: 1932.5 MHz (NUL = 18125) - For 20 MHz Channel Bandwidth: 1930 MHz (NUL = 18100)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_05 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	1	24
3	5MHz			QPSK	25	0
4	10MHz			QPSK	1	0
5	10MHz			QPSK	1	49
6	10MHz			QPSK	12	0
7	10MHz			QPSK	12	37
8	10MHz			QPSK	48	0
9	10MHz			QPSK	48	2
10 (Note 5)	10MHz			QPSK	50	0
11 (Note 5)	10MHz			16QAM	50 (Note 4)	0
12 (Note 6)	15MHz			QPSK	1	8
13 (Note 6)	15MHz			QPSK	1	66
14 (Note 6)	15MHz			QPSK	16	8
15 (Note 6)	15MHz			QPSK	16	51
16 (Note 6)	15MHz			QPSK	30	8
17 (Note 6)	15MHz			QPSK	30	38
18 (Note 6)	20MHz			QPSK	1	24
19 (Note 6)	20MHz			QPSK	1	75
20 (Note 6)	20MHz			QPSK	18	24
21 (Note 6)	20MHz			QPSK	18	58
22 (Note 6)	20MHz			QPSK	24	24
23 (Note 6)	20MHz			QPSK	24	52
24 (Note 7)	15MHz			QPSK	1	0
25 (Note 7)	15MHz			QPSK	1	74
26 (Note 7)	15MHz			QPSK	16	0
27 (Note 7)	15MHz			QPSK	16	59

28 (Note 7)	15MHz		QPSK	48	0
29 (Note 7)	15MHz		QPSK	48	27
30 (Note 7)	15MHz		QPSK	75	0
31 (Note 7)	15MHz		16QAM	75 (Note 4)	0
32 (Note 7)	20MHz		QPSK	1	0
33 (Note 7)	20MHz		QPSK	1	99
34 (Note 7)	20MHz		QPSK	18	0
35 (Note 7)	20MHz		QPSK	18	82
36 (Note 7)	20MHz		QPSK	48	0
37 (Note 7)	20MHz		QPSK	48	52
38 (Note 7)	20MHz		QPSK	100	0
39 (Note 7)	20MHz		16QAM	100 (Note 4)	0
40 (Note 8)	10MHz		QPSK	50	0
41 (Note 8)	10MHz		16QAM	50 (Note 4)	0
42 (Note 8)	15MHz		QPSK	1	0
43 (Note 8)	15MHz		QPSK	75	0
44 (Note 8)	15MHz		QPSK	16	8
45 (Note 8)	15MHz		QPSK	30	8
46 (Note 8)	15MHz		QPSK	54	8
47 (Note 8)	15MHz		QPSK	64	8
48 (Note 8)	15MHz		QPSK	1	74
49 (Note 8)	15MHz		QPSK	6	69
50 (Note 8)	15MHz		QPSK	8	67
51 (Note 8)	20MHz		QPSK	1	0
52 (Note 8)	20MHz		QPSK	100	0
53 (Note 8)	20MHz		QPSK	18	24
54 (Note 8)	20MHz		QPSK	24	24
55 (Note 8)	20MHz		QPSK	40	24
56 (Note 8)	20MHz		QPSK	50	24
57 (Note 8)	20MHz		QPSK	72	24
58 (Note 8)	20MHz		QPSK	1	99
59 (Note 8)	20MHz		QPSK	6	94
60 (Note 8)	20MHz		QPSK	24	76
61	10MHz		QPSK	50	0

(Note 9)					
62 (Note 9)	10MHz		16QAM	50 (Note 4)	0
63 (Note 9)	15MHz		QPSK	1	0
64 (Note 9)	15MHz		QPSK	1	74
65 (Note 9)	15MHz		QPSK	16	0
66 (Note 9)	15MHz		QPSK	16	59
67 (Note 9)	15MHz		QPSK	48	0
68 (Note 9)	15MHz		QPSK	48	27
69 (Note 9)	15MHz		QPSK	75	0
70 (Note 9)	15MHz		16QAM	75 (Note 4)	0
71 (Note 9)	20MHz		QPSK	1	0
72 (Note 9)	20MHz		QPSK	1	99
73 (Note 9)	20MHz		QPSK	18	0
74 (Note 9)	20MHz		QPSK	18	82
75 (Note 9)	20MHz		QPSK	48	0
76 (Note 9)	20MHz		QPSK	48	52
77 (Note 9)	20MHz		QPSK	100	0
78 (Note 9)	20MHz		16QAM	100 (Note 4)	0

Note 1: Void
Note 2: Void
Note 3: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 4: Applies only for UE-Categories ≥2.
Note 5: Applies when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 6: Applies for low range and when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 7: Applies for mid range and when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 8: Applies only for low range and when bit number 1 in modifiedMPRbehavior = 1 (Rel-12 minimum requirements apply) for Band1 and low range for Band65.
Note 9: Applies only for mid range and when bit number 1 in modifiedMPRbehavior = 1 (Rel-12 minimum requirements apply) for Band1 and mid range for Band65.
Note 10: ModifiedMPRbehavior is defined in annex J.1.

Table 6.2.4B.4.1-4: Test Configuration Table (network signalled value "NS_06")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] clause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				Low range, Mid range, High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				Lowest, 5MHz, 10MHz, Highest	
Test Parameters for NS_05 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	1.4MHz	N/A for A-MPR testing		QPSK	6
2	1.4MHz			QPSK	5
3	1.4MHz			16QAM	5
4	3MHz			QPSK	15
5	3MHz			QPSK	4
6	3MHz			16QAM	4
7	5MHz			QPSK	25
8	5MHz			QPSK	8
9	5MHz			16QAM	8
10	10MHz			QPSK	50
11	10MHz			QPSK	12
12	10MHz			16QAM	12
13	15MHz			QPSK	75
14	15MHz			QPSK	16
15	15MHz			16QAM	16
16	20MHz			QPSK	100
17	20MHz			QPSK	18
18	20MHz			16QAM	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 3: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Table 6.2.4B.4.1-5: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				10MHz		
Test Parameters for NS_07 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD	RB_{start} FDD
1	10MHz	N/A for A-MPR testing		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			16QAM	36	13
7	10MHz			QPSK	16	19
8	10MHz			QPSK	12	19
9	10MHz			16QAM	16	19
10	10MHz			QPSK	30	19
11	10MHz			16QAM	30	19
12	10MHz			QPSK	6	43
13	10MHz			QPSK	2	48
14	10MHz			QPSK	50	0
15	10MHz			QPSK	12	0
16	10MHz			16QAM	50	0
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.						

Table 6.2.4B.4.1-6: Test Configuration Table (network signalled value "NS_08")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] clause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				5MHz, 10MHz, 15MHz	
Test Parameters for NS_08 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	5MHz	N/A for A-MPR testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	10MHz			QPSK	1
5	10MHz			QPSK	12
6	10MHz			QPSK	40
7	10MHz			QPSK	50
8	10MHz			16QAM	50
9	15MHz			QPSK	1
10	15MHz			QPSK	16
11	15MHz			QPSK	40
12	15MHz			QPSK	75
13	15MHz			16QAM	75
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.					
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.					
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max + 1 - RB allocation) of the channel bandwidth.					

Table 6.2.4B.4.1-7: Test Configuration Table (network signalled value "NS_09")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] clause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				5MHz, 10MHz, 15MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	5MHz	N/A for A-MPR testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	10MHz			QPSK	1
5	10MHz			QPSK	12
6	10MHz			QPSK	40
7	10MHz			QPSK	50
8	10MHz			16QAM	50
9	15MHz			QPSK	1
10	15MHz			QPSK	16
11	15MHz			QPSK	40
12	15MHz			QPSK	54
13	15MHz			QPSK	75
14	15MHz			16QAM	75
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.					
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.					
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max + 1 - RB allocation) of the channel bandwidth.					

Table 6.2.4B.4.1-8: Test Configuration Table (network signalled value "NS_11")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] clause 4.1)			Normal		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)			Low range For 3 MHz Channel Bandwidth: a. UL 2001.5 MHz (N_UL=25515), DL 2181.5 MHz(N_DL=7515) b UL 2004.5 MHz (N_UL=25545), DL 2184.5 (N_DL=7545) For 5 MHz Channel Bandwidth: a. UL 2002.5 MHz (N_UL=25525), DL 2182.5 MHz(N_DL=7525) b. UL 2004.5 MHz (N_UL=25545), DL 2184.5 MHz(N_DL=7545) c. UL 2007.5 MHz (N_UL=25575), DL 2187.5 MHz(N_DL=7575) For 10 MHz Channel Bandwidth: UL 2005 MHz (N_UL=25550), DL 2185 MHz (N_DL=7550)		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)			1.4MHz, 3MHz, 5MHz, 10MHz		
Test Parameters for NS_11 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	3MHz	N/A for A-MPR testing		QPSK	6
2	3MHz			QPSK	15
3	3MHz			16QAM	6
4	3MHz			16QAM	15
5	5MHz			QPSK	1
6	5MHz			QPSK	8
7	5MHz			QPSK	25
8	5MHz			16QAM	8
9	5MHz			16QAM	25
10	10MHz			QPSK	1
11	10MHz			QPSK	12
12	10MHz			QPSK	50
13	10MHz			16QAM	12
14	10MHz			16QAM	50

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in clause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Table 6.2.4B.4.1-9: Test Configuration Table (network signalled value "NS_12")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				For 1.4 MHz Channel Bandwidth: UL 814.9 MHz (NUL = 26699) For 3 MHz Channel Bandwidth: UL 815.7 MHz (NUL = 26707) For 5 MHz Channel Bandwidth: UL 816.7 MHz (NUL = 26717) For 10 MHz Channel Bandwidth: UL 819.2 MHz (NUL = 26742) For 15 MHz Channel Bandwidth: UL 821.7 MHz (NUL = 26767)		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz and 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1	1.4 MHz	N/A for A-MPR testing.		QPSK	1	0
2	1.4 MHz			QPSK	6	0
3	1.4 MHz			QPSK	1	1
4	1.4 MHz			QPSK	5	1
5	1.4 MHz			16QAM	6	0
6 (Note 1)	3 MHz			QPSK	4	0
7 (Note 1)	3 MHz			QPSK	6	0
8	3 MHz			QPSK	4	4
9	3 MHz			QPSK	6	4
10 (Note 1)	3 MHz			16QAM	15	0
11	5 MHz			QPSK	8	0
12	5 MHz			QPSK	15	0
13	5 MHz			QPSK	8	7
14 (Note 1)	5 MHz			QPSK	15	7
15	5 MHz			16QAM	25	0
16 (Note 2)	10 MHz			QPSK	18	0
17 (Note 2)	10 MHz			QPSK	18	16
18 (Note 2)	10 MHz			16QAM	50	0
19 (Note 2)	15 MHz			QPSK	30	0
20 (Note 2)	15 MHz			QPSK	30	31
21 (Note 2)	15 MHz			16QAM	75	0
Note 1: Only for UEs of Rel-11 and earlier Note 2: Only for UEs of Rel-12 and later						

Table 6.2.4B.4.1-10: Test Configuration Table (network signalled value "NS_13")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				For 1.4 MHz Channel Bandwidth: UL 819.7 MHz (NUL = 26747) For 3 MHz Channel Bandwidth: UL 820.5 MHz (NUL = 26755) For 5 MHz Channel Bandwidth: UL 821.5 MHz (NUL = 26765)		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				1.4 MHz, 3MHz and 5 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (Note 1)	1.4 MHz	N/A for A-MPR testing.		QPSK	6	0
2 (Note 1)	3 MHz			QPSK	15	0
3	5 MHz			QPSK	1	0
4	5 MHz			QPSK	25	0
5	5 MHz			QPSK	15	0
6	5 MHz			QPSK	15	7
7	5 MHz			16QAM	25	0
Note 1: Only for UEs of Rel-12 and later						

Table 6.2.4B.4.1-11: Test Configuration Table (network signalled value "NS_14")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				For 10 MHz Channel Bandwidth: UL 829 MHz (NUL = 26840) For 15 MHz Channel Bandwidth: Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				10 MHz, 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1	10 MHz	N/A for A-MPR testing.		QPSK	1	0
2	10 MHz			QPSK	25	0
3	10 MHz			QPSK	50	0
4	10 MHz			QPSK	25	1
5	10 MHz			16QAM	50	0
6	15 MHz			QPSK	8	0
7	15 MHz			QPSK	25	0
8	15 MHz			QPSK	75	0
9	15 MHz			QPSK	50	15
10	15 MHz			16QAM	75	0

Table 6.2.4B.4.1-12: Test Configuration Table (network signalled value "NS_15")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	For 1.4 MHz Channel Bandwidth: High range For 3 MHz Channel Bandwidth: UL 843.5 MHz (N_{UL} = 26985) or High range For 5 MHz Channel Bandwidth: UL 842.5 MHz (N_{UL} = 26975) or High range For 10 MHz Channel Bandwidth: UL 840 MHz (N_{UL} = 26950) or High range For 15 MHz Channel Bandwidth: UL 837.5 MHz (N_{UL} = 26925) or High range
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz

Test Parameters for Channel Bandwidths						
		Downlink Configuration		Uplink Configuration		
Configuration ID	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1 (note 3)	1.4 MHz	N/A for A-MPR testing.		QPSK	4	0
2 (note 3)	1.4 MHz			16QAM	6	0
3 (note 3)	3 MHz			QPSK	6	7
4 (note 3)	3 MHz			QPSK	12	1
5 (note 3)	3 MHz			16QAM	15	0
6 (note 2)	3 MHz			QPSK	15	0
7 (note 3)	5 MHz			QPSK	6	14
8 (note 3)	5 MHz			QPSK	20	0
9 (note 3)	5 MHz			16QAM	25	0
10 (note 2)	5 MHz			QPSK	16	9
11 (note 2)	5 MHz			QPSK	25	0
12 (note 3)	10 MHz			QPSK	1	39
13 (note 3)	10 MHz			QPSK	1	10
14 (note 3)	10 MHz			QPSK	3	0
15 (note 3)	10 MHz			QPSK	20	3
16 (note 3)	10 MHz			QPSK	36	1
17 (note 3)	10 MHz			QPSK	50	0
18 (note 1, 3)	10 MHz			16QAM	50	0
19 (note 2)	10 MHz			QPSK	20	25
20 (note 2)	10 MHz			QPSK	45	0
21 (note 3)	15 MHz			QPSK	18	36
22 (note 3)	15 MHz			QPSK	25	1
23 (note 3)	15 MHz			QPSK	54	0
24 (note 1, 3)	15 MHz			16QAM	75	0
25 (note 2)	15 MHz			QPSK	18	44

26 (note 2)	15 MHz		QPSK	60	2

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only test frequency < high range
Note 3: Applicable only to high range frequency testing

Table 6.2.4B.4.1-13: Test Configuration Table (network signalled value "NS_16")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: Low range For 3 MHz Channel Bandwidth: Low range, 810 MHz (N_{UL}= 27070) For 5 MHz Channel Bandwidth: Low range, 811 MHz (N_{UL}= 27080), 814.5 MHz (N_{UL}= 27115) For 10 MHz Channel Bandwidth: Low range, 813.5 MHz (N_{UL}= 27105), 817 MHz (N_{UL}= 27140)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for A-MPR testing.		QPSK	1	0
2	1.4 MHz			QPSK	6	0
3	1.4 MHz			16QAM	6	0
4	3 MHz			QPSK	1	0
5	3 MHz			QPSK	12	1
62	3 MHz			QPSK	15	0
7	3 MHz			16QAM	15	0
8	5 MHz			QPSK	1	0
95	5 MHz			QPSK	12	2
10	5 MHz			QPSK	18	2
11	5 MHz			QPSK	20	0
12	5 MHz			QPSK	20	2
13	5 MHz			QPSK	25	0
14	5 MHz			16QAM	25	0
15	10 MHz			QPSK	1	0
16 (Note 2)	10 MHz			QPSK	1	10

17 (Note 2)	10 MHz		QPSK	20	0
18 (Note 2)	10 MHz		QPSK	27	15
19 (Note 2)	10 MHz		QPSK	32	15
20	10 MHz		QPSK	32	0
21	10 MHz		QPSK	50	0
22 (Note 1)	10 MHz		16QAM	50	0
23 (Note 3)	10 MHz		QPSK	40	0
24 (Note 3)	10 MHz		QPSK	40	1

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applies only for 10 MHz channel for Low Range, and 813.5 MHz
Note 3: Applies only for 10 MHz channel for 817 MHz range

Table 6.2.4B.4.1-14: Test Configuration Table (network signalled value "NS_20")

TBD

Table 6.2.4B.4.1-15: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)			NC			
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)			Low range or High range			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)			5 MHz, 10 MHz			
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 2)	5 MHz			QPSK	1	0
2 (note 2)	5 MHz			QPSK	25	0
3 (note 2)	10 MHz			QPSK	1	0
4 (note 3)	10 MHz			QPSK	1	49
5 (note 2)	10 MHz			QPSK	15	0
6 (note 3)	10 MHz			QPSK	3	47
7 (note 3)	10 MHz			QPSK	50	0
8 (note 1, 3)	10 MHz			16QAM	50	0

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only to low range frequency testing.
Note 3: Applicable only to high range frequency testing.

Table 6.2.4B.4.1-16: Test Configuration Table (network signalled value "NS_22")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_22 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	25	0
3	5MHz			QPSK	1	24
4	5MHz			16QAM	1	0
5	5MHz			16QAM	1	24
6	10MHz			QPSK	50	0
7	10MHz			QPSK	36	0
8	10MHz			QPSK	1	0
9	10MHz			QPSK	1	49
10	10MHz			16QAM	1	0
11	10MHz			16QAM	1	49
12	15MHz			QPSK	75	0
13	15MHz			QPSK	50	0
14	15MHz			QPSK	1	0
15	15MHz			QPSK	1	74
16	15MHz			16QAM	1	0
17	15MHz			16QAM	1	74
18	20MHz			QPSK	100	0
19	20MHz			QPSK	64	0
20	20MHz			QPSK	1	0
21	20MHz			QPSK	1	99
22	20MHz			16QAM	1	0
23	20MHz			16QAM	1	99

Table 6.2.4B.4.1-17: Test Configuration Table (network signalled value "NS_23")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_23 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	1	24
3	5MHz			QPSK	25	0
4	5MHz			16QAM	1	0
5	5MHz			16QAM	1	24
6	10MHz			QPSK	50	0
7	15MHz			QPSK	75	0
8	20MHz			QPSK	100	0

Table 6.2.4B.4.1-18: Test Configuration Table (network signalled value "NS_24")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Refer to F_{UL} in test parameters with following: 5MHz CH BW: - 1985 MHz (N_{UL} = 131722) 10 and 15 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772)
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_24 A-MPR							
			Downlink Configuration		Uplink Configuration		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	High	5MHz	N/A for A-MPR testing		QPSK	1	0
2	High	5MHz			QPSK	8	17
3	High	5MHz			QPSK	25	0
4 (Notes 2,3)	High	5MHz			16QAM	25	0
5	1985	5MHz			QPSK	8	17
6	1980	10MHz			QPSK	12	1
7 (Notes 2,3)	1980	10MHz			16QAM	50	0
8	1980	10MHz			QPSK	48	2
9	1980	10MHz			QPSK	25	25
10	1980	10MHz			QPSK	1	49
11	1980	10MHz			QPSK	12	38
12 (Notes 2,3)	1980	10MHz			16QAM	12	38
13	1980	10MHz			QPSK	3	47
14	1980	10MHz			QPSK	8	1
15	1990	10MHz			QPSK	1	0
16	1990	10MHz			QPSK	12	38
17 (Notes 2,3)	1990	10MHz			16QAM	50	0
18	High	10MHz			QPSK	12	38
19	High	10MHz			QPSK	50	0
20 (Notes 2,3)	High	10MHz			16QAM	50	0
21	1980	15MHz			QPSK	1	11
22	1980	15MHz			QPSK	16	11
23	1980	15MHz			QPSK	45	11
24 (Notes 2,3)	1980	15MHz			16QAM	50	0
25	1980	15MHz			QPSK	16	28
26	1980	15MHz			QPSK	16	59
27	1980	15MHz			QPSK	60	15
28	1980	15MHz			QPSK	30	12
29	High	15MHz			QPSK	1	0
30	High	15MHz			QPSK	16	59
31 (Notes 2,3)	High	15MHz			16QAM	16	59
32 (Notes 2,3)	High	15MHz			16QAM	75	0
33	High	20MHz			QPSK	1	0
34	High	20MHz			QPSK	18	82
35 (Notes 2,3)	High	20MHz			16QAM	18	82
36 (Notes 2,3)	High	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4B.4.1-19: Test Configuration Table (network signalled value "NS_25")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to F_{UL} in test parameters with following: 10 and 15 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_25 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	High	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Notes 2,3)	High	5MHz			16QAM	25	0
3	High	5MHz			QPSK	8	9
4	High	5MHz			QPSK	1	24
5	High	5MHz			QPSK	8	17
6 (Notes 2,3)	High	5MHz			16QAM	8	17
7	1980	10MHz			QPSK	12	1
8 (Notes 2,3)	1980	10MHz			16QAM	50	0
9 (Notes 2,3)	1980	10MHz			16QAM	48	2
10	1980	10MHz			QPSK	25	25
11	1980	10MHz			QPSK	1	49
12	1980	10MHz			QPSK	12	38
13	1990	10MHz			QPSK	12	0
14	1990	10MHz			QPSK	25	0
15	1990	10MHz			QPSK	50	0
16 (Notes 2,3)	1990	10MHz			16QAM	25	0
17	1990	10MHz			QPSK	48	2
18	1990	10MHz			QPSK	30	19
19 (Notes 2,3)	1990	10MHz			16QAM	30	19
20	1990	10MHz			QPSK	12	31
21	High	10MHz			QPSK	1	0
22	High	10MHz			QPSK	12	6
23	High	10MHz			QPSK	50	0
24 (Notes 2,3)	High	10MHz			16QAM	50	0
25	High	10MHz			QPSK	40	10
26 (Notes 2,3)	High	10MHz			16QAM	40	10
27	High	10MHz			QPSK	32	18
28 (Notes 2,3)	High	10MHz			16QAM	32	18
29	High	10MHz			QPSK	12	23
30	1980	15MHz			QPSK	16	4
31	1980	15MHz			QPSK	75	0
32	1980	15MHz			QPSK	60	15
33 (Notes 2,3)	1980	15MHz			16QAM	40	35
34	1980	15MHz			QPSK	1	74
35	1980	15MHz			QPSK	12	63
36	1980	15MHz			QPSK	16	55
37	High	15MHz			QPSK	1	0
38	High	15MHz			QPSK	16	0
39 (Notes 2,3)	High	15MHz			16QAM	16	0
40 (Notes 2,3)	High	15MHz			16QAM	1	0
41	1980	20MHz			QPSK	1	0
42	1980	20MHz			QPSK	18	0
43 (Notes 2,3)	1980	20MHz			16QAM	100	0
44	1980	20MHz			QPSK	64	36
45	1980	20MHz			QPSK	18	72
46 (Notes 2,3)	1980	20MHz			16QAM	54	46
47	1980	20MHz			QPSK	18	55
48	High	20MHz			QPSK	1	0
49	High	20MHz			QPSK	18	72

50 (Notes 2,3)	High	20MHz		16QAM	18	72
51 (Notes 2,3)	High	20MHz		16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.2.4B.4.1-20: Reserved

Table 6.2.4B.4.1-21: Test Configuration Table (network signalled value "NS_27")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to Frequency column in test parameters		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid	5MHz	N/A for A-MPR testing		QPSK	1	0
2	High	5MHz			QPSK	1	24
3	Low/Mid/High	5MHz			QPSK	25	0
4	Low/Mid/High	5MHz			16QAM	25	0
5	Low/Mid	10MHz			QPSK	1	0
6	High	10MHz			QPSK	1	49
7	Low/Mid/High	10MHz			QPSK	50	0
8 (Note 2)	Low/Mid/High	10MHz			16QAM	50	0
9	Low/Mid	15MHz			QPSK	1	0
10	Low	15MHz			QPSK	1	7
11	Low/Mid	15MHz			QPSK	16	0
12	High	15MHz			QPSK	1	74
13	High	15MHz			QPSK	1	67
14	High	15MHz			QPSK	16	74
15	Low/Mid/High	15MHz			QPSK	75	0
16 (Note 2)	Low/Mid/High	15MHz			16QAM	75	0
17	Low/Mid	20MHz			QPSK	1	0
18	Low	20MHz			QPSK	1	13
19	Low	20MHz			QPSK	1	16
20	Low/Mid	20MHz			QPSK	21	0
21	High	20MHz			QPSK	1	99
22	High	20MHz			QPSK	1	86
23	High	20MHz			QPSK	1	83
24	High	20MHz			QPSK	21	0
25	Low/Mid/High	20MHz			QPSK	100	0
26 (Note 2)	Low/Mid/High	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Editor's note: The following lines belong at the end of section 6.2.4B.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to the applicable table from Table 6.2.4B.4.1-1 to 6.2.4B.4.1-21.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.4B.4.3.

6.2.4B.4.2 Test procedure

Same test procedure as in clause 6.2.4.4.2.

6.2.4B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with exceptions as in clause 6.2.4.4.3.

6.2.4B.5 Test requirements

The maximum output power, derived in step 2 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4B.5-1 to Table 6.2.4B.5-25. The allowed A-MPR values specified in Table 6.2.4B.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3B. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5B.3-1 apply.

Table 6.2.4B.5-1: UE Power Class test requirements (network signalled value "NS_03") (for Bands 2 and 25)

Configuration ID	EUTRA band	Test Freq.	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	2, 25	Mid					23	+2.7 / -3.7
1	2, 25	Low, High					23	+2.7 / -5.7
2	2, 25	Mid					23	+2.7 / -2.7
2	2, 25	Low, High					23	+2.7 / -4.2
3	2, 25	Mid					23	+2.7 / -3.7
3	2, 25	Low, High					23	+2.7 / -5.7
4	2, 25	Mid					23	+2.7 / -4.7
4	2, 25	Low, High					23	+2.7 / -7.7
5	2, 25	Mid					23	+2.7 / -2.7
5	2, 25	Low, High					23	+2.7 / -4.2
6	2, 25	Mid					23	+2.7 / -6.2
6	2, 25	Low, High					23	+2.7 / -9.2
7	2, 25	Mid					23	+2.7 / -3.7
7	2, 25	Low, High					23	+2.7 / -5.7
8	2, 25	All					23	+2.7 / -4.7
9	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
9	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
10	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
10	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
11	2, 25	All					23	+2.7 / -6.2
12	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
12	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
13	2, 25	All					23	+2.7 / -4.7
14	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
14	2, 25	Low @ RB#0, High @ RB#(max+1-RB					23	+2.7 / -5.7

		allocation)						
15	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
15	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
16	2, 25	All					23	+2.7 / -6.2
17	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
17	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
18	2, 25	All					23	+2.7 / -4.7
19	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
19	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
20	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
20	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
21	2, 25	All					23	+2.7 / -6.2
22	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
22	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
23	2, 25	All					23	+2.7 / -4.7
24	2, 25	All					23	+2.7 / -3.7
25	2, 25	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
25	2, 25	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
26	2, 25	All					23	+2.7 / -6.2
27	2, 25	All					23	+2.7 / -4.7

Table 6.2.4B.5-2: UE Power Class test requirements (network signalled value "NS_03") (for Bands 4, 10, 23, 35, 36, 66 and 70)

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	4,10, 23,35,36, 66					23	+2.7 / -3.7
2	4,10, 23,35,36, 66					23	+2.7 / -2.7
3	4,10, 23,35,36, 66					23	+2.7 / -3.7
4	4,10, 23,35,36, 66					23	2.7 / -4.7
5	4,10, 23,35,36, 66					23	+2.7 / -2.7
6	4,10, 23,35,36, 66					23	+2.7 / -6.2
7	4,10, 23,35,36, 66					23	+2.7 / -3.7
8	4,10, 23,35,36, 66,70					23	2.7 / -4.7
9	4,10, 23,35,36, 66,70					23	+2.7 / -3.7
10	4,10, 23,35,36, 66,70					23	+2.7 / -2.7
11	4,10, 23,35,36, 66,70					23	+2.7 / -6.2
12	4,10, 23,35,36, 66,70					23	2.7 / -4.7
13	4,10, 23,35,36, 66,70					23	2.7 / -4.7
14	4,10, 23,35,36, 66,70					23	+2.7 / -3.7
15	4,10, 23,35,36, 66,70					23	+2.7 / -2.7
16	4,10, 23,35,36, 66,70					23	+2.7 / -6.2
17	4,10, 23,35,36, 66,70					23	2.7 / -4.7
18	4,10,35,36, 66,70					23	2.7 / -4.7
19	4,10,35,36, 66,70					23	+2.7 / -3.7
20	4,10,35,36, 66,70					23	+2.7 / -2.7
21	4,10,35,36, 66,70					23	+2.7 / -6.2
22	4,10,35,36, 66,70					23	2.7 / -4.7
23	4,10,35,36, 66,70					23	2.7 / -4.7
24	4,10,35,36, 66,70					23	+2.7 / -3.7
25	4,10,35,36, 66,70					23	+2.7 / -2.7
26	4,10,35,36,					23	+2.7 /

	66,70						-6.2
27	4,10,35,36, 66,70					23	2.7 / -4.7

Table 6.2.4B.5-3: UE Power Class test requirements (network signalled value "NS_04")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	15.3	15.3	15.3	15.3	15.3	15.3	15.3
2 (RBstart=0; Low Range)	13.8	13.8	13.8	13.8	13.8	13.8	13.8
2 (RBstart=0; Mid, High Range)	16.3	16.3	16.3	16.3	16.3	16.3	16.3
2 (RBstart=17; Low, Mid Range)	16.3	16.3	16.3	16.3	16.3	16.3	16.3
2 (RBstart=17; High Range)	13.8	13.8	13.8	13.8	13.8	13.8	13.8
3 (RBstart=0; Low Range)	15.8	15.8	15.8	15.8	15.8	15.8	15.8
3 (RBstart=0; Mid, High Range)	19.3	19.3	19.3	19.3	19.3	19.3	19.3
3 (RBstart=19; Low, Mid Range)	19.3	19.3	19.3	19.3	19.3	19.3	19.3
3 (RBstart=19; High Range)	15.8	15.8	15.8	15.8	15.8	15.8	15.8
4	15.3	15.3	15.3	15.3	15.3	15.3	15.3
5 (RBstart=0; Low Range)	13.8	13.8	13.8	13.8	13.8	13.8	13.8
5 (RBstart=0; Mid, High Range)	15.3	15.3	15.3	15.3	15.3	15.3	15.3
5 (RBstart=17; Low, Mid Range)	15.3	15.3	15.3	15.3	15.3	15.3	15.3
5 (RBstart=17; High Range)	13.8	13.8	13.8	13.8	13.8	13.8	13.8
6 (Low Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
6 (Mid, High Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
7 (Low Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
7 (Mid, High Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
8	13.3	13.3	13.3	13.3	13.3	13.3	13.3
9	12.3	12.3	12.3	12.3	12.3	12.3	12.3
10	16.3	16.3	16.3	16.3	16.3	16.3	16.3
11	15.3	15.3	15.3	15.3	15.3	15.3	15.3
12	13.3	13.3	13.3	13.3	13.3	13.3	13.3

13 (Low, Mid Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
13 (High Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
14 (Low, Mid Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
14 (High Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
15 (Low Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
15 (Mid, High Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
16 (Low, Mid Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
16 (High Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
17	13.3	13.3	13.3	13.3	13.3	13.3	13.3
18	12.3	12.3	12.3	12.3	12.3	12.3	12.3
19	16.3	16.3	16.3	16.3	16.3	16.3	16.3
20	15.3	15.3	15.3	15.3	15.3	15.3	15.3
21	13.3	13.3	13.3	13.3	13.3	13.3	13.3
22	13.3	13.3	13.3	13.3	13.3	13.3	13.3
23 (Low, Mid Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
23 (High Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
24 (Low Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
24 (Mid, High Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
25 (Low Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
25 (Mid, High Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
26	13.3	13.3	13.3	13.3	13.3	13.3	13.3
27	12.3	12.3	12.3	12.3	12.3	12.3	12.3
28	16.3	16.3	16.3	16.3	16.3	16.3	16.3
29	15.3	15.3	15.3	15.3	15.3	15.3	15.3
30	13.3	13.3	13.3	13.3	13.3	13.3	13.3
31	13.3	13.3	13.3	13.3	13.3	13.3	13.3
32 (Low, Mid Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
32 (High Range)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
33	13.8	13.8	13.8	13.8	13.8	13.8	13.8
34	16.3	16.3	16.3	16.3	16.3	16.3	16.3
35	16.3	16.3	16.3	16.3	16.3	16.3	16.3
36	15.3	15.3	15.3	15.3	15.3	15.3	15.3
37	15.3	15.3	15.3	15.3	15.3	15.3	15.3
38	12.8	12.8	12.8	12.8	12.8	12.8	12.8
39	17.3	17.3	17.3	17.3	17.3	17.3	17.3
40	15.3	15.3	15.3	15.3	15.3	15.3	15.3
41	15.3	15.3	15.3	15.3	15.3	15.3	15.3
42 (Low Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
42 (Mid, High	16.3	16.3	16.3	16.3	16.3	16.3	16.3

Range, 2504.1 MHz)							
43 (Low Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
43 (Mid, High Range, 2504.1 MHz)	15.3	15.3	15.3	15.3	15.3	15.3	15.3
44	12.8	12.8	12.8	12.8	12.8	12.8	12.8
45	17.3	17.3	17.3	17.3	17.3	17.3	17.3
46	15.3	15.3	15.3	15.3	15.3	15.3	15.3
47	15.3	15.3	15.3	15.3	15.3	15.3	15.3
48 (Low Range)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
48 (Mid, High Range, 2510.9 MHz)	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
49 (Low Range)	16.3	16.3	16.3	16.3	16.3	16.3	16.3
49 (Mid, High Range, 2510.9 MHz)	12.3	12.3	12.3	12.3	12.3	12.3	12.3
50	15.3	15.3	15.3	15.3	15.3	15.3	15.3
51	12.8	12.8	12.8	12.8	12.8	12.8	12.8
52	17.3	17.3	17.3	17.3	17.3	17.3	17.3
53	15.3	15.3	15.3	15.3	15.3	15.3	15.3
54 (Low Range)	15.3	15.3	15.3	15.3	15.3	15.3	15.3
54 (Mid, High Range, 2517.6 MHz)	13.3	13.3	13.3	13.3	13.3	13.3	13.3
55 (Low Range)	16.3	16.3	16.3	16.3	16.3	16.3	16.3
55 (Mid, High Range, 2517.6 MHz)	12.3	12.3	12.3	12.3	12.3	12.3	12.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4B.5-4: UE Power Class test requirements (network signalled value "NS_05")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	3.0	25.7	19.3
2	0	0	0	23	3.0	25.7	19.3
3	1	0	0	22	5.0	25.7	16.3
4	0	0	0	23	3.0	25.7	19.3
5	0	0	0	23	3.0	25.7	19.3
6	0	0	0	23	3.0	25.7	19.3
7	0	0	0	23	3.0	25.7	19.3
8	1	0	0	22	5.0	25.7	16.3
9	1	0	0	22	5.0	25.7	16.3
10	1	1	0	21	5.0	25.7	15.3
11	2	1	0	20	6.0	25.7	13.3
12	0	0	0	23	3.0	25.7	19.3
13	0	0	0	23	3.0	25.7	19.3
14	0	0	0	23	3.0	25.7	19.3
15	0	0	0	23	3.0	25.7	19.3
16	1	0	0	22	5.0	25.7	16.3
17	1	0	0	22	5.0	25.7	16.3
18	0	0	0	23	3.0	25.7	19.3
19	0	0	0	23	3.0	25.7	19.3
20	0	0	0	23	3.0	25.7	19.3
21	0	0	0	23	3.0	25.7	19.3
22	1	0	0	22	5.0	25.7	16.3
23	1	0	0	22	5.0	25.7	16.3
24	0	0	0	23	3.0	25.7	19.3
25	0	0	0	23	3.0	25.7	19.3
26	0	0	0	23	3.0	25.7	19.3
27	0	0	0	23	3.0	25.7	19.3
28	1	0	0	22	5.0	25.7	16.3
29	1	0	0	22	5.0	25.7	16.3
30	1	1	0	21	5.0	25.7	15.3
31	2	1	0	20	6.0	25.7	13.3
32	0	0	0	23	3.0	25.7	19.3
33	0	0	0	23	3.0	25.7	19.3
34	0	0	0	23	3.0	25.7	19.3
35	0	0	0	23	3.0	25.7	19.3
36	1	0	0	22	5.0	25.7	16.3
37	1	0	0	22	5.0	25.7	16.3
38	1	1	0	21	5.0	25.7	15.3
39	2	1	0	20	6.0	25.7	13.3
40	1	1	0	21	5.0	25.7	15.3
41	2	1	0	20	6.0	25.7	13.3
42	0	11	0	12	6.0	25.7	5.3
43	1	11	0	11	6.0	25.7	4.3
44	0	0	0	23	3.0	25.7	19.3
45	1	0	0	22	5.0	25.7	16.3
46	1	3	0	19	5.0	25.7	13.3
47	1	5	0	17	5.0	25.7	11.3
48	0	5	0	18	5.0	25.7	12.3
49	0	5	0	18	5.0	25.7	12.3
50	0	1	0	22	5.0	25.7	16.3
51	0	11	0	12	6.0	25.7	5.3
52	1	11	0	11	6.0	25.7	4.3
53	0	0	0	23	3.0	25.7	19.3
54	1	0	0	22	5.0	25.7	16.3
55	1	3	0	19	5.0	25.7	13.3
56	1	5	0	17	5.0	25.7	11.3
57	1	10	0	12	6.0	25.7	5.3
58	0	5	0	18	5.0	25.7	12.3
59	0	5	0	18	5.0	25.7	12.3
60	1	1	0	21	5.0	25.7	15.3
61	1	0	0	22	5.0	25.7	16.3

62	2	0	0	21	5.0	25.7	15.3
63	0	0	0	23	3.0	25.7	19.3
64	0	0	0	23	3.0	25.7	19.3
65	0	0	0	23	3.0	25.7	19.3
66	0	0	0	23	3.0	25.7	19.3
67	1	0	0	22	5.0	25.7	16.3
68	1	0	0	22	5.0	25.7	16.3
69	1	0	0	22	5.0	25.7	16.3
70	2	0	0	21	5.0	25.7	15.3
71	0	0	0	23	3.0	25.7	19.3
72	0	0	0	23	3.0	25.7	19.3
73	0	0	0	23	3.0	25.7	19.3
74	0	0	0	23	3.0	25.7	19.3
75	1	0	0	22	5.0	25.7	16.3
76	1	0	0	22	5.0	25.7	16.3
77	1	1	0	21	5.0	25.7	15.3
78	2	1	0	20	6.0	25.7	13.3

Table 6.2.4B.5-5: UE Power Class test requirements (network signalled value "NS_06") (for Band 12)

Configuration ID	EUTRA band	Test Freq.	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	12	Mid					23	+2.7 / -3.7
1	12	Low, High					23	+2.7 / -5.7
2	12	Mid					23	+2.7 / -2.7
2	12	Low, High					23	+2.7 / -4.2
3	12	Mid					23	+2.7 / -2.7
3	12	Low, High					23	+2.7 / -4.2
4	12	Mid					23	+2.7 / -3.7
4	12	Low, High					23	+2.7 / -5.7
5	12	Mid					23	+2.7 / -2.7
5	12	Low, High					23	+2.7 / -4.2
6	12	Mid					23	+2.7 / -3.7
6	12	Low, High					23	+2.7 / -5.7
7	12	All					23	+2.7 / -3.7
8	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
8	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
9	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
9	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
10	12	All					23	+2.7 / -3.7
11	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
11	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
12	12	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
12	12	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7

Table 6.2.4B.5-6: UE Power Class test requirements (network signalled value "NS_06") (for Bands 13, 14, and 17)

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	13,14,17					23	+2.7 / -3.7
2	13,14,17					23	+2.7 / -2.7
3	13,14,17					23	+2.7 / -2.7
4	13,14,17					23	+2.7 / -3.7
5	13,14,17					23	+2.7 / -2.7
6	13,14,17					23	+2.7 / -3.7
7	13,14,17					23	+2.7 / -3.7
8	13,14,17					23	+2.7 / -2.7
9	13,14,17					23	+2.7 / -3.7
10	13,14,17					23	+2.7 / -3.7
11	13,14,17					23	+2.7 / -2.7
12	13,14,17					23	+2.7 / -3.7
13	13,14,17					23	+2.7 / -3.7
14	13,14,17					23	+2.7 / -2.7
15	13,14,17					23	+2.7 / -3.7
16	13,14,17					23	+2.7 / -3.7
17	13,14,17					23	+2.7 / -2.7
18	13,14,17					23	+2.7 / -3.7

Table 6.2.4B.5-7: UE Power Class test requirements (network signalled value "NS_07")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	13					23	+2.7 / -18.7
2	13					23	+2.7 / -13.7
3	13					23	+2.7 / -2.7
4	13					23	+2.7 / -19.7
5	13					23	+2.7 / -18.7
6	13					23	+2.7 / -20.7
7	13					23	+2.7 / -3.7
8	13					23	+2.7 / -2.7
9	13					23	+2.7 / -4.7
10	13					23	+2.7 / -12.7
11	13					23	+2.7 / -13.7
12	13					23	+2.7 / -2.7
13	13					23	+2.0 / -5.5±TT
14	13					23	+2.7 / -19.7
15	13					23	+2.7 / -18.7
16	13					23	+2.7 / -20.7

Table 6.2.4B.5-8: UE Power Class test requirements (network signalled value "NS_08")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	19					23	+2.7 / -2.7
2	19					23	+2.7 / -2.7
3	19					23	+2.7 / -3.7
4	19					23	+2.7 / -2.7
5	19					23	+2.7 / -2.7
6	19					23	+2.7 / -3.7
7	19					23	+2.7 / -8.2
8	19					23	+2.7 / -9.7
9	19					23	+2.7 / -2.7
10	19					23	+2.7 / -2.7
11	19					23	+2.7 / -3.7
12	19					23	+2.7 / -8.2
13	19					23	+2.7 / -9.7

Table 6.2.4B.5-9: UE Power Class test requirements (network signalled value "NS_09")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	21					23	+2.7 / -2.7
2	21					23	+2.7 / -2.7
3	21					23	+2.7 / -3.7
4	21					23	+2.7 / -2.7
5	21					23	+2.7 / -2.7
6	21					23	+2.7 / -3.7
7	21					23	+2.7 / -4.7
8	21					23	+2.7 / -6.2
9	21					23	+2.7 / -2.7
19	21					23	+2.7 / -2.7
11	21					23	+2.7 / -3.7
12	21					23	+2.7 / -4.7
13	21					23	+2.7 / -6.2
14	21					23	+2.7 / -8.2

Table 6.2.4B.5-10: UE Power Class test requirements (network signalled value "NS_11 for Band 23")

Configuration ID	EUTRA band	Centre Frequency	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1a	23	UL 2001.5 MHz DL 2181.5 MHz						+2.7 / -11.7
1b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -4.7
2a	23	UL 2001.5 MHz DL 2181.5 MHz						+2.7 / -11.7
2b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -4.7
3a	23	UL 2001.5 MHz DL 2181.5 MHz						+2.7 / -12.7
3b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -6.2
4a	23	UL 2001.5 MHz DL 2181.5 MHz						+2.7 / -12.7
4b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -6.2
5a	23	UL 2002.5 MHz DL 2182.5 MHz						+2.7 / -12.7
5b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -8.2
5c	23	UL 2007.5 MHz DL 2187.5 MHz						+2.7 / -2.7
6a	23	UL 2002.5 MHz DL 2182.5 MHz						+2.7 / -12.7
6b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -2.7
6c	23	UL 2007.5 MHz DL 2187.5 MHz						+2.7 / -3.7
7a	23	UL 2002.5 MHz DL 2182.5 MHz						+2.7 / -13.7
7b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -9.7
7c	23	UL 2007.5 MHz DL 2187.5 MHz						+2.7 / -4.7
8a	23	UL 2002.5 MHz DL 2182.5 MHz						+2.7 / -13.7
8b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -3.7
8c	23	UL 2007.5 MHz DL 2187.5 MHz						+2.7 / -4.7
9a	23	UL 2002.5 MHz DL 2182.5 MHz						+2.7 / -14.7
9b	23	UL 2004.5 MHz DL 2184.5 MHz						+2.7 / -11.7
9c	23	UL 2007.5 MHz DL 2187.5 MHz						+2.7 / -6.2
10	23	UL 2005 MHz DL 2185 MHz						+2.7 / -18.7
11	23	UL 2005 MHz DL 2185 MHz						+2.7 / -18.7
12	23	UL 2005 MHz DL 2185 MHz						+2.7 / -19.7
13	23	UL 2005 MHz DL 2185 MHz						+2.7 / -19.7
14	23	UL 2005 MHz DL 2185 MHz						+2.7 / -20.7

Table 6.2.4B.5-11: UE Power Class test requirements (network signalled value "NS_12")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	3	1.5	18.5	4	25.7	13.8
2	1	4	1.5	16.5	5	25.7	10.8
3	0	0	1.5	21.5	3	25.7	17.8
4	0	3	1.5	18.5	4	25.7	13.8
5	2	4	1.5	15.5	5	25.7	9.8
6	0	4	1.5	17.5	5	25.7	11.8
7	1	3	1.5	17.5	5	25.7	11.8
8	0	0	1.5	21.5	3	25.7	17.8
9	1	3	1.5	17.5	5	25.7	11.8
10	2	4	1.5	15.5	5	25.7	9.8
11	0	4	1.5	17.5	5	25.7	11.8
12	1	3	1.5	17.5	5	25.7	11.8
13	0	0	1.5	21.5	3	25.7	17.8
14	1	3	0	19	3,5	25.7	14.8
15	2	3	0	18	4	25.7	13.3
16	1	4	1.5	16.5	5	25.7	10.8
17	1	0	0	22	3	25.7	18.3
18	2	2	0	19	3	25.7	15.3
19	1	4	0	18	4	25.7	13.3
20	1	0	0	22	3	25.7	18.3
21	2	3	0	18	4	25.7	13.3

Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.

Table 6.2.4B.5-12: UE Power Class test requirements (network signalled value "NS_13")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	1	0	0	22	3	25.7	18,3
2	1	0	0	22	3	25.7	18,3
3	0	3	0	20	3	25.7	16,3
4	1	2	0	20	3	25.7	16,3
5	1	0	0	22	3	25.7	18,3
6	1	0	0	22	3	25.7	18,3
7	2	2	0	19	3,5	25.7	14,8

Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.

Table 6.2.4B.5-13: UE Power Class 3 test requirements (network signalled value "NS_14")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	3	0	20	3	25.7	16.3
2	1	0	0	22	3	25.7	18.3
3	1	1	0	21	3	25.7	18.3
4	1	0	0	22	3	25.7	18.3
5	2	1	0	20	3	25.7	16.3
6	0	3	0	20	3	25.7	16.3
7	1	0	0	22	3	25.7	18.3
8	1	1	0	21	3	25.7	17.3
9	1	0	0	22	3	25.7	18.3
10	2	1	0	20	3	25.7	16.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4B.5-14: UE Power Class test requirements (network signalled value "NS_15")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	26					23	+2.7 / -3.2
2	26					23	+2.7 / -8.2
3	26					23	+2.7 / -4.2
4	26					23	+2.7 / -8.2
5	26					23	+2.7 / -14.2
6	26					23	+2.7 / -4.2
7	26					23	+2.7 / -3.2
8	26					23	+2.7 / -9.2
9	26					23	+2.7 / -14.2
10	26					23	+2.7 / -4.2
11	26					23	+2.7 / -6.2
12	26					23	+2.7 / -12.2
13	26					23	+2.7 / -7.2
14	26					23	+2.7 / -3.2
15	26					23	+2.7 / -4.2
16	26					23	+2.7 / -8.2
17	26					23	+2.7 / -3.2
18	26					23	+2.7 / -12.2
19	26					23	+2.7 / -4.2
20	26					23	+2.7 / -8.2
21	26					23	+2.7 / -3.2
22	26					23	+2.7 / -4.2
23	26					23	+2.7 / -9.2
24	26					23	+2.7 / -14.2
25	26					23	+2.7 / -3.2
26	26					23	+2.7 / -9.2

Table 6.2.4B.5-15: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 807 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7 / -2.7
2	27					23	+2.7 / -3.7
3	27					23	+2.7 / -4.7
4	27					23	+2.7 / -2.7
5	27					23	+2.7 / -4.7
6	27					23	+2.7 / -6.2
7	27					23	+2.7 / -8.2
8	27					23	+2.7 / -9.7
9	27					23	+2.7 / -4.7
10	27					23	+2.7 / -6.2
11	27					23	+2.7 / -11.7
12	27					23	+2.7 / -8.2
13	27					23	+2.7 / -11.7
14	27					23	+2.7 / -12.7
15	27					23	+2.7 / -9.7
16	27					23	+2.7 / -2.7
17	27					23	+2.7 / -8.2
18	27					23	+2.7 / -4.7
19	27					23	+2.7 / -8.2
20	27					23	+2.7 / -13.7
21	27					23	+2.7 / -13.7
22	27					23	+2.7 / -14.7
23	27					23	+2.7 / -13.7
24	27					23	+2.7 / -13.7

Table 6.2.4B.5-16: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 808.5 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7 / -2.7
2	27					23	+2.7 / -3.7
3	27					23	+2.7 / -5.2
4	27					23	+2.7 / -2.7
5	27					23	+2.7 / -3.7
6	27					23	+2.7 / -3.7
7	27					23	+2.7 / -4.7
8	27					23	+2.7 / -2.7
9	27					23	+2.7 / -3.7
10	27					23	+2.7 / -4.7
11	27					23	+2.7 / -6.2
12	27					23	+2.7 / -6.2
13	27					23	+2.7 / -8.2
14	27					23	+2.7 / -9.7
15	27					23	+2.7 / -9.7
16	27					23	+2.7 / -2.7
17	27					23	+2.7 / -6.2
18	27					23	+2.7 / -4.7
19	27					23	+2.7 / -4.7
20	27					23	+2.7 / -9.7
21	27					23	+2.7 / -11.7
22	27					23	+2.7 / -12.7
23	27					23	+2.7 / -11.7
24	27					23	+2.7 / -11.7

Table 6.2.4B.5-17: UE Power Class test requirements (network signalled value "NS_16") when lower channel edge is at 812 MHz

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	27					23	+2.7 / - 2.7
2	27					23	+2.7 / - 3.7
3	27					23	+2.7 / - 4.7
4	27					23	+2.7 / - 2.7
5	27					23	+2.7 / -3.7
6	27					23	+2.7 / -3.7
7	27					23	+2.7 / -4.7
8	27					23	+2.7 / -2.7
9	27					23	+2.7 / -3.7
10	27					23	+2.7 / -3.7
11	27					23	+2.7 / -3.7
12	27					23	+2.7 / -3.7
13	27					23	+2.7 / -3.7
14	27					23	+2.7 / -4.7
15	27					23	+2.7 / -2.7
16	27					23	+2.7 / -2.7
17	27					23	+2.7 / -3.7
18	27					23	+2.7 / -3.7
19	27					23	+2.7 / -3.7
20	27					23	+2.7 / -4.7
21	27					23	+2.7 / -8.2
22	27					23	+2.7 / -9.7
23	27					23	+2.7 / -6.2
24	27					23	+2.7 / -4.7

Table 6.2.4B.5-18: UE Power Class test requirements (network signalled value "NS_20 for Band 23")

TBD

Table 6.2.4B.5-19: UE Power Class 3 test requirements (network signalled value "NS_21 for Band 30")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	3.0	25.7	19.3
2	1	0	0	22	3.0	25.7	18.3
3	0	4	0	19	3.5	25.7	14.8
4	0	4	0	19	3.5	25.7	14.8
5	1	0	0	22	3.0	25.7	18.3
6	0	3	0	20	3.0	25.7	16.3
7	1	3	0	19	3.5	25.7	14.8
8	2	3	0	18	4.0	25.7	13.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4B.5-20: UE Power Class Test requirements (network signalled value "NS_22")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	3.0	25.7	19.3
2	1	0	0	22	5.0	25.7	16.3
3	0	0	0	23	3.0	25.7	19.3
4	1	0	0	22	5.0	25.7	16.3
5	1	0	0	22	5.0	25.7	16.3
6	1	4	0	18	5.0	25.7	12.3
7	1	3	0	19	5.0	25.7	13.3
8	0	3	0	20	6.0	25.7	13.3
9	0	3	0	20	6.0	25.7	13.3
10	1	3	0	19	5.0	25.7	13.3
11	1	3	0	19	5.0	25.7	13.3
12	1	5	0	17	5.0	25.7	11.3
13	1	4	0	18	5.0	25.7	12.3
14	0	3	0	20	6.0	25.7	13.3
15	0	3	0	20	6.0	25.7	13.3
16	1	3	0	19	5.0	25.7	13.3
17	1	3	0	19	5.0	25.7	13.3
18	1	5	0	17	5.0	25.7	11.3
19	1	4	0	18	5.0	25.7	12.3
20	0	3	0	20	6.0	25.7	13.3
21	0	3	0	20	6.0	25.7	13.3
22	1	3	0	19	5.0	25.7	13.3
23	1	3	0	19	5.0	25.7	13.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4B.5-21: UE Power Class Test requirements (network signalled value "NS_23")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	3.0	25.7	19.3
2	0	0	0	23	3.0	25.7	19.3
3	1	0	0	22	5.0	25.7	16.3
4	1	0	0	22	5.0	25.7	16.3
5	1	0	0	22	5.0	25.7	16.3
6	1	0	0	22	5.0	25.7	16.3
7	1	0	0	22	5.0	25.7	16.3
8	1	0	0	22	5.0	25.7	16.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4B.5-22: UE Power Class test requirements (network signalled value "NS_24")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	10	0	13	6.0	25.7	6.3
2	0	10	0	13	7.0	25.7	5.3
3	1	10	0	12	5.0	25.7	6.3
4	2	10	0	11	5.0	25.7	5.3
5	0	0	0	23	3.0	25.7	19.3
6	0	2	0	21	5.0	25.7	15.3
7	2	2	0	19	5.0	25.7	13.3
8	1	2	0	20	6.0	25.7	13.3
9	1	1	0	21	5.0	25.7	15.3
10	0	3	0	20	6.0	25.7	13.3
11	0	1	0	22	5.0	25.7	16.3
12	1	1	0	21	5.0	25.7	15.3
13	0	0	0	23	3.0	25.7	19.3
14	0	0	0	23	3.0	25.7	19.3
15	0	9	0	14	6.0	25.7	7.3
16	0	9	0	14	6.0	25.7	7.3
17	1	9	0	13	6.0	25.7	6.3
18	0	17	0	6	7.0	25.7	-1.7
19	1	17	0	5	7.0	25.7	-2.7
20	2	17	0	4	7.0	25.7	-3.7
21	0	2	0	21	3.0	25.7	17.3
22	0	2	0	21	3.0	25.7	17.3
23	1	2	0	20	5.0	25.7	14.3
24	2	8	0	13	6.0	25.7	6.3
25	0	0	0	23	3.0	25.7	19.3
26	0	7	0	16	5.0	25.7	10.3
27	1	7	0	15	6.0	25.7	8.3
28	0	0	0	23	3.0	25.7	19.3
29	0	17	0	6	7.0	25.7	-1.7
30	0	17	0	6	7.0	25.7	-1.7
31	1	17	0	5	7.0	25.7	-2.7
32	2	17	0	4	7.0	25.7	-3.7
33	0	17	0	6	7.0	25.7	-1.7
34	0	17	0	6	7.0	25.7.	-1.7
35	1	17	0	5	7.0	25.7	-2.7
36	2	17	0	4	7.0	25.7	-3.7

Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.

Table 6.2.4B.5-23: UE Power Class test requirements (network signalled value "NS_25")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	1	5	0	17	5.0	25.7	11.3
2	2	5	0	16	5.0	25.7	10.3
3	0	0	0	23	3.0	25.7	19.3
4	0	2	0	21	3.0	25.7	17.3
5	0	2	0	21	5.0	25.7	15.3
6	1	2	0	20	6.0	25.7	13.3
7	0	2	0	21	5.0	25.7	15.3
8	2	2	0	19	5.0	25.7	13.3
9	1	2	0	20	6.0	25.7	13.3
10	1	1	0	21	3.0	25.7	17.3
11	0	3	0	20	6.0	25.7	13.3
12	0	1	0	22	3.0	25.7	18.3
13	0	1	0	22	3.0	25.7	18.3
14	1	1	0	21	3.0	25.7	17.3
15	1	5	0	17	5.0	25.7	11.3
16	2	1	0	20	6.0	25.7	13.3
17	1	5	0	17	5.0	25.7	11.3
18	1	1	0	21	5.0	25.7	15.3
19	2	1	0	20	6.0	25.7	13.3
20	0	0	0	23	3.0	25.7	19.3
21	0	10	0	13	6.0	25.7	6.3
22	0	10	0	13	6.0	25.7	6.3
23	1	10	0	12	6.0	25.7	5.3
24	2	10	0	11	6.0	25.7	4.3
25	1	7	0	15	6.0	25.7	8.3
26	2	7	0	14	6.0	25.7	7.3
27	1	11	0	11	6.0	25.7	4.3
28	2	11	0	10	7.0	25.7	2.3
29	0	0	0	23	3.0	25.7	19.3
30	0	4	0	19	5.0	25.7	13.3
31	1	4	0	18	5.0	25.7	12.3
32	1	3	0	19	5.0	25.7	13.3
33	2	1	0	20	6.0	25.7	13.3
34	0	1	0	22	3.0	25.7	18.3
35	0	1	0	22	3.0	25.7	18.3
36	0	0	0	23	3.0	25.7	19.3
37	0	13	0	10	7.0	25.7	2.3
38	0	13	0	10	7.0	25.7	2.3
39	1	13	0	9	7.0	25.7	1.3
40	2	13	0	8	7.0	25.7	0.3
41	0	11	0	12	6.0	25.7	5.3
42	0	11	0	12	6.0	25.7	5.3
43	2	11	0	10	7.0	25.7	2.3
44	1	11	0	11	6.0	25.7	4.3
45	0	13	0	10	7.0	25.7	2.3
46	2	13	0	8	7.0	25.7	0.3

47	0	0	0	23	3.0	25.7	19.3
48	0	13	0	10	7.0	25.7	2.3
49	0	13	0	10	7.0	25.7	2.3
50	1	13	0	9	7.0	25.7	1.3
51	2	13	0	8	7.0	25.7	0.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

Table 6.2.4B.5-24: Reserved

Table 6.2.4B.5-25: UE Power Class test requirements (network signalled value "NS_27")

Configuration ID	MPR (dB)	A-MPR (dB)	$\Delta T_{C,c}$ (dB)	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	0	23	3.0	25.7	19.3
2	0	0	0	23	3.0	25.7	19.3
3	1	0	0	22	5.0	25.7	16.3
4	2	0	0	21	5.0	25.7	15.3
5	0	0	0	23	3.0	25.7	19.3
6	0	0	0	23	3.0	25.7	19.3
7	1	0	0	22	5.0	25.7	16.3
8	2	0	0	21	5.0	25.7	15.3
9	0	4	0	19	5.0	25.7	13.3
10	0	0	0	23	3.0	25.7	19.3
11	0	0	0	23	3.0	25.7	19.3
12	0	4	0	19	5.0	25.7	13.3
13	0	0	0	23	3.0	25.7	19.3
14	0	0	0	23	3.0	25.7	19.3
15	1	2	0	20	6.0	25.7	13.3
16	2	2	0	19	5.0	25.7	13.3
17	0	4	0	19	5.0	25.7	13.3
18	0	1	0	22	5.0	25.7	16.3
19	0	0	0	23	3.0	25.7	19.3
20	1	0	0	22	5.0	25.7	16.3
21	0	4	0	19	5.0	25.7	13.3
22	0	1	0	22	5.0	25.7	16.3
23	0	0	0	23	3.0	25.7	19.3
24	1	0	0	22	5.0	25.7	16.3
25	1	2	0	20	6.0	25.7	13.3
26	2	2	0	19	5.0	25.7	13.3
Note 1: Lower limit is assuming $\Delta_{TIB,c}$ is zero. If non-zero, $P_{CMAX,c}$ will decrease and $T(P_{CMAX_L,c})$ may be higher resulting in different test requirements according to Table 6.2.5.3-1.							

6.2.4E Additional Maximum Power Reduction (A-MPR) for UE category 0

6.2.4E.1 Test purpose

Same test purpose in clause 6.2.4.1.

6.2.4E.2 Test applicability

The requirements of this test apply in test case 6.6.2.2E Additional Spectrum Emission Mask for network signalled values NS_03, NS_04, NS_06 and NS_07 to all types of E-UTRA UE release 12 and forward of UE category 0.

The requirements of this test apply in test case 6.6.3E.3 Additional Spurious Emissions for network signalled values NS_07 and to all types of E-UTRA UE release 12 and forward of UE category 0.

NOTE: As a result TC 6.2.4E has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.4.3

6.2.4E.4 Test description

6.2.4E.4.1 Initial condition

Same initial conditions as in clause 6.2.4.4.1 with the following exceptions:

- Instead of Tables 6.2.4.4.1-1 to 6.2.4.4.1-24→ use Table 6.2.4E.4.1-1 to 6.2.4E.4.1-5.
- Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.2.4E.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					Lowest, 5MHz, 10MHz, Highest		
Test Parameters for NS_03 A-MPR							
		Downlink Configuration			**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
			FDD	**TDD**		**FDD and HD-FDD**	**TDD**
1	1.4MHz	N/A for A-MPR testing.			QPSK	6	6
2	1.4MHz				QPSK	5	5
3	1.4MHz				16QAM	5	5
4	3MHz				QPSK	15	15
5	3MHz				QPSK	4	4
6	3MHz				16QAM	5	5
7	3MHz				16QAM	4	4
8	5MHz				QPSK	25	25
9	5MHz				QPSK	8	8
10	5MHz				QPSK	6	6
11	5MHz				16QAM	5	5
12	10MHz				QPSK	36	36
13	10MHz				QPSK	12	12
14	10MHz				QPSK	6	6
15	10MHz				16QAM	5	5
16	15MHz				QPSK	36	36
17	15MHz				QPSK	16	16
18	15MHz				QPSK	8	8
19	15MHz				16QAM	5	5
20	20MHz				QPSK	36	36
21	20MHz				QPSK	18	18
22	20MHz				QPSK	10	10
23	20MHz				16QAM	5	5

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Table 6.2.4E.4.1-2: Test Configuration Table (network signalled value "NS_04")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10 MHz, 15 MHz, 20MHz		
Test Parameters for NS_04 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation TDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	25	Note 3
2	5MHz			QPSK	8	Note 3
3	5MHz			QPSK	6	Note 3
4	5MHz			16QAM	5	Note 3
6	10MHz			QPSK	1	0
7	10MHz			QPSK	12	0
8	10MHz			QPSK	36	0
9	10MHz			16QAM	5	0
10	10MHz			QPSK	24	13
11	10MHz			16QAM	5	13
12	10MHz			QPSK	36	13
13	10MHz			QPSK	12	37
14	10MHz			QPSK	1	49
15	15MHz			QPSK	1	0
16	15MHz			QPSK	16	0
17	15MHz			QPSK	36	0
18	15MHz			16QAM	5	0
19	15MHz			QPSK	36	19
20	15MHz			16QAM	5	19
21	15MHz			QPSK	36	33
22	15MHz			QPSK	18	56
23	15MHz			QPSK	1	74
24	20MHz			QPSK	1	0
25	20MHz			QPSK	18	0
26	20MHz			QPSK	36	0
27	20MHz			16QAM	5	0
28	20MHz			QPSK	36	36
29	20MHz			16QAM	5	25
30	20MHz			QPSK	36	25
31	20MHz			QPSK	25	75
32	20MHz			QPSK	1	99

Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in subclause 6.2.4 as not all combinations are necessarily required based on the applicability of the UE.

Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Table 6.2.4E.4.1-3: Test Configuration Table (network signalled value "NS_06")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest	
Test Parameters for NS_06 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD and HD_FDD**
1	1.4MHz	N/A for A-MPR testing		QPSK	6
2	1.4MHz			QPSK	5
3	1.4MHz			16QAM	5
4	3MHz			QPSK	15
5	3MHz			QPSK	4
6	3MHz			16QAM	4
7	5MHz			QPSK	25
8	5MHz			QPSK	8
9	5MHz			16QAM	5
10	10MHz			QPSK	36
11	10MHz			QPSK	12
12	10MHz			16QAM	5
13	15MHz			QPSK	36
14	15MHz			QPSK	16
15	15MHz			16QAM	5
16	20MHz			QPSK	36
17	20MHz			QPSK	18
18	20MHz			16QAM	5

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Table 6.2.4E.4.1-4: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10MHz		
Test Parameters for NS_07 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD and HD-FDD**	**RB_{start} FDD**
1	10MHz	N/A for A-MPR testing		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			16QAM	5	13
7	10MHz			QPSK	16	19
8	10MHz			QPSK	12	19
9	10MHz			16QAM	5	19
10	10MHz			QPSK	30	19
11	10MHz			QPSK	6	43
12	10MHz			QPSK	2	48
13	10MHz			QPSK	36	0
14	10MHz			QPSK	12	0
15	10MHz			16QAM	5	0
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.						

6.2.4E.4.2 Test procedure

Same test procedure as in clause 6.2.4.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard sub frame are not under test.

6.2.4E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions for each network signalled value.

6.2.4E.4.3.1 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4E.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

6.2.4E.4.3.2 Message contents exceptions (network signalled value "NS_04")

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4E.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_04"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	4 (NS_04)		

6.2.4E.4.3.3 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4E.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_06"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

6.2.4E.4.3.4 Message contents exceptions (network signalled value "NS_07")

1. Information element additionalSpectrumEmission is set to NS_07. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4E.4.3.4-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_07"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	7 (NS_07)		

6.2.4E.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4E.5-1 to Table 6.2.4E.5-5. The allowed A-MPR values specified in Table 6.2.4.3-1 are in addition to the allowed MPR requirements specified in clause 6.2.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5.3-1 apply.

Table 6.2.4E.5-1: UE Power Class test requirements (network signalled value "NS_03") (for Band 2)

Configuration ID	EUTRA band	Test Freq.	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	2	Mid					23	+2.7 / -3.7
1	2	Low, High					23	+2.7 / -5.7
2	2	Mid					23	+2.7 / -2.7
2	2	Low, High					23	+2.7 / -4.2
3	2	Mid					23	+2.7 / -3.7
3	2	Low, High					23	+2.7 / -5.7
4	2	Mid					23	+2.7 / -4.7
4	2	Low, High					23	+2.7 / -7.7
5	2	Mid					23	+2.7 / -2.7
5	2	Low, High					23	+2.7 / -4.2
6	2	Mid					23	+2.7 / -6.2
6	2	Low, High					23	+2.7 / -9.2
7	2	Mid					23	+2.7 / -3.7
7	2	Low, High					23	+2.7 / -5.7
8	2	All					23	+2.7 / -4.7
9	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
9	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
10	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
10	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
11	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
11	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
12	2	All					23	+2.7 / -4.7
13	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
13	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
14	2	Low @ RB#(max+1-RB					23	+2.7 /

		allocation), Mid, High @ RB#0						-2.7
14	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
15	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
15	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
16	2	All					23	+2.7 / -4.7
17	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -3.7
17	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -5.7
18	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
18	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
19	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -4.7
19	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -7.7
20	2	All					23	+2.7 / -4.7
21	2	All					23	+2.7 / -3.7
22	2	Low @ RB#(max+1-RB allocation), Mid, High @ RB#0					23	+2.7 / -2.7
22	2	Low @ RB#0, High @ RB#(max+1-RB allocation)					23	+2.7 / -4.2
23	2	All					23	+2.7 / -4.7

Table 6.2.4E.5-2: UE Power Class test requirements (network signalled value "NS_03") (for Band 4)

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	4					23	+2.7 / -3.7
2	4					23	+2.7 / -2.7
3	4					23	+2.7 / -3.7
4	4					23	+2.7 / -4.7
5	4					23	+2.7 / -2.7
6	4					23	+2.7 / -6.2
7	4					23	+2.7 / -3.7
8	4					23	+2.7 / -4.7
9	4					23	+2.7 / -3.7
10	4					23	+2.7 / -2.7
11	4					23	+2.7 / -6.2
12	4					23	+2.7 / -4.7
13	4					23	+2.7 / -4.7
14	4					23	+2.7 / -3.7
15	4					23	+2.7 / -2.7
16	4					23	+2.7 / -6.2
17	4					23	+2.7 / -4.7
18	4					23	+2.7 / -4.7
19	4					23	+2.7 / -3.7
20	4					23	+2.7 / -2.7
21	4					23	+2.7 / -6.2
22	4					23	+2.7 / -4.7
23	4					23	+2.7 / -4.7

Table 6.2.4E.5-3: UE Power Class test requirements (network signalled value "NS_04")

Configuration ID	EUTRA band	Bandwidth (MHz)	Class 3 (dBm)	Tol. (dB)
1	41	5 MHz	23	+2.7 / -4.7
2	41	5 MHz	23	+2.7 / -3.7
3	41	5 MHz	23	+2.7 / -2.7
4	41	5 MHz	23	+2.7 / -6.2
5	41	5 MHz	23	+2.7 / -4.7
6	41	10MHz	23	+2.7/ -6.2
7	41	10MHz	23	+2.7/ -6.2
8	41	10MHz	23	+2.7/ -8.2
9	41	10MHz	23	+2.7/ -9.7
10	41	10MHz	23	+2.7/ -3.7
11	41	10MHz	23	+2.7/ -4.7
12	41	10MHz	23	+2.7/ -6.2
13	41	10MHz	23	+2.7/ -6.2
14	41	10MHz	23	+2.7/ -6.2
15	41	15MHz	23	+2.7/ -6.2
16	41	15MHz	23	+2.7/ -6.2
17	41	15MHz	23	+2.7/ -8.2
18	41	15MHz	23	+2.7/ -9.7
19	41	15MHz	23	+2.7/ -3.7
20	41	15MHz	23	+2.7/ -4.7
21	41	15MHz	23	+2.7/ -6.2
22	41	15MHz	23	+2.7/ -8.2
23	41	15MHz	23	+2.7/ -6.2
24	41	20MHz	23	+2.7/ -6.2
25	41	20MHz	23	+2.7/ -6.2
26	41	20MHz	23	+2.7/ -8.2
27	41	20MHz	23	+2.7/ -9.7
28	41	20MHz	23	+2.7/ -3.7
29	41	20MHz	23	+2.7/ -4.7
30	41	20MHz	23	+2.7/ -6.2
31	41	20MHz	23	+2.7/ -8.2
32	41	20MHz	23	+2.7/

				-6.2

Table 6.2.4E.5-4: UE Power Class test requirements (network signalled value "NS_06") (for Bands 13)

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	13					23	+2.7 / -3.7
2	13					23	+2.7 / -2.7
3	13					23	+2.7 / -2.7
4	13					23	+2.7 / -3.7
5	13					23	+2.7 / -2.7
6	13					23	+2.7 / -3.7
7	13					23	+2.7 / -3.7
8	13					23	+2.7 / -2.7
9	13					23	+2.7 / -3.7
10	13					23	+2.7 / -3.7
11	13					23	+2.7 / -2.7
12	13					23	+2.7 / -3.7
13	13					23	+2.7 / -3.7
14	13					23	+2.7 / -2.7
15	13					23	+2.7 / -3.7
16	13					23	+2.7 / -3.7
17	13					23	+2.7 / -2.7
18	13					23	+2.7 / -3.7

Table 6.2.4E.5-5: UE Power Class test requirements (network signalled value "NS_07")

Configuration ID	EUTRA band	Class 1 (dBm)	Tol. (dB)	Class 2 (dBm)	Tol. (dB)	Class 3 (dBm)	Tol. (dB)
1	13					23	+2.7 / -18.7
2	13					23	+2.7 / -13.7
3	13					23	+2.7 / -2.7
4	13					23	+2.7 / -19.7
5	13					23	+2.7 / -18.7
6	13					23	+2.7 / -20.7
7	13					23	+2.7 / -3.7
8	13					23	+2.7 / -2.7
9	13					23	+2.7 / -4.7
10	13					23	+2.7 / -12.7
11	13					23	+2.7 / -2.7
12	13					23	+2.7 / -6.2
13	13					23	+2.7 / -19.7
14	13					23	+2.7 / -18.7
15	13					23	+2.7 / -20.7

6.2.4EA Additional Maximum Power Reduction (A-MPR) for UE category M1

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- NS_04 (B41), NS_12 (B26): Minimum requirements in 36.101 are incomplete. Test configuration table and test requirements are missing

6.2.4EA.1 Test purpose

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction A-MPR is allowed for the output power as specified in Table 6.2.2 EA -1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2.4EA.2 Test applicability

The requirements of this test apply in test case 6.6.2.2EA Additional Spectrum Emission Mask for network signalled values NS_03, NS_04, NS_06 and NS_07to all types of E-UTRA UE release 13 and forward of UE category M1.

The requirements of this test apply in test case 6.6.3EA.3 Additional Spurious Emissions for network signalled values NS_05, NS_07, NS_08, NS_09, NS_12, NS_13, NS_14, NS_15, NS_16, NS_17 and NS_18 to all types of E-UTRA UE release 13 and forward of UE category M1.

NOTE: As a result TC 6.2.4EA has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4EA.3 Minimum conformance requirements

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the output power as specified in Table 6.2.2EA-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

For UE Power Class 3 and 5 the specific requirements and identified subclauses are specified in Table 6.2.4EA-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in Table 6.2.4EA-1 and from 6.2.4EA-2 to 6.2.4EA-3 are in addition to the allowed MPR requirements specified in subclause 6.2.3EA.

Table 6.2.4EA-1: Additional Maximum Power Reduction (A-MPR) for category M1 UE

Network Signalling value	Requirements (subclause)	E-UTRA Band	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.2-1	Table 5.4.2-1	N/A
NS_03	6.6.2.2.1	2, 4	Table 5.4.2-1	N/A
NS_04	6.6.2.2.2	41	[TBD]	[TBD]
NS_05	6.6.3.3.3.2	1	Table 5.4.2-1	N/A
NS_06	6.6.2.2.3	12, 13	Table 5.4.2-1	N/A
NS_07	6.6.2.2.3 6.6.3.3.3.3	13	Table 6.2.4-2E	
NS_08	6.6.3.3.3.4	19	Table 5.4.2-1	N/A
NS_09	6.6.3.3.3.5	21	Table 5.4.2-1	N/A
NS_10		20	Table 5.4.2-1	N/A
NS_12	6.6.3.3.3.7	26	[TBD]	
NS_13	6.6.3.3.3.8	26	Table 5.4.2-1	N/A
NS_14	6.6.3.3.3.9	26	Table 5.4.2-1	N/A
NS_15	6.6.3.3.3.10	26	Table 6.2.4-9	
NS_16	6.6.3.3.3.11	27	Table 5.4.2-1	N/A
NS_17	6.6.3.3.3.12	28	Table 5.4.2-1	N/A
NS_18	6.6.3.3.3.13	28	Table 5.4.2-1	N/A
NS_32	-	-	-	-

No other A-MPR requirement than those specified in tables 6.2.4EA-1 applies to category M1 UE.

…

Table 6.2.4EA-2: A-MPR for "NS_07“ for Cat-M1

BW [MHz]	5				10	
(NB_{index},RB_{start})	(0,<6)	(0,<6)	(3,<6)	(3,<6)	(0,<6)	(7,<6)
LCRB	>4 and <7	>1 and ≤4	>4 and <7	>1 and ≤4	>2and <7	>2and <7
AMPR [dB]	2	1	2	1	1	1
NOTE 1: NB_{index} is the narrowband index that is defined in 6.2.7 in [8]. The resource block assignment is defined within the narrowband as defined in 5.3.3.1.12 and 5.3.3.1.13 in [9].						

Table 6.2.4EA-3: A-MPR for "NS_15" for E-UTRA highest channel edge > 845 MHz and ≤ 849 MHz

Channel bandwidth [MHz]	Parameters	Region A	Region B	Region C
1.4	RB_{end} [RB]			4-5
	A-MPR [dB]			≤3
3	RB_{end} [RB]	0-1	8-12	13-14
	L_{CRB} [RB]	≤2	≥8	>0
	A-MPR [dB]	≤4	≤4	≤9
5	RB_{end} [RB]	0-4	12-19	20-24
	L_{CRB} [RB]	≤2	≥8	>0
	A-MPR [dB]	≤4	≤5	≤9
10	RB_{end} [RB]	0-12	23-36	37-49
	L_{CRB} [RB]	≤2	≥15	>0
	A-MPR [dB]	≤4	≤6	≤9
15	RB_{end} [RB]	0-20	26-53	54-74
	L_{CRB} [RB]	≤2	≥20	>0
	A-MPR [dB]	≤4	≤5	≤9

The normative reference for this requirement is TS 36.101 [2] subclause 6.2.4EA and 6.2.4.

6.2.4EA.4 Test description

6.2.4EA.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.2.4EA.4.1-1 to 6.2.4EA.4.1-15. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.2.4EA.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest, 5MHz, 10MHz, Highest			
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
Low range, Mid range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	0
7	3MHz		QPSK	5	0
8	3MHz		QPSK	6	0
9	3MHz		16QAM	2	0
10	3MHz		16QAM	5	0
11	5MHz		QPSK	6	0
12 (Note 4)	5MHz		16QAM	1	0
13	5MHz		16QAM	3	0
14	5MHz		16QAM	5	0
15 (Note 4)	10MHz		QPSK	4	0
16	10MHz		QPSK	6	0
17 (Note 4)	10MHz		16QAM	3	0
18	10MHz		16QAM	5	0
19	15MHz		QPSK	6	0
20	15MHz		16QAM	5	0
21	20MHz		16QAM	5	0
High range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	1
7	3MHz		QPSK	5	1
8	3MHz		QPSK	6	1
9	3MHz		16QAM	2	1
10	3MHz		16QAM	5	1
11	5MHz		QPSK	6	3
12 (Note 4)	5MHz		16QAM	1	3
13	5MHz		16QAM	3	3
14	5MHz		16QAM	5	3
15 (Note 4)	10MHz		QPSK	4	7
16	10MHz		QPSK	6	7
17 (Note 4)	10MHz		16QAM	3	7
18	10MHz		16QAM	5	7
19	15MHz		QPSK	6	11
20	15MHz		16QAM	5	11
21	20MHz		16QAM	5	15

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4

Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.

Note 4: Only for power class 3 UE.

Table 6.2.4EA.4.1-2: Test Configuration Table (network signalled value "NS_04")

TBD

Table 6.2.4EA.4.1-3: Test Configuration Table (network signalled value "NS_05")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low Range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4

Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.

Table 6.2.4EA.4.1-4: Test Configuration Table (network signalled value "NS_06")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest, 5MHz, 10MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
Low range, Mid range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	0
7	3MHz		QPSK	5	0
8	3MHz		QPSK	6	0
9	3MHz		16QAM	2	0
10	3MHz		16QAM	5	0
11	5MHz		QPSK	6	0
12 (Note 4)	5MHz		16QAM	1	0
13	5MHz		16QAM	3	0
14	5MHz		16QAM	5	0
15 (Note 4)	10MHz		QPSK	4	0
16	10MHz		QPSK	6	0
17 (Note 4)	10MHz		16QAM	3	0
18	10MHz		16QAM	5	0
High range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	1
7	3MHz		QPSK	5	1
8	3MHz		QPSK	6	1
9	3MHz		16QAM	2	1
10	3MHz		16QAM	5	1
11	5MHz		QPSK	6	3
12 (Note 4)	5MHz		16QAM	1	3
13	5MHz		16QAM	3	3
14	5MHz		16QAM	5	3
15 (Note 4)	10MHz		QPSK	4	7
16	10MHz		QPSK	6	7
17 (Note 4)	10MHz		16QAM	3	7
18	10MHz		16QAM	5	7

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4
Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.
Note 4: Only for power class 3 UE.

Table 6.2.4EA.4.1-5: Test Configuration Table (network signalled value "NS_07")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		10MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
Low range, Mid range					
1	10MHz		QPSK	1	0
2	10MHz		QPSK	4	0
3	10MHz		QPSK	6	0
4	10MHz		16QAM	5	0
High range					
1	10MHz		QPSK	1	7
2	10MHz		QPSK	4	7
3	10MHz		QPSK	6	7
4	10MHz		16QAM	5	7
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.2.4EA.4.1-6: Test Configuration Table (network signalled value "NS_08")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		High Range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		5MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.2.4EA.4.1-7: Test Configuration Table (network signalled value "NS_09")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			High Range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.2.4EA.4.1-8: Test Configuration Table (network signalled value "NS_10")

Void, not tested

Table 6.2.4EA.4.1-9: Test Configuration Table (network signalled value "NS_12")

TBD

Table 6.2.4EA.4.1-10: Test Configuration Table (network signalled value "NS_13")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			UL 819.7 MHz (N_{UL} = 26747)		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			1.4MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	1.4MHz		QPSK	1	0
2	1.4MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.2.4EA.4.1-11: Test Configuration Table (network signalled value "NS_14")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			UL 829 MHz (N_{UL} = 26840)		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			10MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	10MHz		QPSK	1	0
2	10MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.2.4EA.4.1-12: Test Configuration Table (network signalled value "NS_15")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Configuration ID 1-2: UL 844.3 MHz Configuration ID 3-8: High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			1.4MHz, 3MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	1.4MHz		QPSK	1@0, 1@5	0
2	1.4MHz		QPSK	6	0
3	1.4MHz		QPSK	1@5	0
4	1.4MHz		QPSK	6	0
5	3MHz		QPSK	1@1	1
6	3MHz		QPSK	1@5	1
7	3MHz		QPSK	6	1
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4					

Table 6.2.4EA.4.1-13: Test Configuration Table (network signalled value "NS_16")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			1.4MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	1.4MHz		QPSK	1	0
2	1.4MHz		QPSK	6	0

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4
Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.

Table 6.2.4EA.4.1-14: Test Configuration Table (network signalled value “NS_17”)

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			720.5MHz		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4
Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.

Table 6.2.4EA.4.1-15: Test Configuration Table (network signalled value "NS_18")

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low Range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.4EA.4.1-1 to Table 6.2.4EA.4.1-15.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.2.4EA.4.3.

6.2.4EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via M-PDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to the applicable table from Table 6.2.4EA.4.1-1 to Table 6.2.4EA.4.1-15. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.

6.2.4EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA, with the following exceptions for each network signalled value.

6.2.4EA.4.3.1 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

6.2.4EA.4.3.2 Message contents exceptions (network signalled value "NS_04")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_04"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	4 (NS_04)		

6.2.4EA.4.3.3 Message contents exceptions (network signalled value "NS_05")

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_05"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	5 (NS_05)		

6.2.4EA.4.3.5 Message contents exceptions (network signalled value "NS_08")

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_08"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	8 (NS_08)		

6.2.4EA.4.3.6 Message contents exceptions (network signalled value "NS_09")

1. Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.6-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_09"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	9 (NS_09)		

6.2.4EA.4.3.7 Message contents exceptions (network signalled value "NS_10")

1. Information element additionalSpectrumEmission is set to NS_10. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.7-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_10"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	10 (NS_10)		

6.2.4EA.4.3.8 Message contents exceptions (network signalled value "NS_12")

1. Information element additionalSpectrumEmission is set to NS_12. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.8-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_12"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	12 (NS_12)		

6.2.4EA.4.3.9 Message contents exceptions (network signalled value "NS_13")

1. Information element additionalSpectrumEmission is set to NS_13. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.9-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_13"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	13 (NS_13)		

6.2.4EA.4.3.10 Message contents exceptions (network signalled value "NS_14")

1. Information element additionalSpectrumEmission is set to NS_14. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.10-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_14"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	14 (NS_14)		

6.2.4EA.4.3.11 Message contents exceptions (network signalled value "NS_15")

1. Information element additionalSpectrumEmission is set to NS_15. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.11-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_15"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	15 (NS_15)		

6.2.4EA.4.3.12 Message contents exceptions (network signalled value "NS_16")

1. Information element additionalSpectrumEmission is set to NS_16. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.12-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_16"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	16 (NS_16)		

6.2.4EA.4.3.13 Message contents exceptions (network signalled value "NS_18")

1. Information element additionalSpectrumEmission is set to NS_18. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4EA.4.3.13-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_18"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	18 (NS_18)		

6.2.4EA.5 Test requirements

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in the applicable table from Table 6.2.4EA.5-1 to Table 6.2.4EA.5-17. The allowed A-MPR values specified in Table 6.2.4EA-1 are in addition to the allowed MPR requirements specified in clause 6.2.3 EA. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in Table 6.2.5 EA.3-1 and 6.2.5EA.3-2 apply.

Table 6.2.4EA.5-1: UE Power Class test requirements (network signalled value "NS_03") (for Band 2 Low/High range with $\Delta T_{C,c}$=*1.5 dB*)

Config ID	Power class 3					Power class 5				
	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	21.5	2	25.7	18.8	0	18.5	4	22.7	13.8
2	1	20.5	2.5	25.7	17.3	1	17.5	5	22.7	11.8
3	2	19.5	3.5	25.7	15.3	2	16.5	5	22.7	10.8
4	1	20.5	2.5	25.7	17.3	1	17.5	5	22.7	11.8
5	2	19.5	3.5	25.7	15.3	2	16.5	5	22.7	10.8
6	0	21.5	2	25.7	18.8	0	18.5	4	22.7	13.8
7	1	20.5	2.5	25.7	17.3	1	17.5	5	22.7	11.8
8	2	19.5	3.5	25.7	15.3	2	16.5	5	22.7	10.8
9	1	20.5	2.5	25.7	17.3	1	17.5	5	22.7	11.8
10	2	19.5	3.5	25.7	15.3	2	16.5	5	22.7	10.8
11	1	20.5	2.5	25.7	17.3	1	17.5	5	22.7	11.8
12	0	21.5	2	25.7	18.8	N/A				
13	1	20.5	2.5	25.7	17.3	0	18.5	4	22.7	13.8
14	2	19.5	3.5	25.7	15.3	1	17.5	5	22.7	11.8
15	0	21.5	2	25.7	18.8	N/A				
16	1	20.5	2.5	25.7	17.3	1	17.5	5	22.7	11.8
17	0	21.5	2	25.7	18.8	N/A				
18	1	20.5	2.5	25.7	17.3	0	18.5	4	22.7	13.8
19	0	21.5	2	25.7	18.8	0	18.5	4	22.7	13.8
20	0	21.5	2	25.7	18.8	0	18.5	4	22.7	13.8
21	0	21.5	2	25.7	18.8	0	18.5	4	22.7	13.8

Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5
Note 2: $\Delta T_{C,c}$ applicability per band is indicated by note 2 in Table 6.2.2EA-1

Table 6.2.4EA.5-2: UE Power Class test requirements (network signalled value "NS_03") (for Band 2 Mid range and Band 4 with $\Delta T_{C,c}$=*0 dB*)

Config ID	Power class 3					Power class 5				
	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
2	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
3	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
4	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
5	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
6	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
7	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
8	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
9	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
10	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
11	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
12	0	23	2.0	25.7	20.3	N/A				
13	1	22	2.0	25.7	19.3	0	20	2.0	22.7	17.3
14	2	21	2.0	25.7	18.3	1	19	3.5	22.7	14.8
15	0	23	2.0	25.7	20.3	N/A				
16	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
17	0	23	2.0	25.7	20.3	N/A				
18	1	22	2.0	25.7	19.3	0	20	2.0	22.7	17.3
19	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
20	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
21	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5 Note 2: $\Delta T_{C,c}$ applicability per band is indicated by note 2 in Table 6.2.2EA-1										

Table 6.2.4EA.5-3: UE Power Class test requirements (network signalled value "NS_04") (for Band 41)

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Table 6.2.4EA.5-4: UE Power Class test requirements (network signalled value "NS_05") (for Band 1)

Configuration ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2	25.7	20.3	20	2	22.7	17.3
2	1	22	2	25.7	19.3	19	3.5	22.7	14.8
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5									

Table 6.2.4EA.5-5: UE Power Class test requirements (network signalled value "NS_06") (for Band 12 Low/High range with $\Delta T_{C,c}$=*1.5 dB*)

Configuration ID	Power class 3					Power class 5				
	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	21.5	2.0	25.7	18.8	0	18.5	4.0	22.7	13.8
2	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
3	2	19.5	3.5	25.7	15.3	2	16.5	5.0	22.7	10.8
4	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
5	2	19.5	3.5	25.7	15.3	2	16.5	5.0	22.7	10.8
6	0	21.5	2.0	25.7	18.8	0	18.5	4.0	22.7	13.8
7	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
8	2	19.5	3.5	25.7	15.3	2	16.5	5.0	22.7	10.8
9	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
10	2	19.5	3.5	25.7	15.3	2	16.5	5.0	22.7	10.8
11	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
12	0	21.5	2.0	25.7	18.8	N/A				
13	1	20.5	2.5	25.7	17.3	0	18.5	4.0	22.7	13.8
14	2	19.5	3.5	25.7	15.3	1	17.5	5.0	22.7	11.8
15	0	21.5	2.0	25.7	18.8	N/A				
16	1	20.5	2.5	25.7	17.3	1	17.5	5.0	22.7	11.8
17	0	21.5	2.0	25.7	18.8	N/A				
18	1	20.5	2.5	25.7	17.3	0	18.5	4.0	22.7	13.8

Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5
Note 2: $\Delta T_{C,c}$ applicability per band is indicated by note 2 in Table 6.2.2EA-1

Table 6.2.4EA.5-6: UE Power Class test requirements (network signalled value "NS_06") (for Band 12 Mid range and Band 13 with $\Delta T_{C,c}$=*0 dB*)

Config ID	Power class 3					Power class 5				
	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
2	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
3	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
4	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
5	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
6	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
7	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
8	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
9	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
10	2	21	2.0	25.7	18.3	2	18	4.0	22.7	13.3
11	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
12	0	23	2.0	25.7	20.3	N/A				
13	1	22	2.0	25.7	19.3	0	20	2.0	22.7	17.3
14	2	21	2.0	25.7	18.3	1	19	3.5	22.7	14.8
15	0	23	2.0	25.7	20.3	N/A				
16	1	22	2.0	25.7	19.3	1	19	3.5	22.7	14.8
17	0	23	2.0	25.7	20.3	N/A				
18	1	22	2.0	25.7	19.3	0	20	2.0	22.7	17.3

Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5
Note 2: $\Delta T_{C,c}$ applicability per band is indicated by note 2 in Table 6.2.2EA-1

Table 6.2.4EA.5-7: UE Power Class test requirements (network signalled value "NS_07") (for band 13)

Configuration ID	A-MPR (dB)		Power class 3					Power class 5			
		MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	0	23	2.0	25.7	20.3	0	20	2.0	22.7	17.3
2	1	0	22	2.0	25.7	19.3	0	19	3.5	22.7	14.8
3	1	1	21	2.0	25.7	18.3	1	18	4.0	22.7	13.3
4	1	1	21	2.0	25.7	18.3	0	19	3.5	22.7	14.8

Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5

Table 6.2.4EA.5-8: UE Power Class test requirements (network signalled value "NS_08") (for band 19)

Configuration ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2	25.7	20.3	20	2	22.7	17.3
2	1	22	2	25.7	19.3	19	3.5	22.7	14.8
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5									

Table 6.2.4EA.5-9: UE Power Class test requirements (network signalled value "NS_09") (for band 21)

Configuration ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2	25.7	20.3	20	2	22.7	17.3
2	1	22	2	25.7	19.3	19	3.5	22.7	14.8
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5									

Table 6.2.4EA.5-10: UE Power Class test requirements (network signalled value "NS_10") (for band 20)

Void, not tested

Table 6.2.4EA.5-11: UE Power Class 3 test requirements (network signalled value "NS_12") (for band 26)

FFS

Table 6.2.4EA.5-12: UE Power Class 3 test requirements (network signalled value "NS_13") (for band 26)

Configuration ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2.0	25.7	20.3	20	2.0	22.7	17.3
2	1	21	2.0	25.7	18.3	18	4.0	22.7	13.3
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5 Note 2: $\Delta T_{C,c}$ is 0 dB for band 26 UL 819.7 MHz (NUL = 26747) as indicated by note 2 in Table 6.2.2EA-1									

Table 6.2.4EA.5-13: UE Power Class 3 test requirements (network signalled value "NS_14") (for band 26)

Configuration ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2.0	25.7	20.3	20	2.0	22.7	17.3
2	1	21	2.0	25.7	18.3	18	4.0	22.7	13.3
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5									
Note 2: $\Delta T_{C,c}$ is 0 dB for band 26 UL 829 MHz (N_{UL} = 26840) as indicated by note 2 in Table 6.2.2EA-1									

Table 6.2.4.5-14: UE Power Class test requirements (network signalled value "NS_15") (for band 26)

Configuration ID	DTC,c (dB)	A-MPR (dB)	MPR (dB)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
Power class 3							
1	0	0	0	23	2	25.7	20.3
2	0	0	2	21	2	25.7	18.3
3	1.5	0	0	21.5	2	25.7	18.8
4	1.5	3	2	16.5	5	25.7	10.8
5	1.5	0	0	21.5	2	25.7	18.8
6	1.5	0	2	21.5	2	25.7	18.8
7	1.5	9	2	10.5	6	25.7	3.8
Power class 5							
1	0	0	0	20	2	22.7	17.3
2	0	0	2	18	4	22.7	13.3
3	1.5	0	0	18.5	4	22.7	13.8
4	1.5	3	2	13.5	5	22.7	7.8
5	1.5	0	0	18.5	4	22.7	13.8
6	1.5	0	2	18.5	4	22.7	13.8
7	1.5	9	2	7.5	7	22.7	-0.2

Table 6.2.4EA.5-15: UE Power Class test requirements (network signalled value "NS_16") (for band 27)

Configuration ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2	25.7	20.3	20	2	22.7	17.3
2	1	22	2	25.7	19.3	19	3.5	22.7	14.8
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5									

Table 6.2.4.5-16: UE Power Class test requirements (network signalled value "NS_17") (for band 28)

Configuration ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2	25.7	19.8	20	2	22.7	16.8
2	1	22	2	25.7	18.8	19	3.5	22.7	14.3
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5									

Table 6.2.4EA.5-17: UE Power Class test requirements (network signalled value "NS_18") (for band 28)

Configuration ID	MPR (dB)	Power class 3				Power class 5			
		$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)	$P_{CMAX_L,c}$ (dBm)	$T(P_{CMAX_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	0	23	2	25.7	19.8	20	2	22.7	16.8
2	1	22	2	25.7	18.8	19	3.5	22.7	14.3
Note 1: $P_{CMAX,c}$ and $T(P_{CMAX_L,c})$ are defined in TS 36.101 [2] clause 6.2.5									

6.2.4G Additional Maximum Power Reduction (A-MPR) for V2X Communication

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- NS_33 (B47): Minimum requirements in TS 36.101 are incomplete. Test configuration table and test requirements are missing.

- Network signalled value "NS_33" is not defined in RAN2.

- Test description

6.2.4G.1 Additional Maximum Power Reduction (A-MPR) for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

6.2.4G.1.1 Test purpose

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction A-MPR is allowed for the output power as specified in Table 6.2.2.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2.4G.1.2 Test applicability

The requirements of this test apply in test case 6.6.2.2.4 Additional Spectrum Emission Mask for network signalled values NS_33 to all types of E-UTRA UE release 14 and forward that support V2X communication.

The requirements of this test apply in test case 6.6.3.3 Additional Spurious Emissions for network signalled values NS_33 to all types of E-UTRA UE release 14 and forward that support V2X communication.

NOTE: As a result TC 6.2.4G.1 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.2G-1, the allowed A-MPR for the maximum output power for V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2.4G.1.3-1.

Table 6.2.4G.1.3-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	A-MPR (dB)
NS_33	6.6.2.2.4 (A-SEM) 6.6.3.2 (A-SE)	47	10	Table 6.2.4G.1.3-2

Table 6.2.4G.1.3-2: A-MPR for NS_33

Resource pool	Carrier frequency(MHz)	Resources Blocks (N_{RB})	Start Resource Block	A-MPR (dB)
Adjacent	5860	[≤ 10]	[0]	[12]
			[5]	[6]
			[10]	[4]
			[≥ 15]	[0.5]
		[>10 & ≤22]	[0]	[11.5]
			[5]	[10]
			[10]	[8]
			[15]	[4.5]
			[20 and 25]	[2.5]
			[≥ 30]	[1]
		[>22]	[0 and 5]	[9]
			[10]	[8]
			[15]	[7.5]
			[20]	[4.5]
	5870, 5910, 5920	[<20]	≥ 0	[3]
		[≥ 20 and ≤45]		[2]
		[>45]		[3]
	5880, 5890, 5900	[<10]	≥ 0	[1.5]
		[≥ 10 and ≤38]		[0]
		[>42]		[1.5]
Non-Adjacent	5860	[≤ 5]	≥ 0	[12]
		[>5]		[10]
	5870, 5910, 5920	[≤ 5]	≥ 0	[3.5]
		[>5 & ≤42]		[1.5]
		[>42]		[3]
	5880, 5890, 5900	[≤18]	≥ 0	[2]
		[>18 & ≤42]		[1]
		[>42]		[1.5]

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.4G.

6.2.4G.1.4 Test description

6.2.4G.1.4.1 Initial condition

FFS

6.2.4G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC. (UE should be already transmitting P_{UMAX} after Initial Conditions setting)

2. Measure the mean power of the UE in the channel bandwidth for each test point in table [FFS] according to the test configuration from Table [FFS]. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.2.4G.1.4.3 Message contents

6.2.4G.1.4.3.1 Message contents exceptions (network signalled value "NS_33")

1. Information element additionalSpectrumEmission is set to NS_33. This can be set in the *SL-PreconfigGeneral-r12* as part of the *SL-V2X-Preconfiguration*. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4G.1.4.3.1-1: SL-PreconfigGeneral-r12: Additional spurious emissions test requirement for "NS_33"

Derivation Path: TS 36.331 [5] clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	33 (NS_33)		

6.2.4G.1.5 Test Requirements

FFS

6.2.4G.2 Additional Maximum Power Reduction (A-MPR) for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram

- Initial conditions and test requirements

- The minimum requirements for NS_33 are still squre brackets in RAN4

6.2.4G.2.1 Test purpose

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction A-MPR is allowed for the output power as specified in Table 6.2.2.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2.4G.2.2 Test applicability

The requirements of this test apply in test case 6.6.2.2.4 Additional Spectrum Emission Mask for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for network signalled values NS_04/NS_33 to all types of E-UTRA Power Class 3 UE release 14 and forward that support V2X communication.

The requirements of this test apply in test case 6.6.3.3 Additional Spurious Emissions for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for network signalled values NS_04/NS_33 to all types of E-UTRA Power Class 3 UE release 14 and forward that support V2X communication.

NOTE: As a result TC 6.2.4G.2 has not been included in the test case applicability table 4.1-1, TS 36.521-2. This does not preclude the test from being used for R&D or other purposes if deemed useful.

6.2.4G.2.3 Minimum conformance requirements

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, the requirements in subclause 6.2.4G.1 apply for V2X PSSCH and PSCCH transmission. The allowed A-MPR requirements in subclause 6.2.4D [2] apply for other V2X sidelink transmission (PSBCH/PSSS/SSSS). The A-MPR requirements in subclause 6.2.4 apply for uplink transmission.

The normative reference for this requirement is in TS 36.101 [2] clause 6.2.4G.

6.2.4G.2.4 Test description

6.2.4G.2.4.1 Initial condition

FFS

6.2.4G.2.4.2 Test procedure

1. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table [TBD]. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at P_{UMAX} level. Configure the UE to transmit PSCCH and PSSCH with the P_{UMAX} level of each test points; allow at least 200ms for the UE to reach P_{UMAX} level.
3. Measure the mean power over all component carriers in the V2X con-current band configuration. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.4G.2.4.3 Message contents

6.2.4G.2.4.3.1 Message contents exceptions (network signalled value "NS_04" for E-UTRA uplink transmission)

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4G.2.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_04"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	4 (NS_04)		

6.2.4G.2.4.3.2 Message contents exceptions (network signalled value "NS_33" for E-UTRA V2X sidelink transmission)

1. Information element additionalSpectrumEmission is set to NS_33. This can be set in the *SL-PreconfigGeneral-r12* as part of the *SL-V2X-Preconfiguration*. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2.4G.2.4.3.1-2: SL-PreconfigGeneral-r12: Additional spurious emissions test requirement for "NS_33"

Derivation Path: TS 36.331 [5] clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	33 (NS_33)		

6.2.4G.2.5 Test Requirements

FFS

6.2.5 Configured UE transmitted Output Power

Editor's notes: This clause is incomplete awaiting for RAN4 decision for CA_7A-40A, CA_7A-40C, CA_42A-46A, CA_2A-4A-29A and CA_7A-8A-20A:

- $\Delta T_{IB,c}$ is still in square brackets

6.2.5.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power the UE power class.

6.2.5.2 Test applicability

This test applies to all types of E-UTRA Power Class 3 UE release 8 and forward.

6.2.5.3 Minimum conformance requirements

The UE is allowed to set its configured maximum output power $P_{CMAX,c}$ for serving cell *c*. The configured maximum output power P_{CMAX} is set within the following bounds:

$$P_{CMAX_L,c} \le P_{CMAX,c} \le P_{CMAX_H,c} \text{ with}$$

$P_{CMAX_L,c}$ = MIN $\{P_{EMAX,c} - \Delta T_{C,c}$, $(P_{PowerClass} - \Delta P_{PowerClass}) - MAX(MPR_c + A\text{-}MPR_c + \Delta T_{IB,c} + \Delta T_{C,c} + \Delta T_{ProSe}, P\text{-}MPR_c)\}$

$$P_{CMAX_H,c} = MIN \{P_{EMAX,c}, P_{PowerClass} - \Delta P_{PowerClass}\}$$

where

- $P_{EMAX,c}$ is the value given by IE *P-Max* for serving cell *c*, defined in [5];
- $P_{PowerClass}$ is the maximum UE power specified in Table 6.2.2.3-1 without taking into account the tolerance specified in the Table 6.2.2.3-1;
- $\Delta P_{PowerClass}$ = 3 dB for a power class 2 capable UE operating in Band 41, when *P-max* of 23 dBm or lower is indicated or if the uplink/downlink configuration is 0 or 6 in the cell; otherwise, $\Delta P_{PowerClass}$ = 0 dB
- MPR_c and $A\text{-}MPR_c$ for serving cell *c* are specified in Section 6.2.3 and Section 6.2.4, respectively;
- $\Delta T_{IB,c}$ is the additional tolerance for serving cell *c* as specified in Table 6.2.5.3-2; $\Delta T_{IB,c}$ = 0 dB otherwise;
- $\Delta T_{C,c}$ = 1.5 dB when Note 2 in Table 6.2.2.3-1 applies;
- $\Delta T_{C,c}$ = 0 dB when Note 2 in Table 6.2.2.3-1 does not apply.
- ΔT_{ProSe} = 0.1 dB when the UE supports ProSe Direct Discovery and/or ProSe Direct Communication on the corresponding E-UTRA ProSe band; ΔT_{ProSe} = 0 dB otherwise.

$P\text{-}MPR_c$ is the allowed maximum output power reduction for

a) ensuring compliance with applicable electromagnetic energy absorption requirements and addressing unwanted emissions / self defence requirements in case of simultaneous transmissions on multiple RAT(s) for scenarios not in scope of 3GPP RAN specifications;

b) ensuring compliance with applicable electromagnetic energy absorption requirements in case of proximity detection is used to address such requirements that require a lower maximum output power.

The UE shall apply P-MPR$_c$ for serving cell *c* only for the above cases. For UE conducted conformance testing P-MPR$_c$ shall be 0 dB

NOTE 1: P-MPR$_c$ was introduced in the $P_{CMAX,c}$ equation such that the UE can report to the eNB the available maximum output transmit power. This information can be used by the eNB for scheduling decisions.

NOTE 2: P-MPR$_c$ may impact the maximum uplink performance for the selected UL transmission path.

For each subframe, the $P_{CMAX_L,c}$ for serving cell *c* is evaluated per slot and given by the minimum value taken over the transmission(s) within the slot; the minimum $P_{CMAX_L,c}$ over the two slots is then applied for the entire subframe. $P_{PowerClass}$ shall not be exceeded by the UE during any period of time.

The measured maximum output power $P_{UMAX,c}$ shall be within the following bounds:

$$P_{CMAX_L,c} - MAX\{T_L, T(P_{CMAX_L,c})\} \leq P_{UMAX,c} \leq P_{CMAX_H,c} + T(P_{CMAX_H,c})$$

Where the tolerance $T(P_{CMAX,c})$ for applicable values of $P_{CMAX,c}$ is specified in Table 6.2.5.3-1. The tolerance $T_{L,c}$ is the absolute value of the lower tolerance for the applicable operating band as specified in Table 6.2.2.3-1.

Table 6.2.5.3-1: $P_{CMAX,c}$ tolerance

$P_{CMAX,c}$ (dBm)	Tolerance $T(P_{CMAX,c})$ (dB)
$23 < P_{CMAX,c} \leq 33$	2.0
$21 \leq P_{CMAX,c} \leq 23$	2.0
$20 \leq P_{CMAX,c} < 21$	2.5
$19 \leq P_{CMAX,c} < 20$	3.5
$18 \leq P_{CMAX,c} < 19$	4.0
$13 \leq P_{CMAX,c} < 18$	5.0
$8 \leq P_{CMAX,c} < 13$	6.0
$-40 \leq P_{CMAX,c} < 8$	7.0

For the UE which supports inter-band carrier aggregation configurations with the uplink assigned to one or two E-UTRA bands the $\Delta T_{IB,c}$ is defined for applicable bands in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4.

Table 6.2.5.3-2: $\Delta T_{IB,c}$ (two bands)

Inter-band CA Configuration	E-UTRA Band	$\Delta T_{IB,c}$ [dB]
CA_1A-1A-3A	1	0.3
	3	0.3
CA_1A-1A-3C	1	0.3
	3	0.3
CA_1A-1A-5A	1	0.3
	5	0.3
CA_1A-1A-28A	1	0.3
	28	0.6
CA_1A-3A	1	0.3
	3	0.3
CA_1A-3A-3A	1	0.3
	3	0.3
CA_1A-3C	1	0.3
	3	0.3
CA_1C-3A	1	0.3
	3	0.3
CA_1A-5A	1	0.3
	5	0.3
CA_1A-7A	1	0.5
	7	0.6
CA_1A-7A-7A	1	0.5
	7	0.6
CA_1A-7C	1	0.5
	7	0.6
CA_1A-8A	1	0.3
	8	0.3
CA_1A-11A	1	0.3
	11	0.3
CA_1A-18A	1	0.3
	18	0.3
CA_1A-19A	1	0.3
	19	0.3
CA_1A-20A	1	0.3
	20	0.3
CA_1A-21A	1	0.3
	21	0.3
CA_1A-26A	1	0.3
	26	0.3
CA_1A-28A	1	0.3
	28	0.6
CA_1A-38A	1	0.5
	38	0.5
CA_1A-40A	1	0.5
	40	0.5
CA_1A-40C	1	0.5
	40	0.5
CA_1A-41A[8]	1	0.5
	41	0.5
CA_1A-41C[8]	1	0.5
	41	0.5
CA_1A-42A	1	0.3
	42	0.8
CA_1A-42C	1	0.3
	42	0.8
CA_1A-46A	1	0
CA_1A-46C	1	0
CA_1A-46D	1	0
CA_1A-46E	1	0
CA_2A-4A	2	0.5
	4	0.5
CA_2A-2A-4A	2	0.5

	4	0.5
CA_2A-4A-4A	2	0.5
	4	0.5
CA_2A-2A-4A-4A	2	0.5
	4	0.5
CA_2A-5A	2	0.3
	5	0.3
CA_2A-2A-5A	2	0.3
	5	0.3
CA_2A-2A-29A	2	0.3
CA_2C-5A	2	0.3
	5	0.3
CA_2A-5B	2	0.3
	5	0.3
CA_2C-5B	2	0.3
	5	0.3
CA_2A-7A	2	0.5
	7	0.5
CA_2A-7C	2	0.5
	7	0.5
CA_2A-7A-7A	2	0.5
	7	0.5
CA_2A-12A	2	0.3
	12	0.3
CA_2A-2A-12A	2	0.3
	12	0.3
CA_2A-2A-12A-12A	2	0.3
	12	0.3
CA_2A-12A-12A	2	0.3
	12	0.3
CA_2A-2A-12B	2	0.3
	12	0.3
CA_2A-12B	2	0.3
	12	0.3
CA_2C-12A	2	0.3
	12	0.3
CA_2A-13A	2	0.3
	13	0.3
CA_2A-2A-13A	2	0.3
	13	0.3
CA_2A-17A	2	0.3
	17	0.8
CA_2A-28A	2	0.3
	28	0.3
CA_2A-29A	2	0.3
CA_2C-29A	2	0.3
CA_2A-30A	2	0.5
	30	0.3
CA_2A-2A-30A	2	0.5
	30	0.3
CA_2C-30A	2	0.5
	30	0.3
CA_2A-46A	2	0
CA_2A-46A-46C	2	0
CA_2A-46C	2	0
CA_2A-46D	2	0
CA_2A-46A-46A	2	0
CA_2A-46A-46D	2	0
CA_2A-48A	2	0.6
	48	0.8
CA_2A-48A-48A	2	0.6
	48	0.8

CA_2A-48C	2	0.6
	48	0.8
CA_2A-66A	2	0.5
	66	0.5
CA_2A-66B	2	0.5
	66	0.5
CA_2A-66C	2	0.5
	66	0.5
CA_2A-66D	2	0.5
	66	0.5
CA_2A-2A-66A	2	0.5
	66	0.5
CA_2A-2A-66A-66A	2	0.5
	66	0.5
CA_2A-2A-66A-66B	2	0.5
	66	0.5
CA_2A-2A-66A-66C	2	0.5
	66	0.5
CA_2A-66A-66A	2	0.5
	66	0.5
CA_2A-66A-66B	2	0.5
	66	0.5
CA_2A-66A-66C	2	0.5
	66	0.5
CA_2A-2A-66B	2	0.5
	66	0.5
CA_2A-2A-66C	2	0.5
	66	0.5
CA_2A-2A-66D	2	0.5
	66	0.5
CA_3A-5A	3	0.3
	5	0.3
CA_3C-5A	3	0.3
	5	0.3
CA_3A-7A	3	0.5
	7	0.5
CA_3A-3A-7A	3	0.5
	7	0.5
CA_3A-3A-7A-7A	3	0.5
	7	0.5
CA_3A-7A-7A	3	0.5
	7	0.5
CA_3A-7B	3	0.5
	7	0.5
CA_3A-7C	3	0.5
	7	0.5
CA_3C-7A	3	0.5
	7	0.5
CA_3C-7C	3	0.5
	7	0.5
CA_3A-8A	3	0.3
	8	0.3
CA_3A-3A-8A	3	0.3
	8	0.3
CA_3A-3A-41A	3	0.5
	41	0.3[10]
		0.8[11]
CA_3C-8A	3	0.3
	8	0.3
CA_3A-11A	3	0.8
	11	0.9
CA_3A-19A	3	0.3
	19	0.3
CA_3A-20A	3	0.3
	20	0.3

CA_3C-20A	3	0.3
	20	0.3
CA_3A-3A-20A	3	0.3
	20	0.3
CA_3A-21A	3	0.8
	21	0.9
CA_3A-26A	3	0.3
	26	0.3
CA_3A-27A	3	0.3
	27	0.3
CA_3A-28A	3	0.3
	28	0.3
CA_3C-28A	3	0.3
	28	0.3
CA_3A-31A	3	0.3
	31	0.6
CA_3A-32A	3	0.5
CA_3A-38A	3	0,5
	38	0,5
CA_3A-40A	3	0.5
	40	0.5
CA_3A-40A-40A	3	0.5
	40	0.5
CA_3A-40C	3	0.5
	40	0.5
CA_3A-40D	3	0.5
	40	0.5
CA_3A-40E	3	0.5
	40	0.5
CA_3C-40A	3	0.5
	40	0.5
CA_3C-40C	3	0.5
	40	0.5
CA_3A-41A	3	0.5
	41	0.3[10]
		0.8[11]
CA_3A-41C	3	0.5
	41	0.3[10]
		0.8[11]
CA_3A-41D	3	0.5
	41	0.3[10]
		0.8[11]
CA_3C-41A	3	0.5
	41	0.3[10]
		0.8[11]
CA_3C-41C	3	0.5
	41	0.3[10]
		0.8[11]
CA_3C-41D	3	0.5
	41	0.3[10]
		0.8[11]

CA_3A-42A	3	0.6
	42	0.8
CA_3A-42C	3	0.6
	42	0.8
CA_3A-46A	3	0
CA_3A-46C	3	0
CA_3A-46D	3	0
CA_3A-46E	3	0
CA_3A-69A	3	0.5
CA_4A-5A	4	0.3
	5	0.3
CA_4A-4A-5A	4	0.3
	5	0.3
CA_4A-5B	4	0.3
	5	0.3
CA_4A-4A-5B	4	0.3
	5	0.3
CA_4A-7A	4	0.5
	7	0.5
CA_4A-4A-7A	4	0.5
	7	0.5
CA_4A-7A-7A	4	0.5
	7	0.5
CA_4A-7C	4	0.5
	7	0.5
CA_4A-12A	4	0.3
	12	0.8
CA_4A-12A-12A	4	0.3
	12	0.8
CA_4A-4A-12A	4	0.3
	12	0.8
CA_4A-4A-12A-12A	4	0.3
	12	0.8
CA_4A-4A-12B	4	0.3
	12	0.8
CA_4A-12B	4	0.3
	12	0.8
CA_4A-13A	4	0.3
	13	0.3
CA_4A-4A-13A	4	0.3
	13	0.3
CA_4A-17A	4	0.3
	17	0.8
CA_4A-27A	4	0.3
	27	0.3
CA_4A-28A	4	0.3
	28	0.6
CA_4A-29A	4	0.3
CA_4A-4A-29A	4	0.3
CA_4A-30A	4	0.5
	30	0.3
CA_4A-4A-30A	4	0.5
	30	0.3
CA_4A-46A	4	0
CA_4A-46A-46C	4	0
CA_4A-46C	4	0
CA_4A-46D	4	0
CA_4A-46A-46A	4	0
CA_4A-46A-46D	4	0
CA_5A-5A-40A	5	0.3
	40	0.3
CA_5A-7A	5	0.3

	7	0.3
CA_5A-7A-7A	5	0.3
	7	0.3
CA_5A-7C	5	0.3
	7	0.3
CA_5A-12A	5	0.8
	12	0.4
CA_5A-12A-12A	5	0.8
	12	0.4
CA_5A-12B	5	0.8
	12	0.4
CA_5A-13A	5	0.5
	13	0.5
CA_5A-17A	5	0.8
	17	0.4
CA_5A-25A	5	0.3
	25	0.3
CA_5A-29A	5	0.5
CA_5A-30A	5	0.3
	30	0.3
CA_5B-30A	5	0.3
	30	0.3
CA_5A-38A	5	0.3
	38	0.3
CA_5A-40A	5	0.3
	40	0.3
CA_5A-40A-40A	5	0.3
	40	0.3
CA_5A-40C	5	0.3
	40	0.3
CA_5A-41A	5	0.3
	41	0.3
CA_5A-46A	5	0
CA_5A-46C	5	0
CA_5A-46D	5	0
CA_5A-46E	5	0
CA_5A-48A	5	0.3
	48	0.3
CA_5A-66A	5	0.3
	66	0.3
CA_5A-5A-66A	5	0.3
	66	0.3
CA_5A-5A-66A-66A	5	0.3
	66	0.3
CA_5A-5A-66A-66B	5	0.3
	66	0.3
CA_5A-5A-66A-66C	5	0.3
	66	0.3
CA_5A-5A-66B	5	0.3
	66	0.3
CA_5A-5A-66C	5	0.3
	66	0.3
CA_5A-5A-66D	5	0.3
	66	0.3
CA_5A-66A-66A	5	0.3
	66	0.3
CA_5A-66A-66B	5	0.3
	66	0.3
CA_5A-66A-66C	5	0.3
	66	0.3
CA_5A-66B	5	0.3
	66	0.3
CA_5A-66C	5	0.3
	66	0.3
CA_5A-66D	5	0.3

	66	0.3
CA_5B-66A	5	0.3
	66	0.3
CA_5B-66A-66A	5	0.3
	66	0.3
CA_5B-66A-66B	5	0.3
	66	0.3
CA_5B-66A-66C	5	0.3
	66	0.3
CA_5B-66B	5	0.3
	66	0.3
CA_5B-66C	5	0.3
	66	0.3
CA_7A-8A	7	0.3
	8	0.6
CA_7A-7A-8A	7	0.3
	8	0.6
CA_7A-12A	7	0.3
	12	0.3
CA_7A-20A	7	0.3
	20	0.3
CA_7A-22A	7	0.5
	22	0.8
CA_7A-26A	7	0.3
	26	0.3
CA_7A-7A-26A	7	0.3
	26	0.3
CA_7A-28A	7	0.3
	28	0.3
CA_7B-28A	7	0.3
	28	0.3
CA_7C-28A	7	0.3
	28	0.3
CA_7A-32A	7	0.7
CA_7A-40A	7	0.5
	40	[0.6]
CA_7A-40C	7	0.5
	40	[0.6]
CA_7A-42A	7	0.5
	42	0.8
CA_7A-42A-42A	7	0.5
	42	0.8
CA_7A-46A	7	0
CA_7A-46C	7	0
CA_7A-46D	7	0
CA_7A-46E	7	0
CA_7A-66A	7	0.5
	66	0.5
CA_7C-46A	7	0
CA_7C-46C	7	0
CA_7C-46D	7	0
CA_8A-11A	8	0.3
	11	0.4
CA_8A-20A	8	0.4
	20	0.4
CA_8A-28A[14]	8	0.6
	28	0.5
CA_8A-39A	8	0,3
	39	0,3
CA_8A-39C	8	0.3
	39	0.3
CA_8B-39A	8	0.3
	39	0.3
CA_8B-39C	8	0.3
	39	0.3

CA_8A-40A	8	0.3
	40	0.3
CA_8A-41A	8	0.3
	41	0.3
CA_8A-41C	8	0.3
	41	0.3
CA_8A-41D	8	0.3
	41	0.3
CA_8B-41A	8	0.3
	41	0.3
CA_8B-41C	8	0.3
	41	0.3
CA_8B-41D	8	0.3
	41	0.3
CA_8A-42A	8	0.6
	42	0.8
CA_8A-42C	8	0.6
	42	0.8
CA_8A-46A	8	0
CA_8A-46C	8	0
CA_8A-46D	8	0
CA_8A-46E	8	0
CA_8B-46A	8	0
CA_8B-46C	8	0
CA_8B-46D	8	0
CA_11A-18A	11	0.3
	18	0.3
CA_11A-28A	11	0.4
	28	0.6
CA_11A-41A	11	0.3
	41	0.3
CA_11A-41C	11	0.3
	41	0.3
CA_11A-42A	11	0.4
	42	0.8
CA_11A-42C	11	0.4
	42	0.8
CA_11A-46A	11	0
CA_11A-46C	11	0
CA_11A-46D	11	0
CA_11A-46E	11	0
CA_12A-25A	12	0.3
	25	0.3
CA_12A-30A	12	0.3
	30	0.3
CA_12A-66A	12	0.8
	66	0.3
CA_12A-66A-66A	12	0.8
	66	0.3
CA_12A-66C	12	0.8
	66	0.3
CA_12B-66A	12	0.8
	66	0.3
CA_12B-66A-66A	12	0.8
	66	0.3
CA_13A-46A	13	0
CA_13A-46C	13	0
CA_13A-46D	13	0
CA_13A-46E	13	0

CA_13A-48A	13	0.3
	48	0.3
CA_13A-66A	13	0.3
	66	0.3
CA_13A-66A-66A	13	0.3
	66	0.3
CA_13A-66A-66C	13	0.3
	66	0.3
CA_13A-66A-66D	13	0.3
	66	0.3
CA_13A-66B	13	0.3
	66	0.3
CA_13A-66C	13	0.3
	66	0.3
CA_13A-66D	13	0.3
	66	0.3
CA_18A-28A[9]	18	0.5
	28	0.5

CA_19A-21A	19	0.3
	21	0.4
CA_19A-28A[9]	19	0.5
	28	0.5
CA_19A-42A	19	0.3
	42	0.8
CA_19A-42C	19	0.3
	42	0.8
CA_19A-46A	19	0
CA_19A-46C	19	0
CA_19A-46D	19	0
CA_19A-46E	19	0
CA_20A-28A	20	0.5
	28	0.5
CA_20A-31A	20	0.5
	31	0.5
CA_20A-32A	20	0.3
CA_20A-38A	20	0.3
	38	0.3
CA_20A-40A	20	0.3
	40	0.3
CA_20A-42A	20	0.6
	42	0.8
CA_20A-42A-42A	20	0.6
	42	0.8
CA_20A-67A	20	0.5
CA_21A-28A	21	0.4
	28	0.3
CA_21A-42A	21	0.4
	42	0.8
CA_21A-42C	21	0.4
	42	0.8
CA_21A-46A	21	0
CA_21A-46C	21	0
CA_21A-46D	21	0
CA_21A-46E	21	0
CA_23A-29A	23	0.3
CA_25A-26A	25	0.3
	26	0.3
CA_25A-41A[8]	25	0.5
	41	0.5
CA_25A-41C[8]	25	0.5
	41	0.5
CA_25A-41D[8]	25	0.5
	41	0.5
CA_26A-41A	26	0.3
	41	0.3
CA_26A-41C	26	0.3
	41	0.3
CA_26A-46A	26	0
CA_28A-40A	28	0.3
	40	0.3
CA_28A-40C	28	0.3
	40	0.3
CA_28A-40D	28	0.3
	40	0.3
CA_28A-41A	28	0.3
	41	0.3
CA_28A-41C	28	0.3
	41	0.3
CA_28A-42A	28	0.5
	42	0.8
CA_28A-42C	28	0.5
	42	0.8
CA_28A-46A	28	0

CA_28A-46C	28	0
CA_28A-46D	28	0
CA_28A-46E	28	0
CA_29A-30A	30	0.3
CA_29A-66A	66	0.3
CA_29A-66A-66A	66	0.3
CA_29A-66C	66	0.3
CA_29A-70A	70	0.3
CA_30A-66A	30	0.3
	66	0.5
CA_30A-66A-66A	30	0.3
	66	0.5
CA_38A-40A	38	0[4]
	40	0[4]
CA_38A-40A-40A	38	0[4]
	40	0[4]
CA_38A-40C	38	0[4]
	40	0[4]
CA_39A-40A	39	0[4]
	40	0[4]
CA_39A-40C	39	0[4]
	40	0[4]
CA_39A-40D	39	0
	40	0
CA_39A-40E	39	0[4]
	40	0[4]
CA_39C-40A	39	0[4]
	40	0[4]
CA_39C-40C	39	0
	40	0
CA_39C-40D	39	0[4]
	40	0[4]
CA_39A-41A	39	0[4]
	41	0[4]
CA_39A-41A	39	0.5[7]
	41	0.5[7]
CA_39A-41C	39	0[4]
	41	0[4]
CA_39A-41C	39	0.5[7]
	41	0.5[7]
CA_39A-41D	39	0[4]
	41	0[4]
CA_39A-42A	39	0[4]
	42	0.5[4]
CA_39A-46D	39	0
CA_39A-46E	39	0
CA_39C-41A	39	0[4]
	41	0[4]
CA_39C-41A	39	0.5[7]
	41	0.5[7]
CA_39C-41C	39	0[4]
	41	0[4]
CA_39C-41D	39	0[4]
	41	0[4]
CA_39A-42C	39	0[4]
	42	0.5[4]
CA_39A-42D	39	0
	42	0.5
CA_39A-42E	39	0[4]
	42	0.5[4]
CA_39C-42A	39	0[4]
	42	0.5[4]
CA_39C-42C	39	0
	42	0.5

CA_39C-42D	39	0^4
	42	0.5^4
CA_39A-46A	39	0
CA_39A-46C	39	0
CA_39C-46A	39	0
CA_39C-46C	39	0
CA_39C-46D	39	0
CA_40A-41A	40	0.5^4
	41	0.5^4
CA_40A-42A	40	0^4
	42	0.5^4
CA_40A-42C	40	0^4
	42	0.5^4
CA_40A-46A	40	0
CA_40A-46C	40	0
CA_40A-46D	40	0
CA_40A-46E	40	0
CA_40C-42A	40	0^4
	42	0.5^4
CA_40C-42C	40	0^4
	42	0.5^4
CA_40C-46A	40	0
CA_40C-46C	40	0
CA_40C-46D	40	0
CA_40D-46A	40	0
CA_40D-46C	40	0
CA_41A-42A	41	0^4
	42	0.5^4
CA_41A-42A	41	0.3^7
	42	0.8^7
CA_41A-42C	41	0^4
	42	0.5^4
CA_41A-42C	41	0.3^7
	42	0.8^7
CA_41A-42D	41	0^4
	42	0.5^4
CA_41A-46A	41	0
CA_41A-46C	41	0
CA_41C-42A	41	0^4
	42	0.5^4
CA_41C-42A	41	0.3^7
	42	0.8^7
CA_41C-42C	41	0^4
	42	0.5^4
CA_41C-42C	41	0.3^7
	42	0.8^7
CA_41D-42A	41	0^4
	42	0.5^4
CA_41C-42D	41	0^4
	42	0.5^4
CA_41C-46A	41	0
CA_41D-42C	41	0^4
	42	0.5^4

CA_41A-46D	41	0
CA_41A-46E	41	0
CA_41C-46C	41	0
CA_41C-46D	41	0
CA_41D-46A	41	0
CA_41D-46C	41	0
CA_42A-46A	42	[0.5]
CA_46A-46C-66A	66	0
CA_46A-46D-66A	66	0
CA_46A-66A	66	0
CA_46A-66A-66A	66	0
CA_46A-66C	66	0
CA_46C-66A	66	0
CA_46D-66A	66	0
CA_46E-66A	66	0
CA_46A-46A-66A	66	0
CA_46A-70A	70	0
CA_48A-66A	48	0.8
	66	0.6
CA_48A-48A-66A	48	0.8
	66	0.6
CA_48A-48C-66A	48	0.8
	66	0.6
CA_48C-66A	48	0.8
	66	0.6
CA_48D-66A	48	0.8
	66	0.6

NOTE 1: The above additional tolerances are only applicable for the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations

NOTE 2: The above additional tolerances also apply in non-aggregated operation for the supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations

NOTE 3: In case the UE supports more than one of the above 2DL inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one 2DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the 2DL tolerances above, truncated to one decimal place for that operating band among the supported 2DL CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 2DL carrier aggregation configurations involving such band shall be applied
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 2DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 2DL CA configurations

NOTE 4: Only applicable for UE supporting inter-band carrier aggregation with uplink in one E-UTRA band and without simultaneous Rx/Tx.

NOTE 5: Unless otherwise specified, in case the UE supports more than one of the above 3DL inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one 3DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 3DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 3DL carrier aggregation configurations involving such band shall be applied.
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 3DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 3DL CA configurations.

NOTE 6: The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation

configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.
NOTE 7: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx.
NOTE 8: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in the FDD band.
NOTE 9: For Band 28, the requirements only apply for the restricted frequency range specified for this CA configuration (Table 5.2A-2).
NOTE 10: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz.
NOTE 11: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.
NOTE 12: For UE supporting E-UTRA band 65 and CA configurations including Band 1, the Band 65 $\Delta T_{IB,c}$ is the max(Band 65 $\Delta T_{IB,c}$, Band 1 $\Delta T_{IB,c}$)
NOTE 13: For UE supporting E-UTRA band 42, 43 or 48 and CA configurations including Band 42, 43 or 48, the applicable $\Delta T_{IB,c}$ in Band 42, 43, or 48 is the max(Band 42 $\Delta T_{IB,c}$, Band 43 $\Delta T_{IB,c}$, Band 48 $\Delta T_{IB,c}$).
NOTE 14: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 8.

NOTE 3: The above additional tolerances do not apply to supported UTRA operating bands with frequency range below 1 GHz that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations when such bands are belonging only to band combination(s) where one band is <1GHz and another band is >1.7GHz and there is no harmonic relationship between the low band UL and high band DL. Otherwise the above additional tolerances also apply to supported UTRA operating bands that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

NOTE 4: To meet the $\Delta T_{IB,c}$ requirements for CA_3A-7A with state-of-the-art technology, an increase in power consumption of the UE may be required. It is also expected that as the state-of-the-art technology evolves in the future, this possible power consumption increase can be reduced or eliminated.

Table 6.2.5.3-3: $\Delta T_{IB,c}$ (three bands)

Inter-band CA Configuration	E-UTRA Band	$\Delta T_{IB,c}$ [dB]
CA_1A-1A-3A-5A	1	0.3
	3	0.3
	5	0.3
CA_1A-1A-3A-28A	1	0.3
	3	0.3
	28	0.6
CA_1A-3A-3A-8A	1	0.3
	3	0.3
	8	0.3
CA_1A-3A-5A	1	0.3
	3	0.3
	5	0.3
CA_1A-3A-7A	1	0.6
	3	0.6
	7	0.6
CA_1A-3A-7A-7A	1	0.6
	3	0.6
	7	0.6
CA_1A-3A-7C	1	0.6
	3	0.6
	7	0.6
CA_1A-3A-8A	1	0.3
	3	0.3
	8	0.3
CA_1A-3A-11A	1	0.3
	3	0.8
	11	0.9
	8	0.3
CA_1A-3A-19A	1	0.3
	3	0.3
	19	0.3
CA_1A-3A-20A	1	0.3
	3	0.3
	20	0.3
CA_1A-3A-21A	1	0.3
	3	0.8
	21	0.9
CA_1A-3A-26A	1	0.3
	3	0.3
	26	0.3
CA_1A-3A-28A	1	0.3
	3	0.3
	28	0.6
CA_1A-3A-38A	1	0.5
	3	0.5
	38	0.5
CA_1A-3A-40A	1	0.5
	3	0.5
	40	0.5
CA_1A-3A-40C	1	0.5
	3	0.5
	40	0.5
CA_1A-3A-41A	1	0.5
	3	0.5
	41	0.3[5]/0.8[6]
CA_1A-3A-42A	1	0.6
	3	0.6
	42	0.8
CA_1A-3A-42C	1	0.6
	3	0.6
	42	0.8

CA_1A-3C-5A	1	0.3
	3	0.3
	5	0.3
CA_1A-3C-7A	1	0.6
	3	0.6
	7	0.6
CA_1A-3C-7C	1	0.6
	3	0.6
	7	0.6
CA_1A-3C-8A	1	0.3
	3	0.3
CA_1A-3C-28A	1	0.3
	3	0.3
	28	0.6
CA_1A-3C-40A	1	0.5
	3	0.5
	40	0.5
CA_1A-3C-40C	1	0.5
	3	0.5
	40	0.5
CA_1A-5A-7A	1	0.5
	5	0.3
	7	0.6
CA_1A-5A-7A-7A	1	0.5
	5	0.3
	7	0.6
CA_1A-5A-40A	1	0.5
	5	0.3
	40	0.5
CA_1A-5A-41A	1	0.5
	5	0.3
	41	0.5
CA_1A-5A-46A	1	0.3
	5	0.3
CA_1A-5A-46C	1	0.3
	5	0.3
CA_1A-5A-46D	1	0.3
	5	0.3
CA_1A-7A-8A	1	0.5
	7	0.6
	8	0.6
CA_1A-7A-20A	1	0.5
	7	0.6
	20	0.3
CA_1A-7A-26A	1	0.5
	7	0.6
	26	0.3
CA_1A-7A-7A-26A	1	0.5
	7	0.6
	26	0.3
CA_1A-7A-28A	1	0.5
	7	0.6
	28	0.6
CA_1A-7A-40A	1	0.6
	7	0.8
	40	0.9
CA_1A-7A-42A	1	0.6
	7	0.6
	42	0.8
CA_1A-7A-46A	1	0.5
	7	0.8
CA_1A-7A-46C	1	0.5
	7	0.6
CA_1A-7A-46D	1	0.5
	7	0.6

CA_1A-7C-28A	1	0.5
	7	0.6
	28	0.6
CA_1A-8A-11A	1	0.3
	8	0.3
	11	0.4
CA_1A-8A-20A	1	0.3
	8	0.4
	20	0.4
CA_1A-8A-28A[11]	1	0.3
	8	0.6
	28	0.6
CA_1A-8A-40A	1	0.5
	8	0.3
	40	0.5
CA_1A-11A-18A	1	0.3
	11	0.4
	18	0.3
CA_1A-11A-28A	1	0.3
	11	0.4
	28	0.6
CA_1A-18A-28A	1	0.3
	18	0.5
	28	0.5
CA_1A-19A-21A	1	0.3
	19	0.3
	21	0.4
CA_1A-19A-28A	1	0.3
	19	0.5
	28	0.5
CA_1A-19A-42A	1	0.3
	19	0.3
	42	0.8
CA_1A-19A-42C	1	0.3
	19	0.3
	42	0.8
CA_1A-20A-28A	1	0.3
	20	0.6
	28	0.6
CA_1A-20A-42A	1	0.3
	20	0.3
	42	0.8
CA_1A-21A-28A	1	0.3
	21	0.4
	28	0.6
CA_1A-21A-42A	1	0.3
	21	0.4
	42	0.8
CA_1A-21A-42C	1	0.3
	21	0.4
	42	0.8
CA_1A-28A-42A	1	0.3
	28	0.6
	42	0.8
CA_1A-28A-42C	1	0.3
	28	0.6
	42	0.8
CA_1A-41A-42A[8, 13]	1	0.5
	41	0.5
	42	0.8
CA_1A-41A-42C[8, 13]	1	0.5
	41	0.5
	42	0.8
CA_1A-41C-42C[8, 13]	1	0.5
	41	0.5

	42	0.8
CA_1A-41C-42A[8, 13]	1	0.5
	41	0.5
	42	0.8
CA_2A-2A-4A-5A	2	0.5
	4	0.5
	5	0.3
CA_2A-2A-4A-12A	2	0.5
	4	0.5
	12	0.8
CA_2A-2A-5A-12A	2	0.3
	5	0.8
	12	0.4
CA_2A-2A-5A-30A	2	0.5
	5	0.3
	30	0.3
CA_2A-2A-5A-66A	2	0.5
	5	0.3
	66	0.5
CA_2A-2A-5A-66A-66A	2	0.5
	5	0.3
	66	0.5
CA_2A-2A-5A-66B	2	0.5
	5	0.3
	66	0.5
CA_2A-2A-5A-66C	2	0.5
	5	0.3
	66	0.5
CA_2A-2A-12B-66A	2	0.5
	12	0.8
	66	0.5
CA_2A-2A-13A-66A	2	0.5
	13	0.3
	66	0.5
CA_2A-2A-30A-66A	2	0.5
	30	0.3
	66	0.5
CA_2A-4A-4A-5A	2	0.5
	4	0.5
	5	0.3
CA_2A-4A-4A-12A	2	0.5
	4	0.5
	12	0.8
CA_2A-4A-5A	2	0.5
	4	0.5
	5	0.3
CA_2A-4A-5B	2	0.5
	4	0.5
	5	0.3
CA_2A-4A-7A	2	0.5
	4	0.5
	7	0.5
CA_2A-4A-7A-7A	2	0.5
	4	0.5
	7	0.5
CA_2A-4A-7C	2	0.5
	4	0.5
	7	0.5
CA_2A-4A-12A	2	0.5
	4	0.5
	12	0.8
CA_2A-4A-12A-12A	2	0.5
	4	0.5
	12	0.8
CA_2A-4A-12B	2	0.5

	4	0.5
	12	0.8
CA_2A-4A-13A	2	0.5
	4	0.5
	13	0.3
CA_2A-4A-29A	2	[0.5]
	4	0.5
CA_2A-4A-30A	2	0.5
	4	0.5
	30	0.3
CA_2A-5A-12A-12A	2	0.3
	5	0.8
	12	0.4
CA_2A-5A-12A	2	0.3
	5	0.8
	12	0.4
CA_2A-5A-12B	2	0.3
	5	0.8
	12	0.4
CA_2A-5A-13A	2	0.3
	5	0.5
	13	0.5
CA_2A-5A-29A	2	0.3
	5	0.5
CA_2A-5A-30A	2	0.5
	5	0.3
	30	0.3
CA_2C-5A-30A	2	0.5
	5	0.3
	30	0.3
CA_2A-5A-66A	2	0.5
	5	0.3
	66	0.5
CA_2A-5A-66A-66A	2	0.5
	5	0.3
	66	0.5
CA_2A-5A-66B	2	0.5
	5	0.3
	66	0.5
CA_2A-5A-66C	2	0.5
	5	0.3
	66	0.5
CA_2A-5A-66D	2	0.5
	5	0.3
	66	0.5
CA_2A-5B-30A	2	0.5
	5	0.3
	30	0.3
CA_2A-5B-66A	2	0.5
	5	0.3
	66	0.5
CA_2A-5B-66B	2	0.5
	5	0.3
	66	0.5
CA_2A-5B-66C	2	0.5
	5	0.3
	66	0.5
CA_2A-7A-12A	2	0.5
	7	0.5
	12	0.3
CA_2A-7A-66A	2	0.5
	7	0.5
	66	0.5
CA_2A-12A-30A	2	0.5
	12	0.3

	30	0.3
CA_2A-2A-12A-30A	2	0.5
	12	0.3
	30	0.3
CA_2A-12A-66A	2	0.5
	12	0.8
	66	0.5
CA_2A-2A-12A-66A	2	0.5
	12	0.8
	66	0.5
CA_2A-12A-66A-66A	2	0.5
	12	0.8
	66	0.5
CA_2A-12A-66C	2	0.5
	12	0.8
	66	0.5
CA_2A-12B-66A	2	0.5
	12	0.8
	66	0.5
CA_2A-12B-66A-66A	2	0.5
	12	0.8
	66	0.5
CA_2A-13A-66A	2	0.5
	13	0.3
	66	0.5
CA_2A-13A-66D	2	0.5
	13	0.3
	66	0.5
CA_2A-13A-66A-66A	2	0.5
	13	0.3
	66	0.5
CA_2A-13A-66A-66B	2	0.5
	13	0.3
	66	0.5
CA_2A-13A-66A-66C	2	0.5
	13	0.3
	66	0.5
CA_2A-13A-66B	2	0.5
	13	0.3
	66	0.5
CA_2A-13A-66C	2	0.5
	13	0.3
	66	0.5
CA_2A-29A-30A	2	0.5
	30	0.3
CA_2A-29A-66A	2	0.5
	66	0.5
CA_2A-30A-66A	2	0.5
	30	0.3
	66	0.5
CA_2A-30A-66A-66A	2	0.5
	30	0.3
	66	0.5
CA_2A-46A-66A	2	0.5
	66	0.5
CA_2A-46A-46A-66A	2	0.5
CA_2A-46C-66A	66	0.5
	2	0.5
	66	0.5
CA_2A-46A-46C-66A	2	0.5
	66	0.5
CA_2A-46D-66A	2	0.5
CA_2A-48A-66A	2	0.6
	48	0.8

	66	0.6
CA_2A-48A-48A-66A	2	0.6
	48	0.8
	66	0.6
CA_2C-5B-30A	2	0.5
	5	0.3
	30	0.3
CA_2C-12A-30A	2	0.5
	12	0.3
	30	0.3
CA_2C-29A-30A	2	0.5
	30	0.3
CA_3A-5A-7A	3	0.5
	5	0.3
	7	0.5
CA_3A-5A-7A-7A	3	0.5
	5	0.3
	7	0.5
CA_3A-5A-40A		0.5
	5	0.3
	40	0.5
CA_3A-5A-40A-40A	3	0.5
	5	0.3
	40	0.5
CA_3A-5A-41A	3	0.5
	5	0.3[18]
	41	0.3[5]
CA_3A-3A-7A-7A-8A	3	0.8[6]
	7	0.5
	8	0.6
CA_3A-3A-7A-8A	3	0.5
	7	0.5
	8	0.6
CA_3A-7A-7A-8A	3	0.5
	7	0.5
	8	0.6
CA_3A-7A-8A	3	0.5
	7	0.5
	8	0.6
CA_3A-7A-20A	3	0.5
	7	0.5
	20	0.3
CA_3A-7A-26A	3	0.5
	7	0.5
	26	0.3
CA_3A-7A-7A-26A	3	0.5
	7	0.5
	26	0.3
CA_3A-7A-28A	3	0.5
	7	0.5
	28	0.3
CA_3A-7C-28A	3	0.5
	7	0.5
	28	0.3
CA_3C-7A-28A	3	0.5
	7	0.5
	28	0.3
CA_3C-7C-28A	3	0.5
	7	0.5
	28	0.3
CA_3A-7A-32A	3	0.7
	7	0.7
CA_3A-7A-38A	3	0.5
	7	0.5

	38	0.5
CA_3A-7A-40A	3	0.6
	7	0.8
	40	0.9
CA_3A-7A-40C	3	0.6
	7	0.8
	40	0.9
CA_3A-7A-42A	3	0.6
	7	0.6
	42	0.8
CA_3A-8A-11A	3	0.8
	8	0.3
	11	0.9
CA_3A-8A-20A	3	0.3
	8	0.4
	20	0.4
CA_3A-8A-28A[12]	3	0.3
	8	0.6
	28	0.5
CA_3A-8A-40A	3	0.5
	8	0.3
	40	0.5
CA_3A-11A-28A	3	0.8
	11	0.9
	28	0.6
CA_3A-19A-21A	3	0.8
	19	0.3
	21	0.9
CA_3A-19A-42A	3	0.6
	19	0.3
	42	0.8
CA_3A-19A-42C	3	0.6
	19	0.3
	42	0.8
CA_3A-20A-28A	3	0.3
	20	0.5
	28	0.5
CA_3A-20A-32A	3	0.5
	20	0.3
CA_3A-20A-42A	3	0.6
	20	0.3
	42	0.8
CA_3A-21A-28A	3	0.8
	21	0.9
	28	0.3
CA_3A-21A-42A	3	0.8
	21	0.9
	42	0.8
CA_3A-21A-42C	3	0.8
	21	0.9
	42	0.8
CA_3A-28A-40A	3	0.5
	28	0.3
	40	0.5
CA_3A-28A-40C	3	0.5
	28	0.3
	40	0.5
CA_3A-28A-40D	3	0.5
	28	0.3
	40	0.5
CA_3A-28A-41A	3	0.5
	28	0.3
	41	0.3[5]/0.8[6]
CA_3A-28A-41C	3	0.5
	28	0.3

	41	0.3[5]/0.8[6]
CA_3A-28A-42A	3	0.6
	28	0.5
	42	0.8
CA_3A-28A-42C	3	0.6
	28	0.5
	42	0.8
CA_3A-41A-42A[14]	3	1
	41	0.3[5]/0.8[6]
	42	0.8
CA_3A-41A-42C[14]	3	1
	41	0.3[5]/0.8[6]
	42	0.8
CA_3A-41C-42A[14]	3	1
	41	0.3[5]/0.8[6]
	42	0.8
CA_3A-41C-42C[14]	3	1
	41	0.3[5]/0.8[6]
	42	0.8
CA_3C-7A-20A	3	0.5
	7	0.5
	20	0.3
CA_4A-5A-12A	4	0.3
	5	0.8
	12	0.8
CA_4A-5A-12A-12A	4	0.3
	5	0.8
	12	0.8
CA_4A-5A-12B	4	0.3
	5	0.8
	12	0.8
CA_4A-4A-5A-12A	4	0.3
	5	0.8
	12	0.8
CA_4A-5A-13A	4	0.3
	5	0.5
	13	0.5
CA_4A-5A-29A	4	0.3
	5	0.5
CA_4A-5A-30A	4	0.5
	5	0.3
	30	0.3
CA_4A-4A-5A-30A	4	0.5
	5	0.3
	30	0.3
CA_4A-5B-30A	4	0.5
	5	0.3
	30	0.3
CA_4A-4A-5B-30A	4	0.5
	5	0.3
	30	0.3
CA_4A-7A-12A	4	0.5
	7	0.5
	12	0.8
CA_4A-12A-30A	4	0.5
	12	0.8
	30	0.3
CA_4A-4A-12A-30A	4	0.5
	12	0.8
	30	0.3
CA_4A-29A-30A	4	0.5
	30	0.3
CA_4A-4A-29A-30A	4	0.5
	30	0.3
CA_5A-7A-46A	5	0.3

	7	0.3
CA_5A-7A-46C	5	0.3
	7	0.3
CA_5A-7A-46D	5	0.3
	7	0.3
CA_5A-12A-66A	5	0.3
	12	0.8
	66	0.8
CA_5A-30A-66A	5	0.3
	30	0.3
	66	0.5
CA_5A-30A-66A-66A	5	0.3
	30	0.3
	66	0.5
CA_5B-30A-66A	5	0.3
	30	0.3
	66	0.5
CA_5A-40A-41A	5	0.3
	40	0.5
	41	0.5
CA_7A-8A-20A	7	0.3
	8	0.6
	20	[0.6]
CA_7A-20A-28A	7	0.3
	20	0.6
	28	0.6
CA_7A-20A-32A	7	0.7
	20	0.3
	32	N/A
CA_7A-20A-38A	7	0.3
	20	0.3
	38	0.3
CA_7A-20A-42A	7	0.3
	20	0.3
	42	0.8
CA_8A-11A-28A	8	0.6
	11	0.4
	28	0.6
CA_8A-28A-41A[15]	8	0.6
	28	0.5
	41	0.3
CA_12A-30A-66A	12	0.8
	30	0.3
	66	0.5
CA_12A-30A-66A-66A	12	0.8
	30	0.3
	66	0.5
CA_19A-21A-42A	19	0.3
	21	0.4
	42	0.8
CA_19A-21A-42C	19	0.3
	21	0.4
	42	0.8
CA_21A-28A-42A	21	0.4
	28	0.5
	42	0.8
CA_21A-28A-42C	21	0.4
	28	0.5
	42	0.8
CA_28A-41A-42A[10]	28	0.5
	41	0.3[1]
	42	0.8[1]
CA_28A-41C-42C	28	0.5
	41	0.3[9]
	42	0.8[9]

CA_28A-41A-42C	28	0.5
	41	0.3[9]
	42	0.8[9]
CA_28A-41C-42A	28	0.5
	41	0.3[9]
	42	0.8[9]
CA_29A-30A-66A	30	0.3
	66	0.5
CA_29A-46A-66A	66	0.3

NOTE 1: The above additional tolerances are only applicable for the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations

NOTE 2: The above additional tolerances also apply in non-aggregated operation for the supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations

NOTE 3: Unless otherwise specified, in case the UE supports more than one of the above 3DL inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one 3DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 3DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 3DL carrier aggregation configurations involving such band shall be applied
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 3DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 3DL CA configurations.

NOTE 4: The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.

NOTE 5**:** The requirement is specified for the frequency range of 2545-2690MHz.

NOTE 6**:** The requirement is specified for the frequency range of 2496-2545MHz.

NOTE 7: For UE supporting E-UTRA band 65 and CA configurations including Band 1, the Band 65 $\Delta T_{IB,c}$ is the max(Band 65 $\Delta T_{IB,c}$, Band 1 $\Delta T_{IB,c}$)

NOTE 8: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 1 or Band 42.

NOTE 9: Only applicable for UE supporting inter-band carrier aggregation with uplink in one E-UTRA band and without simultaneous Rx/Tx on Band 41 and Band 42.

NOTE 10: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx among TDD bands.

NOTE 11: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 1 or Band 8

NOTE 12: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 3 or Band 8.

NOTE 13: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx among TDD bands.

NOTE 14: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx among TDD bands.

NOTE 15: Only applicable for UE supporting inter-band carrier aggregration with the uplink active in Band 8 or Band 41.

NOTE 16: For UE supporting E-UTRA band 42, 43 or 48 and CA configurations including Band 42, 43 or 48, the applicable $\Delta T_{IB,c}$ in Band 42, 43, or 48 is the max(Band 42 $\Delta T_{IB,c}$, Band 43 $\Delta T_{IB,c}$, Band 48 $\Delta T_{IB,c}$).

NOTE 17: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 8 or Band 11.

NOTE 18: The values in the table reflect what can be achieved with the present state of the art technology. They shall be reconsidered when the state of the art technology progresses.

Table 6.2.5.3-4: $\Delta T_{IB,c}$ (four bands)

Inter-band CA Configuration	E-UTRA Band	$\Delta T_{IB,c}$ [dB]
CA_1A-3A-5A-7A	1	0.6
	3	0.6
	5	0.3
	7	0.6
CA_1A-3A-5A-7A-7A	1	0.6
	3	0.6
	5	0.3
	7	0.6
CA_1A-3A-5A-40A	1	0.5
	3	0.5
	5	0.3
	40	0.5
CA_1A-3A-5A-41A	1	0.5
	3	0.5
	5	0.3[9]
	41	0.5[7]
		0.8[8]
CA_1A-3A-7A-7A-26A	1	0.6
	3	0.6
	7	0.6
	26	0.3
CA_1A-3A-7A-8A	1	0.6
	3	0.6
	7	0.6
	8	0.6
CA_1A-3A-7A-20A	1	0.6
	3	0.6
	7	0.6
	20	0.3
CA_1A-3A-7A-26A	1	0.6
	3	0.6
	7	0.6
	26	0.3
CA_1A-3A-7A-28A	1	0.6
	3	0.6
	7	0.6
	28	0.6
CA_1A-3A-7C-28A	1	0.6
	3	0.6
	7	0.6
	28	0.6
CA_1A-3A-7A-40A	1	0.6
	3	0.6
	7	0.8
	40	0.9
CA_1A-3A-7A-40C	1	0.6
	3	0.6
	7	0.8
	40	0.9
CA_1A-3A-7A-42A	1	0.7
	3	0.7
	7	0.7
	42	0.8
CA_1A-3A-8A-11A	1	0.3
	3	0.8
	8	0.3
	11	0.9
CA_1A-3A-8A-40A	1	0.5
	3	0.5
	8	0.3
	40	0.5

CA_1A-3A-19A-21A	1	0.3
	3	0.8
	19	0.3
	21	0.9
CA_1A-3A-19A-42A	1	0.6
	3	0.6
	19	0.3
	42	0.8
CA_1A-3A-19A-42C	1	0.6
	3	0.6
	19	0.3
	42	0.8
CA_1A-3A-20A-28A	1	0.3
	3	0.3
	20	0.6
	28	0.6
CA_1A-3A-20A-42A	1	0.6
	3	0.6
	20	0.3
	42	0.8
CA_1A-3A-21A-28A	1	0.3
	3	0.8
	21	0.9
	28	0.6
CA_1A-3A-21A-42A	1	0.6
	3	0.8
	21	0.9
	42	0.8
CA_1A-3A-21A-42C	1	0.6
	3	0.8
	21	0.9
	42	0.8
CA_1A-3A-28A-42A	1	0.6
	3	0.6
	28	0.6
	42	0.8
CA_1A-3A-28A-42C	1	0.6
	3	0.6
	28	0.6
	42	0.8
CA_1A-21A-28A-42A	1	0.3
	21	0.4
	28	0.6
	42	0.8
CA_1A-5A-7A-46A	1	0.5
	5	0.3
	7	0.6
CA_1A-5A-7A-46C	1	0.5
	5	0.3
	7	0.6
CA_1A-7A-20A-28A	1	0.5
	7	0.6
	20	0.6
	28	0.6
CA_1A-7A-20A-42A	1	0.6
	7	0.7
	20	0.4
	42	0.8
CA_1A-19A-21A-42A	1	0.3
	19	0.3
	21	0.4
	42	0.8
CA_1A-19A-21A-42C	1	0.3
	19	0.3
	21	0.4

	42	0.8
CA_1A-21A-28A-42C	1	0.3
	21	0.4
	28	0.6
	42	0.8
CA_2A-2A-5A-12A-66A	2	0.5
	5	0.8
	12	0.8
	66	0.5
CA_2A-2A-5A-30A-66A	2	0.5
	5	0.3
	30	0.3
	66	0.5
CA_2A-2A-12A-30A-66A	2	0.5
	12	0.8
	30	0.3
	66	0.5
CA_2A-4A-5A-12A	2	0.5
	4	0.5
	5	0.8
	12	0.8
CA_2A-4A-5A-29A	2	0.5
	4	0.5
	5	0.5
CA_2A-4A-5A-30A	2	0.5
	4	0.5
	5	0.3
	30	0.3
CA_2A-4A-5B-30A	2	0.5
	4	0.5
	5	0.3
	30	0.3
CA_2A-4A-7A-12A	2	0.5
	4	0.5
	7	0.5
	12	0.8
CA_2A-4A-12A-30A	2	0.5
	4	0.5
	12	0.8
	30	0.3
CA_2A-4A-29A-30A	2	0.5
	4	0.5
	30	0.3
CA_2A-5A-12A-66A	2	0.5
	5	0.8
	12	0.8
	66	0.5
CA_2A-5A-30A-66A	2	0.5
	5	0.3
	30	0.3
	66	0.5
CA_2A-5A-30A-66A-66A	2	0.5
	5	0.3
	30	0.3
	66	0.5
CA_2A-5B-30A-66A	2	0.5
	5	0.3
	30	0.3
	66	0.5
CA_2A-12A-30A-66A	2	0.5
	12	0.8
	30	0.3
	66	0.5
CA_3A-7A-20A-28A	3	0.5
	7	0.5

	20	0.6
	28	0.5
CA_3A-7A-20A-32A	3	0.7
	7	0.7
	20	0.3
CA_3A-7A-20A-42A	3	0.6
	7	0.6
	20	0.3
	42	0.8
CA_3A-19A-21A-42A	3	0.8
	19	0.3
	21	0.9
	42	0.8
CA_3A-28A-41A-42A	3	1
	28	0.5
	41	0.3[7]/0.8[8]
	42	0.8
CA_3A-28A-41A-42C	3	1
	28	0.5
	41	0.3[7]/0.8[8]
	42	0.8
CA_3A-28A-41C-42A	3	1
	28	0.5
	41	0.3[7]/0.8[8]
	42	0.8

NOTE 1: The above additional tolerances are only applicable for the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.
NOTE 2: The above additional tolerances also apply in non-aggregated operation for the supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.
NOTE 3: Tolerances for a UE supporting multiple 4DL inter-band CA configurations are FFS.
NOTE 4: The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.
NOTE 5: For UE supporting E-UTRA band 65 and CA configurations including Band 1, the Band 65 $\Delta T_{IB,c}$ is the max(Band 65 $\Delta T_{IB,c}$, Band 1 $\Delta T_{IB,c}$).
NOTE 6: For UE supporting E-UTRA band 42, 43 or 48 and CA configurations including Band 42, 43 or 48, the applicable $\Delta T_{IB,c}$ in Band 42, 43, or 48 is the max(Band 42 $\Delta T_{IB,c}$, Band 43 $\Delta T_{IB,c}$, Band 48 $\Delta T_{IB,c}$).
NOTE 7: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz.
NOTE 8: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.
NOTE 9: The values in the table reflect what can be achieved with the present state of the art technology. They shall be reconsidered when the state of the art technology progresses.

Table 6.2.5.3-5: $\Delta T_{IB,c}$ (five bands)

Inter-band CA Configuration	E-UTRA Band	$\Delta T_{IB,c}$ [dB]
CA_1A-3A-7A-20A-28A	1	0.6
	3	0.6
	7	0.6
	20	0.6
	28	0.6
CA_1A-3A-7A-20A-42A	1	0.7
	3	0.7
	7	0.7
	20	0.3
	42	0.8
NOTE 1: The above additional tolerances are only applicable for the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations. NOTE 2: The above additional tolerances also apply in non-aggregated operation for the supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations. NOTE 3: Tolerances for a UE supporting multiple 5DL inter-band CA configurations are FFS. NOTE 4: The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.		

NOTE: The above additional tolerances do not apply to supported UTRA operating bands with frequency range below 1 GHz that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations when such bands are belonging only to band combination(s) where one band is <1GHz and other bands are >1.7GHz and there is no harmonic relationship between the low band UL and high band DL. Otherwise the above additional tolerances also apply to supported UTRA operating bands that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5.

6.2.5.4 Test description

6.2.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Configured UE transmitted Output Power test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	5	5
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: For the uplink RB allocation the RB_{start} shall be RB #0.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.5.4.3.

6.2.5.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.5.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the Pumax level of the test point.
3. Measure the mean power of the UE in the channel bandwidth for each test point in table 6.2.5.5-1 according to the test configuration from Table 6.2.5.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.5.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.2.5.4.3-1: SystemInformationBlockType1: Test point 1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	-10		

Table 6.2.5.4.3-2: SystemInformationBlockType1: Test point 2

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	10		

Table 6.2.5.4.3-3: SystemInformationBlockType1: Test point 3

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	15		

6.2.5.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5.5-1.

Table 6.2.5.5-1: P_{CMAX} configured UE output power

	Channel bandwidth / maximum output power					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Measured UE output power test point 1	For carrier frequency f ≤ 3.0GHz: -10 dBm ± 7.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -10 dBm ± 8.0					
Measured UE output power test point 2	For carrier frequency f ≤ 3.0GHz: 10 dBm ± 6.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: 10 dBm ± 7.0					
Measured UE output power test point 3	For carrier frequency f ≤ 3.0GHz: 15 dBm ± 5.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: 15 dBm ± 6.0					
Note: In addition note 2 in Table 6.2.2.3-1 shall apply to the tolerances.						

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

6.2.5_1 Configured UE transmitted Output Power for HPUE

6.2.5_1.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power signalled by the E-UTRAN and the $P_{PowerClass}$ maximum UE power the UE power class.

Additionally, for power class 2 UE in band 41, to verify that $P_{CMAX,c}$ is reduced when the uplink/downlink configuration is 0 or 6 in the cell.

6.2.5_1.2 Test applicability

This test applies to all types of E-UTRA power Class 1 or power Class 2 UE release 10 and forward.

6.2.5_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.5.3 with the following exceptions:

- Instead of Table 6.2.2.3-1 → use Table 6.2.2_1.3-1
- Instead of Section 6.2.3 → use Section 6.2.3_1
- Instead of Section 6.2.4 → use Section 6.2.4_1

-

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5.

6.2.5_1.4 Test description

6.2.5_1.4.1 Initial conditions

Same initial conditions as in clause 6.2.5.4.1 with the following exceptions

- Instead of clause 6.2.5.4.3 → use clause 6.2.5_1.4.3
- Instead of table 6.2.5.4.1-1 → use table 6.2.5_1.4.1-1

Table 6.2.5_1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Configured UE transmitted Output Power test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	5	5
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: For the uplink RB allocation the RB_{start} shall be RB #0. Note 3: For power class 2 operation in band 41, RMC with UL-DL config 1 is used in test points 1 to 4 and RMC with UL-DL config 0 is used in test point 5.				

6.2.5_1.4.2 Test procedure

Same test procedure as in clause 6.2.5.4.2 with the following exceptions:

- Instead of Table 6.2.5.5-1 → use Tables 6.2.5_1.5-1 and 6.2.5_1.5-2

6.2.5_1.4.3 Message contents

Same message contents as in clause 6.2.5.4.3 with the following additional test point:

Table 6.2.5_1.4.3-1: SystemInformationBlockType1: Test point 4 for Power class 1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	25		

Table 6.2.5_1.4.3-2: SystemInformationBlockType1: Test point 4 for Power class 2

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	21		

Table 6.2.5_1.4.3-3: SystemInformationBlockType1: Test point 5

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	26		

Table 6.2.5_1.4.3-4: TDD-Config-DEFAULT: Test point 5

Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-1: TDD-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0	To enable PC3 fallback operation	
specialSubframePatterns	ssp4		
}			

6.2.5_1.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5_1.5-1 and Table 6.2.5_1.5-2.

Table 6.2.5_1.5-1: P_{CMAX} configured HPUE output power for Power class 1

	Channel bandwidth / maximum output power	
	5MHz	**10MHz**
Measured UE output power test point 1	-10 dBm ± 7.7	
Measured UE output power test point 2	10 dBm ± 6.7	
Measured UE output power test point 3	15 dBm ± 5.7	
Measured UE output power test point 4	25dBm ± 2.7	
Note 1: Only applicable to power class 2 capable UE operating on Band 41with ULDL config 0 or 6.		

Table 6.2.5_1.5-2: P_{CMAX} configured HPUE output power for Power class 2

	Channel bandwidth / maximum output power	
	5MHz	**20MHz**

Measured UE output power test point 1	-10 dBm ± 7.7
Measured UE output power test point 2	10 dBm ± 6.7
Measured UE output power test point 3	15 dBm ± 5.7
Measured UE output power test point 4	21 dBm ±2.7
Measured UE output power test point 5 (Note 1)	23 dBm ± 2.7
Note 1: Only applicable to power class 2 capable UE operating on Band 41with UL-DL config 0 or 6.	

6.2.5A Configured transmitted power for CA

6.2.5A.1 Configured UE transmitted Output Power for CA (intra-band contiguous DL CA and UL CA)

6.2.5A.1.1 Test purpose

To verify the UE does not exceed the minimum between the $P_{EMAX,c}$ maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5A.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.2.5A.1.3 Minimum conformance requirements

For uplink carrier aggregation the UE is allowed to set its configured maximum output power $P_{CMAX,c}$ for serving cell c and its total configured maximum output power P_{CMAX}.

The configured maximum output power $P_{CMAX,c}$ on serving cell *c* shall be set as specified in subclause 6.2.5.

For uplink inter-band carrier aggregation, MPR_c and $A\text{-}MPR_c$ apply per serving cell c and are specified in clause 6.2.3 and clause 6.2.4, respectively. $P\text{-}MPR_c$ accounts for power management for serving cell *c*. $P_{CMAX,c.}$ $P_{CMAX,c}$ is calculated under the assumption that the transmit power is increased independently on all component carriers.

For uplink intra-band contiguous carrier aggregation, MPR_c = MPR and $A\text{-}MPR_c$ = A-MPR with MPR and A-MPR specified in clause 6.2.3A and clause 6.2.4A respectively. There is one power management term for the UE, denoted $P\text{-}MPR_c$, and $P\text{-}MPR_c$ = P-MPR. $P_{CMAX,c}$ is calculated under the assumption that the transmit power is increased by the same amount in dB on all component carriers.

The total configured maximum output power P_{CMAX} shall be set within the following bounds:

$$P_{CMAX_L} \leq P_{CMAX} \leq P_{CMAX_H}$$

For uplink inter-band carrier aggregation with one serving cell c per operating band,

$$P_{CMAX_L} = \text{MIN}\ \{10\log_{10}\textstyle\sum \text{MIN}\ [p_{EMAX,c}/(\Delta t_{C,c}),\ p_{PowerClass}/(mpr_c \cdot a\text{-}mpr_c \cdot \Delta t_{C,c} \cdot \Delta t_{IB,c}),\ p_{PowerClass}/(pmpr_c \cdot \Delta t_{C,c})],\ P_{PowerClass}\}$$

$$P_{CMAX_H} = \text{MIN}\{10\ \log_{10} \textstyle\sum p_{EMAX,c},\ P_{PowerClass}\}$$

where

- $p_{EMAX,c}$ is the linear value of $P_{EMAX,\,c}$ which is given by IE *P-Max* for serving cell *c* in [5];
- $P_{PowerClass}$ is the maximum UE power specified in Table 6.2.2A.0-2 without taking into account the tolerance specified in the Table 6.2.2A.1.3-1; $p_{PowerClass}$ is the linear value of $P_{PowerClass}$;

- mpr_c and $a\text{-}mpr_c$ are the linear values of MPR_c and $A\text{-}MPR_c$ as specified in subclause 6.2.3 and subclause 6.2.4, respectively;

- $pmpr_c$ is the linear value of $P\text{-}MPR_c$;

- $\Delta t_{C,c}$ is the linear value of $\Delta T_{C,c}$. $\Delta t_{C,c} = 1.41$ when Note 2 in Table 6.2.2A.0-2 applies for a serving cell *c*, otherwise $\Delta t_{C,c} = 1$;

- $\Delta t_{IB,c}$ is the linear value of the inter-band relaxation term $\Delta T_{IB,c}$ of the serving cell *c* as specified in Table 6.2.5.3-2; otherwise $\Delta t_{IB,c} = 1$.

For uplink intra-band contiguous carrier aggregation,

$$P_{CMAX_L} = MIN\{10 \log10 \sum P_{EMAX,c} - \Delta T_C , P_{PowerClass} - MAX(MPR + A\text{-}MPR + \Delta T_{IB,c}, P\text{-}MPR) - \Delta T_C\}$$

$$P_{CMAX_H} = MIN\{10 \log10 \sum P_{EMAX,c} , P_{PowerClass}\}$$

where

- $P_{EMAX,c}$ is the linear value of $P_{EMAX,\,c}$ which is given by IE *P-Max* for serving cell *c* in [5] ;

- $P_{PowerClass}$ is the maximum UE power specified in Table 6.2.2A.0-2 without taking into account the tolerance specified in the Table 6.2.2A.0-2;

- MPR and A-MPR are specified in clause 6.2.3A and clause 6.2.4A respectively ;

- $\Delta T_{IB,c}$ is the additional tolerance for serving cell *c* as specified in Table 6.2.5.3-2 ;

- P-MPR is the power management term for the UE ;

- ΔT_C is the highest value $\Delta T_{C,c}$ among all serving cells *c* in the subframe over both timeslots. $\Delta T_{C,c} = 1.5$ dB when Note 2 in Table 6.2.2A.0-2 applies to the serving cell *c*; otherwise $\Delta T_{C,c} = 0$ dB.

For each subframe, the P_{CMAX_L} is evaluated per slot and given by the minimum value taken over the transmission(s) within the slot; the minimum P_{CMAX_L} over the two slots is then applied for the entire subframe. $P_{PowerClass}$ shall not be exceeded by the UE during any period of time.

The measured maximum output power P_{UMAX} over all serving cells shall be within the following range:

$$P_{CMAX_L} - T(P_{CMAX_L}) \leq P_{UMAX} \leq P_{CMAX_H} + T(P_{CMAX_H})$$

$$P_{UMAX} = 10 \log10 \sum P_{UMAX,c}$$

where

- $P_{UMAX,c}$ denotes the measured maximum output power for serving cell *c* expressed in linear scale.

The tolerance $T(P_{CMAX})$ is defined by the table below and applies to P_{CMAX_L} and P_{CMAX_H} separately.

Table 6.2.5A.1.3-1: P_{CMAX} tolerance for intra-band with two active UL serving cells

P_{CMAX} (dBm)	Tolerance $T_{LOW}(P_{CMAX})$ (dB)	Tolerance $T_{HIGH}(P_{CMAX})$ (dB)
$21 \leq P_{CMAX} \leq 23$	2.0	
$20 \leq P_{CMAX} < 21$	2.5	
$19 \leq P_{CMAX} < 20$	3.5	
$18 \leq P_{CMAX} < 19$	4.0	
$13 \leq P_{CMAX} < 18$	5.0	
$8 \leq P_{CMAX} < 13$	6.0	
$-40 \leq P_{CMAX} < 8$	7.0	

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5A.

6.2.5A.1.4 Test description

6.2.5A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5A.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Mid range					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50		QPSK	8	P_8@0	S_0@0		
50	50		QPSK	12	P_12@0	S_0@0		
75	75	N/A for this test	QPSK	16	P_16@0	S_0@0	-	-
100	25		QPSK	8	P_8@0	S_0@0	-	-
100	50		QPSK	12	P_12@0	S_0@0	-	-
100	75		QPSK	16	P_16@0	S_0@0	-	-
100	100		QPSK	18	P_18@0	S_0@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5A.1.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.5A.1.4.3.

6.2.5A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.5A.1.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.5A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the P_{UMAX} level of the test point.
6. Measure the mean power over all component carriers in the CA configuration for each test point in table 6.2.5A.1.5-1 according to the test configuration from Table 6.2.5A.1.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.5A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions. In test procedure step 2, for SCC configuration there are no additional message contents.

Table 6.2.5A.1.4.3-1: SystemInformationBlockType1: Test point 1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	-10		

Table 6.2.5A.1.4.3-2: SystemInformationBlockType1: Test point 2

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	10		

Table 6.2.5A.1.4.3-3: SystemInformationBlockType1: Test point 3

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	15		

6.2.5A.1.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5A.1.5-1.

Table 6.2.5A.1.5-1: P_{CMAX} configured UE output power

	Channel bandwidth / maximum output power				
	25RB+50RB (5 MHz + 10 MHz)	**50RB+50RB (10 MHz + 10 MHz)**	**50RB+100RB (10 MHz + 20 MHz)**	**75RB + 75RB (15 MHz + 15 MHz)**	**100RB (20 MHz**
Measured UE output power test point 1	For carrier frequency f ≤ 3.0GHz: -10 dBm ± 7.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -10 dBm ± 8.0				
Measured UE output power test point 2	For carrier frequency f ≤ 3.0GHz: 10 dBm ± 6.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: 10 dBm ± 7.0				
Measured UE output power test point 3	For carrier frequency f ≤ 3.0GHz: 15 dBm ± 5.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: 15 dBm ± 6.0				
Note: In addition Note 2 in Table 6.2.2A.0-2 shall apply to the tolerances.					

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

6.2.5A.2 Void

6.2.5A.3 Configured UE transmitted Output Power for CA (inter-band DL CA and UL CA)

6.2.5A.3.1 Test purpose

To verify the UE does not exceed the minimum between the $P_{EMAX,c}$ maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5A.3.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.2.5A.3.3 Minimum conformance requirements

For uplink carrier aggregation the UE is allowed to set its configured maximum output power $P_{CMAX,c}$ for serving cell *c* and its total configured maximum output power P_{CMAX}.

The configured maximum output power $P_{CMAX,c}$ on serving cell *c* shall be set as specified in subclause 6.2.5.

For uplink inter-band carrier aggregation, MPR_c and A-MPR_c apply per serving cell *c* and are specified in subclause 6.2.3 and subclause 6.2.4, respectively. P-MPR_c accounts for power management for serving cell *c*. $P_{CMAX,c}$ is calculated under the assumption that the transmit power is increased independently on all component carriers.

For uplink intra-band contiguous and non-contiguous carrier aggregation, MPR_c = MPR and A-MPR_c = A-MPR with MPR and A-MPR specified in subclause 6.2.3A and subclause 6.2.4A respectively. There is one power management

term for the UE, denoted P-MPR, and P-MPR $_c$ = P-MPR. $P_{CMAX,c}$ is calculated under the assumption that the transmit power is increased by the same amount in dB on all component carriers.

The total configured maximum output power P_{CMAX} shall be set within the following bounds:

$$P_{CMAX_L} \leq P_{CMAX} \leq P_{CMAX_H}$$

For uplink inter-band carrier aggregation with one serving cell c per operating band,

$$P_{CMAX_L} = MIN \{10\log_{10}\sum MIN [p_{EMAX,c}/ (\Delta t_{C,c}), \quad p_{PowerClass}/(mpr_c \cdot a\text{-}mpr_c \cdot \Delta t_{C,c} \cdot \Delta t_{IB,c}) , p_{PowerClass}/pmpr_c], P_{PowerClass}\}$$

$$P_{CMAX_H} = MIN\{10 \log_{10} \sum p_{EMAX,c} , P_{PowerClass}\}$$

where

- $p_{EMAX,c}$ is the linear value of $P_{EMAX, c}$ which is given by IE *P-Max* for serving cell *c* in [5];
- $P_{PowerClass}$ is the maximum UE power specified in Table 6.2.2A.0-1 without taking into account the tolerance specified in the Table 6.2.2A.0-1; $p_{PowerClass}$ is the linear value of $P_{PowerClass}$;
- mpr $_c$ and a-mpr $_c$ are the linear values of MPR $_c$ and A-MPR $_c$ as specified in subclause 6.2.3 and subclause 6.2.4, respectively;
- $pmpr_c$ is the linear value of P-MPR $_c$;
- $\Delta t_{C,c}$ is the linear value of $\Delta T_{C,c}$. $\Delta t_{C,c}$ = 1.41 when Note 2 in Table 6.2.2.3-1 applies for a serving cell *c*, otherwise $\Delta t_{C,c}$ = 1;
- $\Delta t_{IB,c}$ is the linear value of the inter-band relaxation term $\Delta T_{IB,c}$ of the serving cell *c* as specified in Table 6.2.5.3-2; otherwise $\Delta t_{IB,c}$ = 1.

For each subframe, the P_{CMAX_L} is evaluated per slot and given by the minimum value taken over the transmission(s) within the slot; the minimum P_{CMAX_L} over the two slots is then applied for the entire subframe. $P_{PowerClass}$ shall not be exceeded by the UE during any period of time.

If the UE is configured with multiple TAGs and transmissions of the UE on subframe *i* for any serving cell in one TAG overlap some portion of the first symbol of the transmission on subframe *i* +1 for a different serving cell in another TAG, the UE minimum of P_{CMAX_L} for subframes *i* and *i* + 1 applies for any overlapping portion of subframes *i* and *i* + 1. $P_{PowerClass}$ shall not be exceeded by the UE during any period of time.

The measured maximum output power P_{UMAX} over all serving cells shall be within the following range:

$$P_{CMAX_L} - MAX\{T_L, T_{LOW}(P_{CMAX_L})\} \leq P_{UMAX} \leq P_{CMAX_H} + T_{HIGH}(P_{CMAX_H})$$

$$P_{UMAX} = 10 \log_{10} \sum p_{UMAX,c}$$

where $p_{UMAX,c}$ denotes the measured maximum output power for serving cell *c* expressed in linear scale. The tolerances $T_{LOW}(P_{CMAX})$ and $T_{HIGH}(P_{CMAX})$ for applicable values of P_{CMAX} are specified in Table 6.2.5A.3.3-1 for inter-band carrier aggregation. The tolerance T_L is the absolute value of the lower tolerance for applicable E-UTRA CA configuration as specified in Table 6.2.2A.0-1 for inter-band carrier aggregation.

Table 6.2.5A.3.3-1: P_{CMAX} tolerance for dual-uplink inter-band CA

P_{CMAX} (dBm)	Tolerance $T_{LOW}(P_{CMAX})$ (dB)	Tolerance $T_{HIGH}(P_{CMAX})$ (dB)
P_{CMAX} = 23	3.0	2.0
22 ≤ P_{CMAX} < 23	5.0	2.0
21 ≤ P_{CMAX} < 22	5.0	3.0
20 ≤ P_{CMAX} < 21	6.0	4.0
16 ≤ P_{CMAX} < 20	5.0	
11 ≤ P_{CMAX} < 16	6.0	
-40 ≤ P_{CMAX} < 11	7.0	

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5A.

6.2.5A.3.4 Test description

6.2.5A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5A.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5A.3.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.			Mid range for PCC and SCC					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/A for this test	QPSK	13	P_5@0	S_8@0	-	-
6	50		QPSK	17	P_5@0	S_12@0	-	-
25	15		QPSK	12	P_8@0	S_4@0	-	-
25	25		QPSK	16	P_8@0	S_8@0	-	-
25	50		QPSK	20	P_8@0	S_12@0	-	-
50	50		QPSK	24	P_12@0	S_12@0	-	-
50	100		QPSK	30	P_12@0	S_18@0	-	-
75	75		QPSK	32	P_16@0	S_16@0	-	-
75	100		QPSK	34	P_16@0	S_18@0	-	-
100	50		QPSK	30	P_18@0	S_12@0	-	-
100	100		QPSK	36	P_18@0	S_18@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5A.3.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.5A.3.4.3.

6.2.5A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.5A.3.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.5A.3.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the P_{UMAX} level of the test point.
6. Measure the mean power over all component carriers in the CA configuration for each test point in table 6.2.5A.3.5-1 according to the test configuration from Table 6.2.5A.3.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.5A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions. In test procedure step 2, for SCC configuration there are no additional message contents.

Table 6.2.5A.3.4.3-1: SystemInformationBlockType1: Test point 1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	-10		

Table 6.2.5A.3.4.3-2: SystemInformationBlockType1: Test point 2

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	10		

Table 6.2.5A.3.4.3-3: SystemInformationBlockType1: Test point 3

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	15		

6.2.5A.3.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5A.3.5-1.

Table 6.2.5A.3.5-1: P_{CMAX} configured UE output power

Test point	maximum output power		
Measured UE output power test point 1	For carrier frequency f ≤ 3.0GHz: -7 dBm ± 7.7	For carrier frequency f ≤ 3.0GHz: 13 dBm ± 6.7	For carrier frequency f ≤ 3.0GHz: 18 dBm ± 5.7
Measured UE output power test point 2			
Measured UE output power test point 3			

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied.
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

6.2.5A.4 Configured UE transmitted Output Power for CA (intra-band non-contiguous DL CA and UL CA)

6.2.5A.4.1 Test purpose

To verify the UE does not exceed the minimum between the $P_{EMAX,c}$ maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5A.4.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.2.5A.4.3 Minimum conformance requirements

For uplink carrier aggregation the UE is allowed to set its configured maximum output power $P_{CMAX,c}$ for serving cell c and its total configured maximum output power P_{CMAX}.

The configured maximum output power $P_{CMAX,c}$ on serving cell *c* shall be set as specified in subclause 6.2.5.

For uplink intra-band contiguous and non-contiguous carrier aggregation, MPR_c = MPR and $A\text{-}MPR_c$ = A-MPR with MPR and A-MPR specified in clause 6.2.3A and clause 6.2.4A respectively. There is one power management term for the UE, denoted $P\text{-}MPR_c$, and $P\text{-}MPR_c$ = P-MPR. $P_{CMAX,c}$ is calculated under the assumption that the transmit power is increased by the same amount in dB on all component carriers.

The total configured maximum output power P_{CMAX} shall be set within the following bounds:

$$P_{CMAX_L} \leq P_{CMAX} \leq P_{CMAX_H}$$

For uplink intra-band contiguous and non-contiguous carrier aggregation,

$$P_{CMAX_L} = MIN\{10 \log_{10} \sum p_{EMAX,c} - \Delta T_C , P_{PowerClass} - MAX(MPR + A\text{-}MPR + \Delta T_{IB,c} + \Delta T_C, P\text{-}MPR) \}$$

$$P_{CMAX_H} = MIN\{10 \log_{10} \sum p_{EMAX,c} , P_{PowerClass}\}$$

where

- $p_{EMAX,c}$ is the linear value of $P_{EMAX,c}$ which is given by IE *P-Max* for serving cell *c* in [5];
- $P_{PowerClass}$ is the maximum UE power specified in Table 6.2.2A.0-2 without taking into account the tolerance specified in the Table 6.2.2A.0-2;
- MPR and A-MPR are specified in subclause 6.2.3A and subclause 6.2.4A respectively;
- $\Delta T_{IB,c}$ is the additional tolerance for serving cell *c* as specified in Table 6.2.5.3-2;
- P-MPR is the power management term for the UE;
- ΔT_C is the highest value $\Delta T_{C,c}$ among all serving cells *c* in the subframe over both timeslots. $\Delta T_{C,c}$ = 1.5 dB when Note 2 in Table 6.2.2A.0-2 applies to the serving cell *c*, otherwise $\Delta T_{C,c}$ = 0 dB.

For each subframe, the P_{CMAX_L} is evaluated per slot and given by the minimum value taken over the transmission(s) within the slot; the minimum P_{CMAX_L} over the two slots is then applied for the entire subframe. $P_{PowerClass}$ shall not be exceeded by the UE during any period of time.

If the UE is configured with multiple TAGs and transmissions of the UE on subframe *i* for any serving cell in one TAG overlap some portion of the first symbol of the transmission on subframe *i* +1 for a different serving cell in another TAG, the UE minimum of P_{CMAX_L} for subframes *i* and *i* + 1 applies for any overlapping portion of subframes *i* and *i* + 1. $P_{PowerClass}$ shall not be exceeded by the UE during any period of time.

The measured maximum output power P_{UMAX} over all serving cells shall be within the following range:

$$P_{CMAX_L} - MAX\{T_L, T_{LOW}(P_{CMAX_L})\} \leq P_{UMAX} \leq P_{CMAX_H} + T_{HIGH}(P_{CMAX_H})$$

$$P_{UMAX} = 10 \log_{10} \sum p_{UMAX,c}$$

where $p_{UMAX,c}$ denotes the measured maximum output power for serving cell *c* expressed in linear scale. The tolerances $T_{LOW}(P_{CMAX})$ and $T_{HIGH}(P_{CMAX})$ for applicable values of P_{CMAX} are specified in Table 6.2.5A.4.3-1 for intra-band carrier aggregation. The tolerance T_L is the absolute value of the lower tolerance for applicable E-UTRA CA configuration as specified in Table 6.2.2A-2 of TS 36.101 for intra-band non-contiguous carrier aggregation.

Table 6.2.5A.4.3-1: P_{CMAX} tolerance

P_{CMAX} (dBm)	Tolerance $T_{LOW}(P_{CMAX})$ (dB)	Tolerance $T_{HIGH}(P_{CMAX})$ (dB)
$21 \leq P_{CMAX} \leq 23$	2.0	
$20 \leq P_{CMAX} < 21$	2.5	
$19 \leq P_{CMAX} < 20$	3.5	
$18 \leq P_{CMAX} < 19$	4.0	
$13 \leq P_{CMAX} < 18$	5.0	
$8 \leq P_{CMAX} < 13$	6.0	
$-40 \leq P_{CMAX} < 8$	7.0	

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5A.

6.2.5A.4.4 Test description

6.2.5A.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5A.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5A.4.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1				NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.				Refer to test points A: Low Wgap, Maximum Wgap					
Test CC Combination setting (N_{RB}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC					
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A for this test		QPSK	P_1@0	QPSK	S_1@24
2	25	25	35			QPSK	P_25@0	QPSK	S_25@0
3	25	25	5			QPSK	P_1@0	QPSK	S_1@24
4	25	25	5			QPSK	P_25@0	QPSK	S_25@0
5	100	100	5			QPSK	P_1@0	QPSK	S_1@99
6	100	100	5			QPSK	P_100@0	QPSK	S_100@0

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5A.4.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.5A.4.4.3.

6.2.5A.4.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1, and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.2.5A.4.4.3.
3. SS activates SCC by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.5A.4.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the P_{UMAX} level of the test point.

6. Measure the mean power over all component carriers in the CA configuration for each test point in table 6.2.5A.4.5-1 according to the test configuration from Table 6.2.5A.4.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.2.5A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions. In test procedure step 2, for SCC configuration there are no additional message contents.

Table 6.2.5A.4.4.3-1: SystemInformationBlockType1: Test point 1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	-13		

Table 6.2.5A.4.4.3-2: SystemInformationBlockType1: Test point 2

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	7		

Table 6.2.5A.4.4.3-3: SystemInformationBlockType1: Test point 3

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	12		

6.2.5A.4.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5A.4.5-1.

Table 6.2.5A.4.5-1: P_{CMAX} configured UE output power

Configuration ID	MPR (dB)	P_{CMAX} (dBm)	$T(P_{CMAX_L})$ (dB)	maximum output power					
				Measured UE output power test point 1		Measured UE output power test point 2		Measured UE output power test point 3	
				Upper limit (dBm)	Lower limit (dBm)	Upper limit (dBm)	Lower limit (dBm)	Upper limit (dBm)	Lower limit (dBm)
1	18	5	7	-2.3	-17.7	16.7	-2.7	20.7	-2.7
2	12	11	6				3.3		4.3
3	18	5	7				-2.7		-2.7
4	7	16	5				3.3		9.3

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is $\leq$ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

6.2.5B Configured UE transmitted Output Power for UL-MIMO

Editor's notes: The following items are missing or incomplete:

- Test Tolerance

6.2.5B.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power for UL-MIMO signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL- MIMO.

6.2.5B.3 Minimum conformance requirements

For UE with multiple transmit antenna connectors, the transmitted power is configured per each UE.

The definitions of configured maximum output power $P_{CMAX,c}$, the lower bound $P_{CMAX_L,c}$, and the higher bound $P_{CMAX_H,c}$ specified in Section 6.2.5 shall apply to UE with multiple transmit antenna connectors, where

- $P_{PowerClass}$ and $\Delta T_{C,c}$ are specified in Section 6.2.2B;
- MPR_c is specified in Section 6.2.3B;
- A-MPR_c is specified in Section 6.2.4B.

The measured configured maximum output power $P_{UMAX,c}$ for serving cell c shall be within the following bounds:

$$P_{CMAX_L,c} - MAX\{T_L, T_{LOW}(P_{CMAX_L,c})\} \leq P_{UMAX,c} \leq P_{CMAX_H,c} + T_{HIGH}(P_{CMAX_H,c})$$

where $T_{LOW}(P_{CMAX_L,c})$ and $T_{HIGH}(P_{CMAX_H,c})$ are defined as the tolerance and applies to $P_{CMAX_L,c}$ and $P_{CMAX_H,c}$ separately, while T_L is the absolute value of the lower tolerance in Table 6.2.2B.3-1 for the applicable operating band.

For UE with two transmit antenna connectors, the tolerance is specified in Table 6.2.5B.3-1 with UL-MIMO configurations specified in Table 6.2.2B.3-2.

Table 6.2.5B.3-1: $P_{CMAX,c}$ tolerance in closed-loop spatial multiplexing scheme

$P_{CMAX,c}$ (dBm)	Tolerance $T_{LOW}(P_{CMAX_L,c})$ (dB)	Tolerance $T_{HIGH}(P_{CMAX_H,c})$ (dB)
$P_{CMAX,c}$ =23	3.0	2.0
[22] ≤ $P_{CMAX,c}$ < [23]	[5.0]	[2.0]
[21] ≤ $P_{CMAX,c}$ < [22]	[5.0]	[3.0]
[20] ≤ $P_{CMAX,c}$ < [21]	[6.0]	[4.0]
[16] ≤ $P_{CMAX,c}$ < [20]	[5.0]	
[11] ≤ $P_{CMAX,c}$ < [16]	[6.0]	
[-40] ≤ $P_{CMAX,c}$ < [11]	[7.0]	

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5B.

6.2.5B.4 Test description

6.2.5B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Configured UE transmitted Output Power test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	5	5
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: For the uplink RB allocation the RB_{start} shall be RB #0.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5B.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.2.5B.4.3.

6.2.5B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.2.5B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the P_{umax} level of the test point.
3. Measure the sum mean power of the UE at each UE antenna connector in the associated measurement bandwidth for each test point in table 6.2.5B.5-1 according to the test configuration from Table 6.2.5B.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.2.5B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.2.5B.4.3-1: SystemInformationBlockType1: Test point 1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	-10		

Table 6.2.5B.4.3-2: SystemInformationBlockType1: Test point 2

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	13		

Table 6.2.5B.4.3-3: SystemInformationBlockType1: Test point 3

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	18		

6.2.5B.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5B.5-1.

Table 6.2.5B.5-1: P_{CMAX} configured UE output power

	Channel bandwidth / maximum output power					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Measured UE output power test point 1	For carrier frequency f ≤ 3.0GHz: -10 dBm ± [7.7] For carrier frequency 3.0GHz < f ≤ 4.2GHz: -10 dBm ± [8]					
Measured UE output power test point 2	For carrier frequency f ≤ 3.0GHz: 13 dBm ± [6.7] For carrier frequency 3.0GHz < f ≤ 4.2GHz: 13 dBm ± [7]					
Measured UE output power test point 3	For carrier frequency f ≤ 3.0GHz: 18 dBm ± [5.7] For carrier frequency 3.0GHz < f ≤ 4.2GHz: 18 dBm ± [6]					
Note: In addition note 2 in Table 6.2.2B.3-1 shall apply to the tolerances.						

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ in Tables 6.2.5.3-2, 6.2.5.3-3 and 6.2.5.3-4 shall be applied for applicable bands.

In case the UE supports more than one of the above inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 6.2.5.3-2, truncated to one decimal place for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 6.2.5.3-2 that applies for that operating band among the supported CA configurations.

6.2.5E Configured UE transmitted Output Power for UE category 0

6.2.5E.1 Test purpose

Same test purpose as on clause 6.2.5.1.

6.2.5E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.2.5E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.2.3.

6.2.5E.4 Test description

6.2.5E.4.1 Initial conditions

Same initial conditions as in clause 6.2.5.4.1 with following exceptions:

- Instead of Table 6.2.5.4.1-1 → use Table 6.2.5E.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.2.5E.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Configured UE transmitted Output Power test case	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	5	5
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: For the uplink RB allocation the RB_{start} shall be RB #0.				

6.2.5E.4.2 Test procedure

Same test procedure as in clause 6.2.5.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard sub frame are not under test.

6.2.5E.4.3 Message contents

Same message contents as in clause 6.2.5.4.3.

6.2.5E.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5E.5-1.

Table 6.2.5E.5-1: P_{CMAX} configured UE output power

	Channel bandwidth / maximum output power					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Measured UE output power test point 1	For carrier frequency f ≤ 3.0GHz: -10 dBm ± 7.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -10 dBm ± 8.0					
Measured UE output power test point 2	For carrier frequency f ≤ 3.0GHz: 10 dBm ± 6.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: 10 dBm ± 7.0					
Measured UE output power test point 3	For carrier frequency f ≤ 3.0GHz: 15 dBm ± 5.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: 15 dBm ± 6.0					
Note: In addition note 2 in Table 6.2.2.3-1 shall apply to the tolerances.						

6.2.5EA Configured UE transmitted Power for UE category M1

6.2.5EA.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.2.5EA.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.5.3 with the following exceptions:

- stead of Table 6.2.2.3-1 → use Table 6.2.2EA-1
- stead of Section 6.2.3 → use Section 6.2.3EA
- stead of Section 6.2.4 → use Section 6.2.4EA
- stead of Table 6.2.5.3-1 → use Table 6.2.5EA.3-1 and Table 6.2.5EA.3-2

Table 6.2.5EA.3-1: $P_{CMAX,c}$ tolerance

$P_{CMAX,c}$ (dBm)	Tolerance $T(P_{CMAX,c})$ (dB)
$23 < P_{CMAX,c} \leq 33$	2.0
$21 \leq P_{CMAX,c} \leq 23$	2.0
$20 \leq P_{CMAX,c} < 21$	2.5
$19 \leq P_{CMAX,c} < 20$	3.5
$18 \leq P_{CMAX,c} < 19$	4.0
$13 \leq P_{CMAX,c} < 18$	5.0
$8 \leq P_{CMAX,c} < 13$	6.0
$-40 \leq P_{CMAX,c} < 8$	7.0

Table 6.2.5EA.3-2: P_{CMAX} tolerance for power class 5

$P_{CMAX,c}$ (dBm)	Tolerance $T(P_{CMAX,c})$ (dB)
$P_{CMAX,c}$ = 20	2.0
19 ≤ $P_{CMAX,c}$ < 20	3.5
18 ≤ $P_{CMAX,c}$ < 19	4.0
13 ≤ $P_{CMAX,c}$ < 18	5.0
8 ≤ $P_{CMAX,c}$ < 13	6.0
-40 ≤ $P_{CMAX,c}$ < 8	7.0

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5.

6.2.5EA.4 Test description

6.2.5EA.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.2.5EA.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz				
Test Parameters for Channel Bandwidths					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for Configured UE transmitted Output Power test case	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index (Note 1)
5MHz		QPSK	1 (Note 3), 3 (Note 4)	1 (Note 3), 3 (Note 4)	0
Note 1: Denote where in the channel bandwidth the narrowband shall be placed. Narrowband and narrowband index are defined in TS 36.211, 5.2.4. Note 2: The RB_{start} of partial RB allocation shall be RB#0 of the narrowband. Note 3: Only applicable for Power class 3 Note 4: Only applicable for Power class 5					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.2.5EA.4.1-1
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.2.5EA.4.3.

6.2.5EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.2.5EA.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send transmit uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach the Pumax level of the test point.

3. Measure the mean power of the UE in the channel bandwidth for each test point in table 6.2.5EA.5-1 according to the test configuration from Table 6.2.5EA.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.

6.2.5EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.2.5EA.4.3-1: SystemInformationBlockType1-BR-r13: Test point 1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3A SystemInformationBlockType1-BR-r13			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	-10		

Table 6.2.5EA.4.3-2: SystemInformationBlockType1-BR-r13: Test point 2

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3A SystemInformationBlockType1-BR-r13			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	10		

Table 6.2.5EA.4.3-3: SystemInformationBlockType1-BR-r13: Test point 3

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3A SystemInformationBlockType1-BR-r13			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	15		

6.2.5EA.5 Test requirements

The maximum output power measured shall not exceed the values specified in Table 6.2.5EA.5-1.

Table 6.2.5EA.5-1: P_{CMAX} configured UE output power for UE category M1

	Channel bandwidth / maximum output power					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Measured UE output power test point 1	For carrier frequency f ≤ 3.0GHz: -10 dBm ± 7.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -10 dBm ± 8.0					
Measured UE output power test point 2	For carrier frequency f ≤ 3.0GHz: 10 dBm ± 6.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: 10 dBm ± 7.0					
Measured UE output power test point 3	For carrier frequency f ≤ 3.0GHz: 15 dBm ± 5.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: 15 dBm ± 6.0					
Note: In addition note 2 in Table 6.2.2EA-1 shall apply to the tolerances.						

6.2.5F Configured UE transmitted Output Power for UE category NB1

6.2.5F.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power for the UE power class.

6.2.5F.2 Test applicability

This test case applies to all types of UE release 13 and forward of UE category NB1

6.2.5F.3 Minimum conformance requirements

For each slot *i* the NB IoT UE is allowed to set its configured maximum output power $P_{CMAX,c}$. The configured maximum output power $P_{CMAX,c}$ is set within the following bounds:

$$P_{CMAX_L,c} \leq \quad P_{CMAX,c} \quad \leq \quad P_{CMAX_H,c}$$

Where

- $P_{CMAX_L,c}$ = MIN { $P_{EMAX,c}$, $P_{PowerClass} - MPR_c - A\text{-}MPR_c$}
- $P_{CMAX_H,c}$ = MIN { $P_{EMAX,c}$, $P_{PowerClass}$}
- $P_{EMAX,c}$ is the value given to IE *P-Max*, defined in [7]
- $P_{PowerClass}$ is the maximum NB IoT UE power specified in Table 6.2.2F.3-1 without taking into account the associated tolerance
- MPR_c is specified in subclause 6.2.3F
- $A\text{-}MPR_c$ = 0dB unless otherwise stated.

The measurement period for $P_{UMAX,c}$ is at least one sub-frame **(**1ms) for 15 KHz channel spacing, and at least a 2ms slot (excluding the 2304Ts gap when UE is not transmitting) respectively for the 3.75 KHz channel spacing. The measured maximum output power $P_{UMAX,c}$ shall be within the following bounds:

$$P_{CMAX_L,c} - \quad T(P_{CMAX_L,c}) \quad \leq \quad P_{UMAX,c} \quad \leq \quad P_{CMAX_H,c} \quad + \quad T(P_{CMAX_H,c})$$

Where $T(P_{CMAX})$ is defined by the tolerance table below and applies to $P_{CMAX_L,c}$ and $P_{CMAX_H,c}$ separately.

Table 6.2.5F.3-1: P_{CMAX} tolerance

P_{CMAX} (dBm)	Tolerance $T(P_{CMAX})$ (dB)
$21 \le P_{CMAX} \le 23$	2.0
$20 \le P_{CMAX} < 21$	2.5
$19 \le P_{CMAX} < 20$	3.5
$18 \le P_{CMAX} < 19$	4.0
$13 \le P_{CMAX} < 18$	5.0
$8 \le P_{CMAX} < 13$	6.0
$-40 \le P_{CMAX} < 8$	7.0

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5F.

6.2.5F.4 Test description

6.2.5F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in TBD.

Table 6.2.5F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		QPSK	1@0	15
4		QPSK	1@11	15
5 (Note 1)		QPSK	12@0	15
Note 1: Applicable to UE supporting UL multi-tone transmissions				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C, and uplink signals according to Annex H.
4. The UL Reference Measurement channel is set according to Table 6.2.5F.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.2.5F.4.3.

6.2.5F.4.2 Test procedure

1. SS sends uplink scheduling information for UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.2.5F.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Configure UE to transmit NPUSCH with the Pumax level of each test points.

3. Measure the mean power of the UE in the channel bandwidth for each test point in table 6.2.5F.5-1 according to the test configuration from Table 6.2.5F.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame **(**1ms) for 15 KHz channel spacing, and at least a 2ms slot (excluding the 2304Ts gap when UE is not transmitting) respectively for the 3.75 KHz channel spacing.

6.2.5F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions:

Table 6.2.5F.4.3-1: SystemInformationBlockType1: Test point 1

Derivation Path: TS 36.508 [7] clause 8.1.4, Table 8.1.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	-10		

Table 6.2.5F.4.3-2: SystemInformationBlockType1: Test point 2

Derivation Path: TS 36.508 [7] clause 8.1.4, Table 8.1.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	10		

Table 6.2.5F.4.3-3: SystemInformationBlockType1: Test point 3

Derivation Path: TS 36.508 [7] clause 8.1.4, Table 8.1.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	15		

6.2.5F.5 Test requirement

The maximum output power measured shall not exceed the values specified in Table 6.2.5F.5-1.

Table 6.2.5F.5-1: P_{CMAX} configured UE output power

	maximum output power
Measured UE output power test point 1	For carrier frequency f ≤ 3.0GHz: -10 dBm ± 7.7
Measured UE output power test point 2	For carrier frequency f ≤ 3.0GHz: 10 dBm ± 6.7
Measured UE output power test point 3	For carrier frequency f ≤ 3.0GHz: 15 dBm ± 5.7

6.2.5G Configured UE transmitted Output Power for V2X Communication

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- RB allocation

- Connection diagram

- The UE test loop mode is TBD.

- Test procedure and requirements

- GNSS in the initial conditions is FFS.

6.2.5G.1 Configured UE transmitted Output Power for V2X Communication / Non-concurrent with E-UTRA uplink transmission

6.2.5G.1.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power the UE power class.

6.2.5G.1.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

6.2.5G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.5G-1, the V2X UE is allowed to set its configured maximum output power $P_{CMAX,c}$ for component carrier *c*. The configured maximum output power $P_{CMAX,c}$ is set within the following bounds:

$$P_{CMAX_L,c} \leq P_{CMAX,c} \leq P_{CMAX_H,c} \text{ with}$$

$P_{CMAX_L,c}$ = MIN {$P_{EMAX,c} - \Delta T_{C,c}$, $P_{PowerClass}$ — MAX(MPR_c + A-MPR_c + $\Delta T_{IB,c}$ + $\Delta T_{C,c}$ + ΔT_{ProSe}, P-MPR_c), $P_{Regulatory,c}$ }

$P_{CMAX_H,c}$ = MIN {$P_{EMAX,c}$, $P_{PowerClass}$, $P_{Regulatory,c}$ }

where

- For the total transmitted power $P_{CMAX,c}$ of PSSCH and PSCCH, $P_{EMAX,c}$ is the value given by IE *maxTxPower*, defined by [5], when the UE is not associated with a serving cell on the V2X carrier.

- For $P_{CMAX,PSBCH}$, $P_{EMAX,c}$ is the value given by the IE *maxTxPower* in [5] when the UE is not associated with a serving cell on the V2X carrier.

- For $P_{CMAX,SSSS}$, the value is as calculated for $P_{CMAX,PSBCH}$ and applying the MPR for SSSS as specified in Section 6.2.3D.

- $P_{PowerClass}$ is the maximum UE power specified in Table 6.2.2.3-1 without taking into account the tolerance specified in the Table 6.2.2.3-1;

- MPR_c and A-MPR_c for serving cell *c* are specified in subclause 6.2.3G and subclause 6.2.4G, respectively;

- $\Delta T_{IB,c}$, $\Delta T_{C,c}$, ΔT_{ProSe} and P-MPR_c are specified in subclause 6.2.5

- $P_{Regulatory,c}$ = 10 dBm when the CEN DSRC tolling system is nearby V2X UE; $P_{Regulatory,c}$ = 33 dBm otherwise.

The maximum output power $P_{CMAX,PSSCH}$ and $P_{CMAX,PSCCH}$ are derived from $P_{CMAX,c}$ based on the PSD offset following subclause 14.1.1.5 in [10]. For all cases, the PSD difference between PSCCH and PSSCH shall be the same as the PSD offset value.

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5G.

6.2.5G.1.4 Test description

6.2.5G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3.

Table 6.2.5G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 6.2.5G.1.4.3.
3. The V2X Reference Measurement channel is set according to Table 6.2.5G.1.4.1-1
4. Propagation conditions are set according to Annex B.0.
5. UE test mode - FFS.

6.2.5G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Measure the mean power of the UE in the channel bandwidth for each test point in table 6.2.5G.1.5-1 according to the test configuration from Table 6.2.5G.1.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.2.5G.1.4.3 Message contents

FFS

6.2.5G.1.5 Test requirements

FFS

6.2.5G.2 Configured UE transmitted Output Power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmission

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram

- Test requirements

- Applicability spec

6.2.5G.2.1 Test purpose

To verify the UE does not exceed the minimum between the P_{EMAX} maximum allowed UL TX Power signalled by the E-UTRAN and the P_{UMAX} maximum UE power the UE power class.

6.2.5G.2.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

6.2.5G.2.3 Minimum conformance requirements

When a UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, the UE is allowed to set its configured maximum output power $P_{CMAX,c,E\text{-}UTRA}$ and $P_{CMAX,c,V2X}$ for the configured E-UTRA uplink carrier and the configured E-UTRA V2X carrier, respectively, and its total configured maximum output power $P_{CMAX,c}$. The $\Delta T_{IB,c}$ of $P_{CMAX,c,E\text{-}UTRA}$ is specified in Table 6.2.5G.2.3-2.

The configured maximum output power $P_{CMAX\ c,E\text{-}UTRA}(p)$ in subframe p for the configured E-UTRA uplink carrier shall be set within the bounds:

$$\leq P_{CMAX,c,E\text{-}UTRA}(p) \leq P_{CMAX_H,c,E\text{-}UTRA}(p)$$

where $P_{CMAX_L,c,E\text{-}UTRA}$ and $P_{CMAX_H,c,E\text{-}UTRA}$ are the limits for a serving cell c as specified in subclause 6.2.5.

The configured maximum output power $P_{CMAX\ c,V2X}(q)$ in subframe q for the configured E-UTRA V2X carrier shall be set within the bounds:

$$P_{CMAX,c,V2X}(q) \leq \quad P_{CMAX_H,c,V2X}(q)$$

where $P_{CMAX_H,c,V2X}$ is the limit as specified in subclause 6.2.5G.

The total UE configured maximum output power $P_{CMAX}(p,q)$ in a subframe p of an E-UTRA uplink carrier and a subframe q of an E-UTRA V2X sidelink that overlap in time shall be set within the following bounds for synchronous and asynchronous operation unless stated otherwise:

$$P_{CMAX_L}(p,q) \leq P_{CMAX}(p,q) \leq P_{CMAX_H}(p,q)$$

with

$$P_{CMAX_L}(p,q) = P_{CMAX_L,c,E\text{-}UTRA}(p)$$

$$P_{CMAX_H}(p,q) = \text{MIN}\ \{10\ \log_{10}\ [p_{CMAX_H,c,E\text{-}UTRA}(p) + p_{CMAX_H,c,V2X}(q)],\ P_{PowerClass}\}$$

where $p_{CMAX_H,c,V2X}$ and $p_{CMAX_H,c,E\text{-}UTRA}$ are the limits $P_{CMAX_H,c,V2X}(q)$ and $P_{CMAX_H,c,E\text{-}UTRA}(p)$ expressed in linear scale.

The measured total maximum output power P_{UMAX} over both the E-UTRA uplink and E-UTRA V2X carriers is

$$P_{UMAX} = 10\ \log_{10}\ [p_{UMAX,c,E\text{-}UTRA} + p_{UMAX,c,V2X}],$$

where $p_{UMAX,c,E\text{-}UTRA}$ denotes the measured output power of serving cell c for the configured E-UTRA uplink carrier, and $p_{UMAX,c,V2X}$ denotes the measured output power for the configured E-UTRA V2X carrier expressed in linear scale.

When a UE is configured for synchronous V2X sidelink and uplink transmissions,

$$P_{CMAX_L}(p, q) - T_{LOW}(P_{CMAX_L}(p, q)) \leq P_{UMAX} \leq P_{CMAX_H}(p, q) + T_{HIGH}(P_{CMAX_H}(p, q))$$

where $P_{CMAX_L}(p,q)$ and $P_{CMAX_H}(p,q)$ are the limits for the pair (p,q) and with the tolerances $T_{LOW}(P_{CMAX})$ and $T_{HIGH}(P_{CMAX})$ for applicable values of P_{CMAX} specified in Table 6.2.5G.2.3-1. P_{CMAX_L} may be modified for any overlapping portion of subframes (p, q) and $(p+1, q+1)$.

When a UE is configured for asynchronous V2X and uplink transmissions, the subframe *p* for the E-UTRA uplink carrier and subframe *q* for the E-UTRA V2X carrier overlap in time and

1. if uplink carrier leads in time over q and V2X UE sidelink transmission has SCI whose "Priority" field is set to a value less than the high layer parameter thresSL-TxPrioritization, then p is the reference subframe and the (p,q) and (p,q-1) pairs are considered for determining the PCMAX tolerance

2. if uplink carrier leads in time over q and V2X UE sidelink transmission has SCI whose "Priority" field is set to a value larger than the high layer parameter thresSL-TxPrioritization, then q is the reference subframe and the (p,q) and (p+1,q) pairs are considered for determining the PCMAX tolerance

3. if V2X carrier leads in time over p and V2X UE sidelink transmission has SCI whose "Priority" field is set to a value less than the high layer parameter thresSL-TxPrioritization, then p is the reference subframe and the (p,q) and (p,q+1) pairs are considered for determining the PCMAX tolerance

4. if V2X carrier leads in time over p and V2X UE sidelink transmission has SCI whose "Priority" field is set to a value larger than the high layer parameter thresSL-TxPrioritization,, then q is the reference subframe and the (p-1,q) and (p,q) pairs are considered for determining the PCMAX tolerance

For the reference subframe *p* duration when uplink carrier leads:

$$P'_{CMAX_L} = P_{CMAX_L,,cE\text{-}UTRA}(p)$$

$$P'_{CMAX_H} = MAX\ \{P_{CMAX_H}(p,q\text{-}1)\ ,\ P_{CMAX_H}\ (p,q)\}$$

For the reference subframe *p* duration when V2X carrier leads:

$$P'_{CMAX_L} = P_{CMAX_L,c,E\text{-}UTRA}(p)$$

$$P'_{CMAX_H} = MAX\ \{P_{CMAX_H}(p,q)\ ,\ P_{CMAX_H}(p,q+1)\}$$

For the reference subframe *q* duration when uplink carrier leads:

$$P'_{CMAX_L} = P_{CMAX_L,c,V2X}(q)$$

$$P'_{CMAX_H} = MAX\ \{P_{CMAX_H}(p,q)\ ,\ P_{CMAX_H}(p+1,q)\}$$

For the reference subframe *q* duration when V2X carrier leads:

$$P'_{CMAX_L} = P_{CMAX_L,cE\text{-}UTRA}(p)$$

$$P'_{CMAX_H} = MAX\ \{P_{CMAX_H}\ (p\text{-}1,q)\ ,\ P_{CMAX_H}\ (p,q)\}$$

where $P_{CMAX_L,,cE\text{-}UTRA}(p)$ and P_{CMAX_H} are the applicable limits for each overlapping subframe pairs above 4case with *(p,q)*, (*p, q-1*) or *(p,q), (p, q+1)* or *(p,q), (p+1,q)* or *(p,q),* (*p-1, q*). The measured total configured maximum output power P_{UMAX} shall be within the following bounds:

$$P'_{CMAX_L} - T_{LOW}(P'_{CMAX_L}) \le P_{UMAX} \le P'_{CMAX_H} + T_{HIGH}(P'_{CMAX_H})$$

with the tolerances $T_{LOW}(P_{CMAX})$ and $T_{HIGH}(P_{CMAX})$ for applicable values of P_{CMAX} specified in Table 6.2.5G.2.3-1.

Table 6.2.5G.2.3-1: P_{CMAX} tolerance

P_{CMAX}(dBm)	Tolerance $T_{LOW}(P_{CMAX_L})$(dB)	Tolerance $T_{HIGH}(P_{CMAX_H})$(dB)
P_{CMAX} = 23	3.0	2.0
22 ≤$P_{CMAX,}$< 23	5.0	2.0
21 ≤ P_{CMAX}< 22	5.0	3.0
20 ≤ $P_{CMAX,}$ < 21	6.0	4.0
16 ≤ P_{CMAX} < 20	5.0	
11 ≤ $P_{CMAX,}$ < 16	6.0	
-40 ≤ P_{CMAX} < 11	7.0	

Table 6.2.5G.2.3-2: $\Delta T_{IB,c}$ for inter-band con-current V2X operation (two bands)

V2X con-current band Configuration	E-UTRA or V2X Operating Band	$\Delta T_{IB,c}$ [dB]
V2X_3A-47A	3	0.0
V2X_7A-47A	7	0.0
V2X_8A-47A	8	0.0
V2X_39A-47A	39	0.0
V2X_41A-47A	41	0.0

The normative reference for this requirement is TS 36.101 [2] clause 6.2.5G.

6.2.5G.2.4 Test description

6.2.5G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.5G.2.4.1-1. The details of the uplink and V2X reference measurement channels (RMCs) are specified in Annexes A.2 and A.8.3 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.5G.2.4.1-1: Test Configuration Table

<table>
<tr><th colspan="8">Initial Conditions</th></tr>
<tr><td colspan="3">Test Environment as specified in TS 36.508 [7] subclause 4.1</td><td colspan="5">Normal, TL/VL, TL/VH, TH/VL, TH/VH</td></tr>
<tr><td colspan="3">Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1</td><td colspan="5">Mid range</td></tr>
<tr><td colspan="3">Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1</td><td colspan="5">Lowest,Highest</td></tr>
<tr><th colspan="8">Test Parameters for Channel Bandwidths</th></tr>
<tr><th></th><th>Downlink</th><th colspan="2">Uplink Configuration</th><th colspan="4">V2X Configuration</th></tr>
<tr><td>Ch BW</td><td rowspan="8">N/A for Configured UE transmitted Output Power test case</td><td>Mod'n</td><td>RB allocation</td><td>Ch BW</td><td>Mod'n</td><td colspan="2">RB allocation</td></tr>
<tr><td>1.4 MHz</td><td>QPSK</td><td>5</td><td>10 MHz</td><td>QPSK</td><td colspan="2">48</td></tr>
<tr><td>3 MHz</td><td>QPSK</td><td>4</td><td>20 MHz</td><td>QPSK</td><td colspan="2">96</td></tr>
<tr><td>5 MHz</td><td>QPSK</td><td>8</td><td colspan="4" rowspan="4"></td></tr>
<tr><td>10 MHz</td><td>QPSK</td><td>12</td></tr>
<tr><td>15 MHz</td><td>QPSK</td><td>16</td></tr>
<tr><td>20 MHz</td><td>QPSK</td><td>18</td></tr>
<tr><td colspan="8">Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: For the uplink RB allocation the RB_{start} shall be RB #0.</td></tr>
</table>

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 6.2.5G.2.4.3
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 6.2.5G.2.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 6.2.5G.2.4.3.

6.2.5G.2.4.2 Test procedure

1. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 6.2.5G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at P_{UMAX} level. Configure the UE to transmit PSCCH and PSSCH with the P_{UMAX} level of each test points. Allow at least 200ms for the UE to reach the P_{UMAX} level of the test point.

3. Measure the mean power over all component carriers in the V2X con-current band configuration. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.2.5G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.2.5G.2.4.3-1: SystemInformationBlockType1: Test point 1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	-10		

Table 6.2.5G.2.4.3-2: SL-PSSCH-TxConfig-r14-DEFAULT: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6, Table 4.6.3-20F SL-PSSCH-TxConfig-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
maxTxPower-r14	-10		

Table 6.2.5G.2.4.3-3: SystemInformationBlockType1: Test point 2

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	10		

Table 6.2.5G.2.4.3-4: SL-PSSCH-TxConfig-r14-DEFAULT: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6, Table 4.6.3-20F SL-PSSCH-TxConfig-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
maxTxPower-r14	10		

Table 6.2.5G.2.4.3-5: SystemInformationBlockType1: Test point 3

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	15		

Table 6.2.5G.2.4.3-6: SL-PSSCH-TxConfig-r14-DEFAULT: Test point 3

Derivation Path: TS 36.508 [7] clause 4.6, Table 4.6.3-20F SL-PSSCH-TxConfig-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
maxTxPower-r14	15		

6.2.5G.2.5 Test requirements

The maximum output power measured shall not exceed the values specified in Table 6.2.5G.2.5-1.

Table 6.2.5G.2.5-1: P_{CMAX} configured UE output power

	maximum output power
Measured UE output power test point 1	-10 dBm ± TT
Measured UE output power test point 2	10 dBm ± TT
Measured UE output power test point 3	15 dBm ± TT

6.3 Output Power Dynamics

6.3.1 Void

6.3.2 Minimum Output Power

6.3.2.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

6.3.2.3 Minimum conformance requirements

The minimum output power is defined as the mean power in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2.3-1.

Table 6.3.2.3-1: Minimum output power

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Minimum output power	-40 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2.1.

Minimum output power test verifies the UE's ability to transmit with a broadband output power below the specified limit when the power is set to a minimum value. The broadband output power is defined as the power in the channel bandwidth, for all transmit bandwidth configurations (resource blocks).

An excess minimum output power potentially increases the Rise Over Thermal (RoT) and therefore reduces the cell coverage area for other UEs.

6.3.2.4 Test description

6.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for min output power test	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.2.4.3.

6.3.2.4.2 Test procedure

SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.2.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC

2. Send continuous uplink power control "down" commands in the uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
3. Measure the mean power of the UE in the associated measurement bandwidth specified in Table 6.3.2.5-1 for the specific channel bandwidth under test. The period of measurement shall be the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.2.5 Test requirement

The minimum output power measured shall not exceed the values specified in Table 6.3.2.5-1.

Table 6.3.2.5-1: Minimum output power

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth (Note 1)	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2A Minimum Output Power for CA

6.3.2A.0 Minimum conformance requirements

For intra-band contiguous carrier aggregation, the minimum controlled output power of the UE is defined as the transmit power of the UE per component carrier, i.e., the power in the channel bandwidth of each component carrier for all transmit bandwidth configurations (resource blocks), when the power on both component carriers are set to a minimum value.

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the minimum output power is defined per carrier and the requirement is specified in subclause 6.3.2A.2-1. If two contiguous component carriers are assigned to one E-UTRA band, the requirements in subclause 6.3.2A.2-2 apply for those component carriers.

Table 6.3.2A.0-1: Minimum output power

	Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Minimum output power	-40 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

Table 6.3.2A.0-2: Minimum output power for intra-band contiguous and non-contiguous CA UE

	CC Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Minimum output power	-40 dBm					
Measurement bandwidth			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2A.

6.3.2A.1 Minimum Output Power for CA (intra-band contiguous DL CA and UL CA)

6.3.2A.1.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power on each component carrier is set to a minimum value.

6.3.2A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.3.2A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.2A.0.

6.3.2A.1.4 Test description

6.3.2A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.2A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2A.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low and High range					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50		QPSK	75	P_25@0	S_50@0		
50	50		QPSK	100	P_50@0	S_50@0		
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	25		QPSK	125	P_100@0	S_25@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	75		QPSK	175	P_100@0	S_75@0		
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.2A.1.4.3.

6.3.2A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.3.2A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.2A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "down" commands in every uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
6. Measure the mean transmitted power of each component carrier in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.3.2A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.3.2A.1.5 Test requirements

For each component carrier, the minimum output power measured shall not exceed the values specified in Table 6.3.2A.1.5-1.

Table 6.3.2A.1.5-1: Minimum output power for intra-band contiguous CA UE

	CC Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2A.2 Minimum Output Power for CA (inter-band DL CA and UL CA)

6.3.2A.2.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power on each component carrier is set to a minimum value.

6.3.2A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.3.2A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.2A.0.

6.3.2A.2.4 Test description

6.3.2A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.2A.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2A.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.			Low range for PCC and SCC High range for PCC and SCC					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/Afor this test	QPSK	31	P_6@0	S_25@0	-	-
6	50		QPSK	56	P_6@0	S_50@0	-	-
25	15		QPSK	40	P_25@0	S_15@0	-	-
25	25		QPSK	50	P_25@0	S_25@0	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2A.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.2A.2.4.3.

6.3.2A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.3.2A.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.2A.2.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "down" commands in every uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
6. Measure the mean transmitted power of each component carrier in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.3.2A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.3.2A.2.5 Test requirements

For each component carrier, the minimum output power measured shall not exceed the values specified in Table 6.3.2A.2.5-1.

Table 6.3.2A.2.5-1: Minimum output power for inter-band CA UE

	CC Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2A.3 Minimum Output Power for CA (intra-band non-contiguous DL CA and UL CA)

6.3.2A.3.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power on each component carrier is set to a minimum value.

6.3.2A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.3.2A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.2A.0.

6.3.2A.3.4 Test description

6.3.2A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.2A.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2A.3.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Maximum Wgap
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC (Note 2)

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	QPSK	P_25@0	QPSK	S_25@0
2	100	100	5	N/A	N/A	QPSK	P_100@0	QPSK	S_100@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.
Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2A.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.2A.3.4.3.

6.3.2A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.3.2A.3.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.2A.3.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "down" commands in every uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
6. Measure the mean transmitted power of each component carrier in the CA configuration of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.3.2A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.3.2A.3.5 Test requirements

For each component carrier, the minimum output power measured shall not exceed the values specified in Table 6.3.2A.3.5-1.

Table 6.3.2A.3.5-1: Minimum output power for intra-band non-contiguous CA UE

	CC Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2B Minimum Output Power for UL-MIMO

6.3.2B.1 Test purpose

To verify the UE's ability to transmit with a UL-MIMO broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO

6.3.2B.3 Minimum conformance requirements

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the minimum output power is defined as the sum of the mean power at each UE antenna connector in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2B.3-1.

Table 6.3.2B.3-1: Minimum output power

	Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	-40 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2B.1.

6.3.2B.4 Test description

6.3.2B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.2B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**	Low range, Mid range, High range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for min output power test	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.2B.4.3.

6.3.2B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.2B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuous uplink power control "down" commands in the uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
3. Measure the sum of mean power of the UE at each UE antenna connector in the associated measurement bandwidth specified in Table 6.3.2B.5-1 for the specific channel bandwidth under test. The period of measurement shall be the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

6.3.2B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

6.3.2B.5 Test requirement

The minimum sum of mean output power of the UE at each antenna connector measured shall not exceed the values specified in Table 6.3.2B.5-1.

Table 6.3.2B.5-1: Minimum output power

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth (Note 1)	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2E Minimum Output Power for UE category 0

6.3.2E.1 Test purpose

Same test purpose as in clause 6.3.2.1.

6.3.2E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.3.2E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3.

6.3.2E.4 Test description

6.3.2E.4.1 Initial conditions

Same initial conditions as in clause 6.3.2.4.1 with following exceptions:

- Instead of Table 6.3.2.4.1-1 → use Table 6.3.2E.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.3.2E.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for min output power test	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	36	36
15MHz		QPSK	36	36
20MHz		QPSK	36	36
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

6.3.2E.4.2 Test procedure

Same test procedure as in clause 6.3.2.4.2 with the following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframes are not under test.

6.3.2E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.2E.5 Test requirement

The minimum output power measured shall not exceed the values specified in Table 6.3.2E.5-1.

Table 6.3.2E.5-1: Minimum output power

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth (Note 1)	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2EA Minimum Output Power for UE category M1

6.3.2EA.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.3.2EA.3 Minimum conformance requirements

The minimum output power is defined as the mean power in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2EA.3-1.

Table 6.3.2EA.3-1: Minimum output power

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	-40 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2.1.

Minimum output power test verifies the UE's ability to transmit with a broadband output power below the specified limit when the power is set to a minimum value. The broadband output power is defined as the power in the channel bandwidth, for all transmit bandwidth configurations (resource blocks).

An excess minimum output power potentially increases the Rise Over Thermal (RoT) and therefore reduces the cell coverage area for other UEs.

6.3.2EA.4 Test description

6.3.2EA.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.2EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.3.2EA.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz				
Test Parameters for Channel Bandwidths					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for min output power test	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index (Note 1)
5MHz		QPSK	6	6	0
Note 1: Denote where in the channel bandwidth the narrowband shall be placed. Narrowband and narrowband index are defined in TS 36.211, 5.2.4.					
Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2EA.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.3.2EA.4.3.

6.3.2EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.3.2EA.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuous uplink power control "down" commands in the uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
3. Measure the mean power of the UE in the associated measurement bandwidth specified in Table 6.3.2EA.5-1 for the specific channel bandwidth under test. The period of measurement shall be the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.

6.3.2EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.2EA.5 Test requirements

The minimum output power measured shall not exceed the values specified in Table 6.3.2EA.5-1.

Table 6.3.2EA.5-1: Minimum output power for UE category M1

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth (Note 1)	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2F Minimum Output Power for category NB1

6.3.2F.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.3.2F.3 Minimum conformance requirements

For category NB1 UE the single-tone and multi-tone transmission minimum output power requirement for the channel bandwidth is -40 dBm. For 3.75kHz sub-carrier spacing the minimum output power is defined as mean power in one slot (2ms) excluding the 2304Ts gap when UE is not transmitting. For 15kHz sub-carrier spacing the minimum output power is defined as mean power in one sub-frame (1ms).

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2F.

6.3.2F.4 Test description

6.3.2F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 6.3.2F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.3.2F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 8.1.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1 (Note 2)		BPSK	1@0	3.75
2 (Note 3)		BPSK	1@47	3.75
3 (Note 2)		QPSK	1@0	15
4 (Note 3)		QPSK	1@11	15
5 (Note 1)		QPSK	12@0	15
Note 1: Applicable to UE supporting UL multi-tone transmissions Note 2: only applicable for low range Note 3: only applicable for high range				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1.1 and H.4.0.
4. The UL Reference Measurement channel is set according to Table 6.3.2F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.3.2F.4.3.

6.3.2F.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via NPDCCH with DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.3.2F.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Measure the mean power of the UE in the channel bandwidth of the radio access mode. The period of measurement shall be at least the continuous duration of one sub-frame (1ms) for sub-carrier spacing of 15 kHz or one slot (2ms) excluding the 2304Ts gap when UE is not transmitting for sub-carrier spacing of 3.75 kHz. Half-Duplex guard subframes are not under test.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.3.2F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exception.

Table 6.3.2F4.3-1: NPDSCH-ConfigCommon-NB-DEFAULT

Derivation Path: 36.508 clause 8.1.6.3, Table 8.1.6.3-4			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	-55 (dBm)		
}			

Table 6.3.2F4.3-2: UplinkPowerControlCommon-NB-DEFAULT

Derivation Path: 36.508 clause 8.1.6.3. Table 8.1.6.3-14			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	-95 (-95 dBm)		
alpha-r13	al1 (1)		
deltaPreambleMsg3-r13	4		
}			

6.3.2F.5 Test requirements

The minimum output power measured shall not exceed the value of -39 dBm for the channel bandwidth of category NB1 UE.

6.3.2G Minimum output power for V2X Communication

6.3.2G.1 Minimum output power for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- RB allocation

- The UE test loop mode is TBD.

- Test procedure and requirements

- Frequency Range for considering band 47 needs to be further investigated

- part 2 spec need to be updated

6.3.2G.1.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2G.1.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

6.3.2G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.2G-1, the requirements in subclause 6.3.2 apply for V2X transmission.

The minimum output power is defined as the mean power in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2G.1.3-1.

Table 6.3.2G.1.3-1: Minimum output power

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	-40 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2G.

6.3.2G.1.4 Test description

6.3.2G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.2G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in A.8.3. GNSS simulator is configured as Table C.2-8 in Annex C.2.

Table 6.3.2G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range for uplink and Low range for V2X, High range for uplink and High range for V2X	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, in Figure A.92.

2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 6.3.2G.1.4.3.

3. The V2X Reference Measurement channel is set according to Table 6.3.2G.1.4.1-1

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 5A-V2X according to TS 36.508 [7] clause 4.5.9.

6.3.2G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.

2. Measure the mean power of the UE in the channel bandwidth for each test point in Table 6.3.2G.1.5-1 according to the test configuration from Table 6.3.2G.1.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.3.2G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.2G.1.5 Test requirements

The minimum output power measured shall not exceed the values specified in Table 6.3.2G.1.5-1.

Table 6.3.2G.1.5-1: Minimum output power

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth (Note 1)	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2G.2 Minimum output power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram

- part 2 spec need to be updated

- Frequency Range for considering band 47 needs to be further investigated

6.3.2G.2.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2G.2.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

6.3.2G.2.3 Minimum conformance requirements

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, the requirements in subclause 6.3.2A apply as specified for the corresponding inter-band con-current operation with uplink assigned to two bands.

The minimum output power is defined as the mean power in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2G.2.3-1.

Table 6.3.2G.2.3-1: Minimum output power

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	-40 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2G.

6.3.2G.2.4 Test description

6.3.2G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.2G.2.4.1-1. The details of the uplink and V2X reference measurement channels (RMCs) are specified in Annexes A.2 and A.8.3 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.2G.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range for uplink and Low range for V2X, High range for uplink and High range for V2X				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest, Highest				
Test Parameters for Channel Bandwidths						
	Downlink	**Uplink Configuration**		**V2X Configuration**		
Ch BW	N/A for min output power test	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz		QPSK	6	10 MHz	QPSK	48
3 MHz		QPSK	15	20 MHz	QPSK	96
5 MHz		QPSK	25			
10 MHz		QPSK	50			
15 MHz		QPSK	75			
20 MHz		QPSK	100			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 6.3.2G.2.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and V2X Reference Measurement channels are set according to Table 6.3.2G.2.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message contents are defined in clause 6.3.2G.2.4.3.

6.3.2G.2.4.2 Test procedure

1. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 6.3.2G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.
2. Send continuous uplink power control "down" commands in the uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.
3. Measure the mean power over all component carriers in the V2X con-current band configuration. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.3.2G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.2G.2.5 Test requirements

The minimum output power measured shall not exceed the values specified in Table 6.3.2G.2.5-1.

Table 6.3.2G.2.5-1: Minimum output power for Inter-band con-current V2X

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth (Note 1)	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.2G.3 Minimum output power for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- UE State in the Initial conditions
- part 2 spec need to be updated
- Frequency Range for considering band 47 needs to be further investigated

6.3.2G.3.1 Test purpose

To verify the UE's ability to transmit with a broadband output power below the value specified in the test requirement when the power is set to a minimum value.

6.3.2G.3.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

6.3.2G.3.3 Minimum conformance requirements

For intra-band contiguous E-UTRA V2X multiple carrier transmissions, the requirements in subclause 6.3.2A apply as specified for the corresponding intra band contiguous carrier aggregation.

The minimum output power is defined as the mean power in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2G.3.3-1.

Table 6.3.2G.3.3-1: Minimum output power for Intra-band contiguous multi-carrier V2X operation

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Minimum output power	-40 dBm					
Measurement bandwidth			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.2G.

6.3.2G.3.4 Test description

6.3.2G.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-4. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.2G.3.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annexes A.8.3 and reference GNSS configuration as defined in Table C.2-8.

Table 6.3.2G.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range , High range					
Test Channel Bandwidths as specified in subclause 5.4.2G	Lowest N_{RB_agg}, Highest N_{RB_agg}					
Test Parameters for V2X MCC Configuration						
V2X MCC Channel Bandwidth			**V2X Sidelink Configuration**			
Configuration ID	**CC1 N_{RB}**	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**N_{RB_agg}**	**CC1 and CC2 RB Allocation (LCRB @ RBstart)**	
1	50	50	QPSK	48	CC1_48@0	CC2_0@0
2	50	50	QPSK	96	CC1_48@0	CC2_48@2
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2G						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.89a.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 6.3.2G.3.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement channels are set according to Table 6.3.2G.3.4.1-1
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State [5A-V2X] according to TS 36.508 [7] clause [4.5.9]. Message contents are defined in clause 6.3.2G.3.4.3.

6.3.2G.3.4.2 Test procedure

1. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 6.3.2G.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.

2. Send continuous uplink power control "down" commands in the uplink scheduling information to the UE to ensure that the UE transmits at its minimum output power.

3. Measure the mean power over all component carriers in the V2X con-current band configuration. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6.3.2G.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.2G.3.5 Test requirements

The minimum output power measured shall not exceed the values specified in Table 6.3.2G.3.5-1.

Table 6.3.2G.3.5-1: Minimum output power for Intra-band contiguous multi-carrier V2X operation

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Minimum output power	For carrier frequency f ≤ 3.0GHz: ≤ -39 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -38.7 dBm					
Measurement bandwidth (Note 1)			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Note 1: Different implementations such as FFT or spectrum analyzer approach are allowed. For spectrum analyzer approach the measurement bandwidth is defined as an equivalent noise bandwidth.						

6.3.3 Transmit OFF power

6.3.3.1 Test purpose

To verify that the UE transmit OFF power is lower than the value specified in the test requirement.

6.3.3.2 Test applicability

The requirements of this test apply in test cases 6.3.4.1 General ON/OFF time mask and 6.3.4.2 PRACH and SRS time mask to all types of E-UTRA UE release 8 and forward.

6.3.3.3 Minimum conformance requirement

The transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1ms) excluding any transient periods. The requirement for the transmit OFF power shall not exceed the values specified in Table 6.3.3.3-1.

Table 6.3.3.3-1: Transmit OFF power

	Channel bandwidth / Transmit OFF power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Transmit OFF power	-50 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3.

Transmit OFF power is defined as the mean power when the transmitter is OFF. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During DTX and measurements gaps, the UE is not considered to be OFF.

An excess transmit OFF power potentially increases the Rise Over Thermal (RoT) and therefore reduces the cell coverage area for other UEs

6.3.3.4 Test description

This test is covered by clause 6.3.4.1 General ON/OFF time mask and 6.3.4.2 PRACH and SRS time mask.

6.3.3.5 Test requirement

The requirement for the transmit OFF power shall not exceed the values specified in Table 6.3.3.5-1.

Table 6.3.3.5-1: Transmit OFF power

	Channel bandwidth / Transmit OFF power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

6.3.3A UE Transmit OFF power for CA

6.3.3A.0 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, transmit OFF power requirement is defined per carrier and the requirement is specified in subclause 6.3.3.3.

For intra-band contiguous and non-contiguous carrier aggregation the transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1ms) excluding any transient periods. The transmit OFF power shall not exceed the values specified in Table 6.3.3A.0-1.

Table 6.3.3A.0-1: Transmit OFF power for intra-band contiguous and non-contiguous CA UE

	CC Channel bandwidth / Transmit OFF power / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	-50 dBm					
Measurement bandwidth			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands and intra-band contiguous and non-contiguous carrier aggregation, transmit OFF power is defined as the mean power per component carrier when the transmitter is OFF on all component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During measurements gaps, the UE is not considered to be OFF.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3A.

6.3.3A.1 UE Transmit OFF power for CA (intra-band contiguous DL CA and UL CA)

6.3.3A.1.1 Test purpose

For intra-band contiguous carrier aggregation the transmit OFF power is defined as the mean power per component carrier when the transmitter is OFF on both component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During measurements gaps, the UE is not considered to be OFF.

To verify that the UE transmit OFF power for CA is lower than the value specified in the test requirement.

6.3.3A.1.2 Test applicability

The requirements of this test case apply in test cases 6.3.4A.1 General ON/OFF time mask for CA and 6.3.4.2 PRACH and SRS time mask to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.3.3A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.3A.0.

6.3.3A.1.4 Test description

This test is covered by clause 6.3.4A.1.1 General ON/OFF time mask for CA and 6.3.4.2 PRACH and SRS time mask.

6.3.3A.1.5 Test Requirements

Table 6.3.3A.1.5-1: Transmit OFF power for intra-band contiguous CA UE

	Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: -48.2 dBm					
Measurement bandwidth			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

6.3.3A.2 UE Transmit OFF power for CA (inter-band DL CA and UL CA)

6.3.3A.2.1 Test purpose

For inter-band carrier aggregation with uplink assigned to two non-contiguous carriers within one E-UTRA band the transmit OFF power is defined as the mean power per component carrier when the transmitter is OFF. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During measurements gaps, the UE is not considered to be OFF.

To verify that the UE transmit OFF power for CA is lower than the value specified in the test requirement.

6.3.3A.2.2 Test applicability

The requirements of this test case apply in test cases 6.3.4A.2 General ON/OFF time mask for CA and 6.3.4.2 PRACH and SRS time mask to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.3.3A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.3A.0.

6.3.3A.2.4 Test description

This test is covered by clause 6.3.4A.1.2 General ON/OFF time mask for CA (inter-band DL CA and UL CA) and 6.3.4.2 PRACH and SRS time mask.

6.3.3A.2.5 Test Requirements

The requirement for the transmit OFF power per each component carrier shall not exceed the values specified in Table 6.3.3A.2.5-1.

Table 6.3.3A.2.5-1: Transmit OFF power

	Channel bandwidth / Transmit OFF power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

6.3.3A.3 UE Transmit OFF power for CA (intra-band non-contiguous DL CA and UL CA)

6.3.3A.3.1 Test purpose

For intra-band non-contiguous carrier aggregation with uplink assigned to two non-contiguous carriers within one E-UTRA band the transmit OFF power is defined as the mean power per component carrier when the transmitter is OFF. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During measurements gaps, the UE is not considered to be OFF.

To verify that the UE transmit OFF power for CA is lower than the value specified in the test requirement.

6.3.3A.3.2 Test applicability

The requirements of this test case apply in test cases 6.3.4A.1 General ON/OFF time mask for CA and 6.3.4.2 PRACH and SRS time mask to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.3.3A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.3A.0.

6.3.3A.3.4 Test description

This test is covered by clause 6.3.4A.1.3 General ON/OFF time mask for CA (intra-band non-contiguous DL CA and UL CA).

6.3.3A.3.5 Test Requirements

Table 6.3.3A.3.5-1: Transmit OFF power for intra-band contiguous and non-contiguous CA UE

	CC Channel bandwidth / Transmit OFF power / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Measurement bandwidth			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

6.3.3B UE Transmit OFF power for UL-MIMO

6.3.3B.1 Test purpose

To verify that the UE transmit OFF power for UL-MIMO is lower than the value specified in the test requirement.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.3B.2 Test applicability

The requirements of this test apply in test cases 6.3.4B.1 General ON/OFF time mask to all types of E-UTRA UE release 10 and forward that support UL-MIMO

6.3.3B.3 Minimum conformance requirement

The transmit OFF power is defined as the mean power at each transmit connector in a duration of at least one sub-frame (1ms) excluding any transient periods. The transmit OFF power at each transmit connector shall not exceed the values specified in Table 6.3.3B.3-1.

Table 6.3.3B.3-1: Transmit OFF power per antenna port

	Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	-50 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3B.1.

6.3.3B.4 Test description

This test is covered by clause 6.3.4B.1 General ON/OFF time mask.

6.3.3B.5 Test requirement

The requirement for the transmit OFF power at each transmit antenna connector shall not exceed the values specified in Table 6.3.3B.5-1.

Table 6.3.3B.5-1: Transmit OFF power

	Channel bandwidth / Transmit OFF power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

6.3.3C

6.3.3D UE Transmit OFF power for ProSe

6.3.3D.0 Minimum conformance requirements

When UE is configured for E-UTRA ProSe sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA ProSe operating bands specified in Table 5.2D-1, the Prose UE shall meet the Transmit OFF power at all times when the UE is not associated with a serving cell on the ProSe carrier and does not have knowledge of its geographical area or is provisioned with pre-configured radio parameters that are not associated with any known Geographical Area.

The requirements specified in subclause 6.3.3.3 shall apply to UE supporting ProSe when

- the UE is associated with a serving cell on the ProSe carrier, or
- the UE is not associated with a serving cell on the ProSe carrier and is provisioned with the preconfigured radio parameters for ProSe Direct Communications and/or ProSe Direct Discovery that are associated with known Geographical Area, or
- the UE is associated with a serving cell on a carrier different than the ProSe carrier, and the radio parameters for ProSe Direct Discovery on the ProSe carrier are provided by the serving cell, or
- the UE is associated with a serving cell on a carrier different than the ProSe carrier, and has a non-serving cell selected on the ProSe carrier that supports ProSe Direct Discovery and/or ProSe Direct Communication.

When UE is configured for simultaneous E-UTRA ProSe sidelink and E-UTRA uplink transmissions for inter-band E-UTRA ProSe / E-UTRA bands specified in Table 5.2D-2, transmit OFF power is defined as the mean power per component carrier when the transmitter is OFF on all component carriers. During measurement gaps and transmission/reception gaps for ProSe, the UE is not considered to be OFF. Transmit OFF power requirement as specified in subclause 6.3.3.3 apply per carrier.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3D.

6.3.3D.1 UE Transmit OFF power for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- It is not yet clear how many test scenarios are required to cover the set of requirements
- The Test description may be replaced by a reference to the General ON/OFF time mask for ProSe Direct Discovery Test Case
- Message exceptions content
- Test procedure for concurrent operation with E-UTRA uplink transmissions is not defined.
- The Downlink configuration is likely to require discontinuous transmission

6.3.3D.1.1 Test purpose

To verify that the UE transmit OFF power is lower than the value specified in the test requirement.

6.3.3D.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which supports ProSe Direct Discovery.

6.3.3D.1.3 Minimum Conformance requirements

The minimum conformance requirements are defined in clause 6.3.3D.0.

An excess transmit OFF power potentially increases the Rise over Thermal (RoT) and therefore reduces the cell coverage area for other UEs

6.3.3D.1.4 Test description

Editor's note: FFS: The Test description may be replaced by a reference to the General ON/OFF time mask for ProSe Direct Discovery Test Case

6.3.3D.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.3D.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2, and details of the sidelink reference measurement channels are specified in Annex A.6. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.3D.1.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, Highest		
	Downlink Configuration	**Uplink Configuration**	**Sidelink Configuration (PSDCH transmission)**
Ch BW	RB allocation	RB allocation	RB allocation
5MHz	8	8	2
10MHz	16	16	2
15MHz	25	25	2
20MHz	30	30	2

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.67.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exception is defined in clause 6.3.3D.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.3D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message content exception is defined in clause 6.3.3D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is closed and UE is set to announce discovery.

6.3.3D.1.4.2 Test procedure

1. [The method to configure the UE is FFS].
2. The SS configures the UE with an UL assignment such that the UE transmits [Physical Channel FFS, from the set {PSDCH, PSCCH, PSSCH, PSSS, SSSS, PSBCH}] on the ProSe carrier, on UL sub-frame [FFS] of every radio frame.

3. For FDD: Measure the UE transmission OFF power during the sub-frame prior to the [Physical Channel FFS] subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the [Physical Channel FFS] subframe.

4. Measure the output power of the UE [Physical Channel FFS] transmission during one sub-frame, excluding a transient period of 20 µs at the beginning of the subframe.

5. Measure the UE transmission OFF power during one sub-frame following the [Physical Channel FFS] subframe, excluding a transient period of 20 µs at the beginning of the subframe.

6.3.3D.1.4.3 Message contents

[FFS]

6.3.3D.1.5 Test requirements

The requirement for the power measured in steps (3) and (5) of the test procedure shall not exceed the values specified in Table 6.3.4.1.5-1.

Table 6.3.3D.1.5-1: Transmit OFF power

	Channel bandwidth / Transmit OFF power / measurement bandwidth					
			5 MHz	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Measurement bandwidth			4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

6.3.3E UE Transmit OFF power for UE category 0

6.3.3E.1 Test purpose

Same test purpose as in clause 6.3.3.1.

6.3.3E.2 Test applicability

The requirements of this test apply in test cases 6.3.4E.1 General ON/OFF time mask and 6.3.4E.2 PRACH and SRS time mask to all types of E-UTRA UE release 12 and forward of UE category 0.

6.3.3E.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.3.3

6.3.3E.4 Test description

This test is covered by clause 6.3.4E.1 General ON/OFF time mask and 6.3.4E.2 PRACH and SRS time mask.

6.3.3E.5 Test requirement

The requirement for the transmit OFF power shall not exceed the values specified in Table 6.3.3E.5-1.

Table 6.3.3E.5-1: Transmit OFF power

	Channel bandwidth / Transmit OFF power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

6.3.3EA UE Transmit OFF power for UE category M1

6.3.3EA.1 Test purpose

To verify that the UE transmit OFF power is lower than the value specified in the test requirement.

6.3.3EA.2 Test applicability

The requirements of this test apply in test cases 6.3.4EA.1 General ON/OFF time mask and 6.3.4EA.2 PRACH and SRS time mask to all types of E-UTRA UE release 13 and forward of UE category M1.

6.3.3EA.3 Minimum conformance requirements

The transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1ms) excluding any transient periods. The requirement for the transmit OFF power shall not exceed the values specified in Table 6.3.3EA.3-1.

Table 6.3.3EA.3-1: Transmit OFF power

	Channel bandwidth / Transmit OFF power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	-50 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3.

Transmit OFF power is defined as the mean power when the transmitter is OFF. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During DTX and measurements gaps, the UE is not considered to be OFF.

An excess transmit OFF power potentially increases the Rise over Thermal (RoT) and therefore reduces the cell coverage area for other UEs.

6.3.3EA.4 Test description

This test is covered by clause 6.3.4EA.1 General ON/OFF time mask and 6.3.4EA.2 PRACH and SRS time mask.

6.3.3EA.5 Test requirements

The requirement for the transmit OFF power shall not exceed the values specified in Table 6.3.3EA.5-1.

Table 6.3.3EA.5-1: Transmit OFF power for UE category M1

	Channel bandwidth / Transmit OFF power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

6.3.3F Transmit OFF power for category NB1

6.3.3F.1 Test purpose

To verify that the UE transmit OFF power is lower than the value specified in the test requirement.

6.3.3F.2 Test applicability

The requirements of this test apply in test cases 6.3.4F.1 General ON/OFF time mask for category NB1 and 6.3.4F.2 NPRACH time mask for category NB1 to all types of E-UTRA UE release 13 and forward of category NB1.

6.3.3F.3 Minimum conformance requirement

For category NB1 UE the transmit OFF power requirement for the channel bandwidth is -50 dBm. For 3.75 kHz sub-carrier spacing the transmit OFF power is defined as mean power in one slot (2ms) excluding the 2304Ts gap when UE is not transmitting. For 15 kHz sub-carrier spacing the transmit OFF power is defined as mean power in one sub-frame (1ms).

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3F.

6.3.3F.4 Test description

This test is covered by clause 6.3.4F.1 General ON/OFF time mask for category NB1 and 6.3.4F.2 NPRACH time mask for category NB1.

6.3.3F.5 Test requirement

The requirement for the transmit OFF power shall not exceed the values of -50 dBm for the channel bandwidth of category NB1.

6.3.3G UE Transmit OFF power for V2X Communication

6.3.3G.1 UE Transmit OFF power for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Annexes A, F.1.2, and F.3.2

- Applicability spec

6.3.3G.1.1 Test purpose

To verify that the UE transmit OFF power is lower than the value specified in the test requirement.

6.3.3G.1.2 Test applicability

The requirements of this test case apply in the test case 6.3.4G.1 General ON/OFF time mask for V2X Communication / Non-concurrent with E-UTRA uplink transmissions to all types of E-UTRA UE release 14 and forward that support V2X communication.

6.3.3G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.5G-1, the V2X UE shall meet the Transmit OFF power in subclause 6.3.3D.0.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.3G.

6.3.3G.1.4 Test description

This test is covered by clause 6.3.4G.1 General ON/OFF time mask for V2X Communication / Non-concurrent with E-UTRA uplink transmissions.

6.3.3G.1.5 Test requirements

The requirement for the transmit OFF power shall not exceed the values specified in Table 6.3.3G.1.5-1.

Table 6.3.3G.1.5-1: Transmit OFF power

	Channel bandwidth / Transmit OFF power / measurement bandwidth	
	10 MHz	20 MHz
Transmit OFF power	For carrier frequency 4.2GHz < f ≤ 6.0GHz: ≤ -48 dBm	
Measurement bandwidth	9.0 MHz	18.0 MHz

6.3.4 ON/OFF time mask

6.3.4.1 General ON/OFF time mask

6.3.4.1.1 Test purpose

To verify that the general ON/OFF time mask meets the requirements given in 6.3.4.1.5.

The time mask for transmit ON/OFF defines the ramping time allowed for the UE between transmit OFF power and transmit ON power.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4.1.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

6.3.4.1.3 Minimum conformance requirement

The General ON/OFF time mask defines the observation period between Transmit OFF and ON power and between Transmit ON and OFF power. ON/OFF scenarios include; the beginning or end of DTX, measurement gap, contiguous, and non contiguous transmission

The OFF power measurement period is defined in a duration of at least one sub-frame excluding any transient periods. The ON power is defined as the mean power over one sub-frame excluding any transient period.

There are no additional requirements on UE transmit power beyond that which is required in clause 6.2.2 and clause 6.6.2.3.

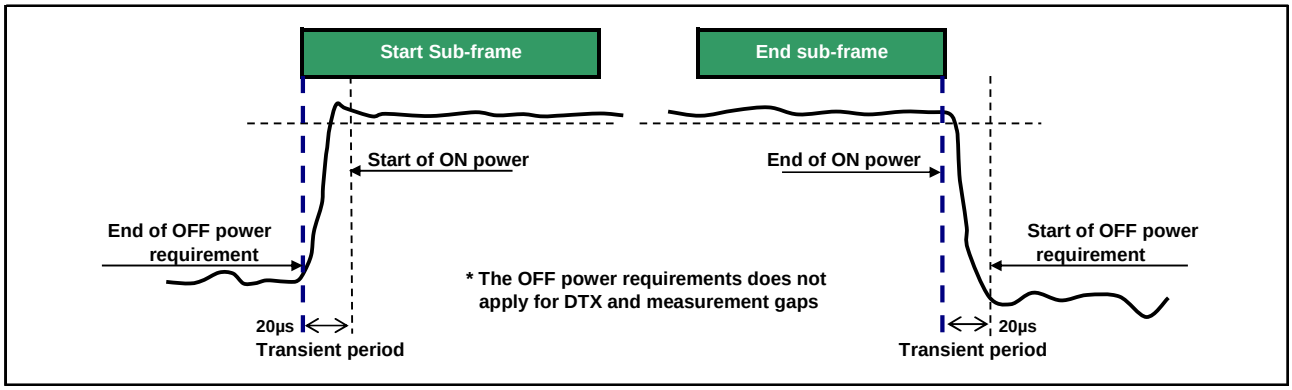


Figure 6.3.4.1.3-1: General ON/OFF time mask

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4.1.

6.3.4.1.4 Test description

6.3.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2

Table 6.3.4.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**	Low range, Mid range, High range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for General On/Off Time Mask test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.4.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4.1.4.3. Note that PDCCH DCI format 0 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.4.1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 0 with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.4.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. The UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame.

2. For FDD: Measure the UE transmission OFF power during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe.

3. Measure the output power of the UE PUSCH transmission during one sub-frame, excluding a transient period of 20 µs at the beginning of the subframe.

4. Measure the UE transmission OFF power during one sub-frame following the PUSCH subframe, excluding a transient period of 20 µs at the beginning of the subframe.

6.3.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.4.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.4.1.4.3-2: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
UplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	SRB1
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC

Table 6.3.4.1.4.3-3: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		SRB1
	0		RBC
}			

Table 6.3.4.1.4.3-4: TDD-Config-DEFAULT: On/OFF time mask measurement

Derivation Path: 36.508 clause 5.3.1 Table 5.3.1-1 (*SystemInformationBlockType1*)			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.3.4.1.5 Test requirement

The requirement for the power measured in steps (2), (3) and (4) of the test procedure shall not exceed the values specified in Table 6.3.4.1.5-1.

Table 6.3.4.1.5-1: General ON/OFF time mask

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected Transmission ON Measured power	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4.2 PRACH and SRS time mask

6.3.4.2.1 PRACH time mask

6.3.4.2.1.1 Test purpose

To verify that the PRACH time mask meets the requirements given in 6.3.4.2.1.5.

The time mask for PRACH time mask defines the ramping time allowed for the UE between transmit OFF power and transmit ON power when transmitting the PRACH.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

6.3.4.2.1.3 Minimum conformance requirement

For the PRACH Power / Time mask defines the observation period for PRACH transmissions. The PRACH ON power is specified as the mean power over the PRACH measurement period excluding any transient periods. The measurement period for different PRACH preamble format is specified in Table 6.3.4.2.1.3-1.

There are no additional requirements on UE transmit power beyond that which is required in clause 6.2.2 and clause 6.6.2.3

Table 6.3.4.2.1.3-1: PRACH ON power measurement period

PRACH preamble format	Measurement period (ms)
0	0.9031
1	1.4844
2	1.8031
3	2.2844
4	0.1479

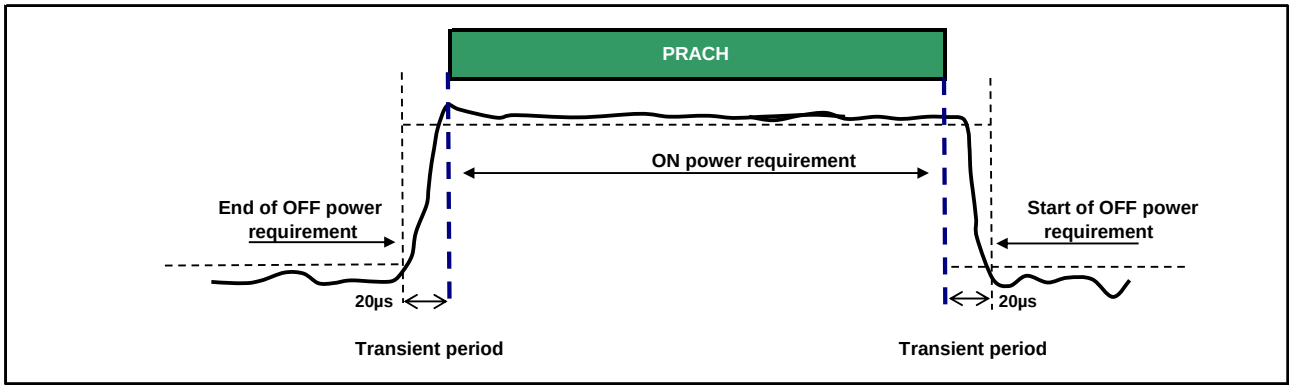


Figure 6.3.4.2.1.3-1: PRACH ON/OFF time mask

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4.2.1.

6.3.4.2.1.4 Test description

6.3.4.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4.2.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3.

Table 6.3.4.2.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	Lowest, 5MHz, Highest	
PRACH preamble format		
	FDD	TDD
PRACH Configuration Index	3	51

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4.2.1.4.3.

6.3.4.2.1.4.2 Test procedure

1. The SS shall signal a Random Access Preamble ID via a PDCCH order to the UE and initiate a Non-contention based Random Access procedure.

2. The UE shall send the signalled preamble to the SS.

3. For FDD UE, the SS measure the UE transmission OFF power during the sub-frame preceding the PRACH preamble excluding a transient period of 20 µs according to Figure 6.3.4.2.1.3-1. For TDD UE, the SS measure the UE transmission OFF power starting (20us+the duration of 8 OFDM symbols) before the PRACH starts, and ending 20us before PRACH starts. Note, the nominal PRACH timing for TDD is not aligned with the sub frame and symbol raster.

4. Measure the output power of the transmitted PRACH preamble according to Figure 6.3.4.2.1.3-1.

5. Measure the UE transmission OFF power, starting 20 µs after the PRACH preamble ends for a measurement period of 980 µs.

6.3.4.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.4.2.1.4.3-1: *RACH-ConfigCommon-DEFAULT:* PRACH measurement

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-12 RACH-ConfigCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RACH-ConfigCommon-DEFAULT ::= SEQUENCE {			
powerRampingParameters SEQUENCE {			
powerRampingStep	dB0		
preambleInitialReceivedTargetPower	dBm-104		PRACH Format 0
	dBm-112		PRACH Format 4
}			
)			

Table 6.3.4.2.1.4.3-2: *PRACH-Config-DEFAULT:* PRACH measurement for TDD

Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-3: PRACH-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PRACH-Config-DEFAULT ::= SEQUENCE {			
prach-ConfigIndex	51		TDD
}			

Table 6.3.4.2.1.4.3-3: *TDD-Config-DEFAULT:* PRACH measurement for TDD

Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-1: TDD-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.3.4.2.1.5 Test requirement

The requirement for the power measured in steps (3), (4) and (5) of the test procedure shall not exceed the values specified in Table 6.3.4.2.1.5-1.

Table 6.3.4.2.1.5-1: PRACH time mask

	Channel bandwidth / Output Power [dBm] / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected PRACH Transmission ON Measured power	-1 dBm	-1 dBm	-1 dBm	-1 dBm	-1 dBm	-1 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4.2.2 SRS time mask

6.3.4.2.2.1 Test purpose

To verify that the SRS time mask meets the requirements given in 6.3.4.2.2.5.

The time mask for SRS time mask defines the ramping time allowed for the UE between transmit OFF power and transmit ON power when transmitting the SRS.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

6.3.4.2.2.3 Minimum conformance requirement

In the case a single SRS transmission, the ON power is defined as the mean power for each symbol duration excluding any transient period. Figure 6.3.4.2.2.3-1.

In the case a dual SRS transmission, the ON power is defined as the mean power for each symbol duration excluding any transient period. Figure 6.3.4.2.2.3-2.

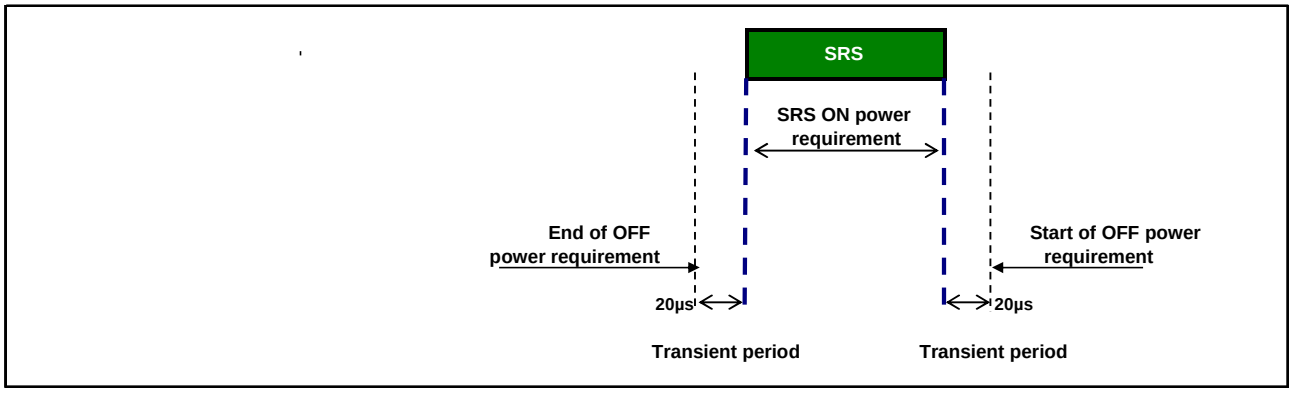


Figure 6.3.4.2.2.3-1: Single SRS time mask

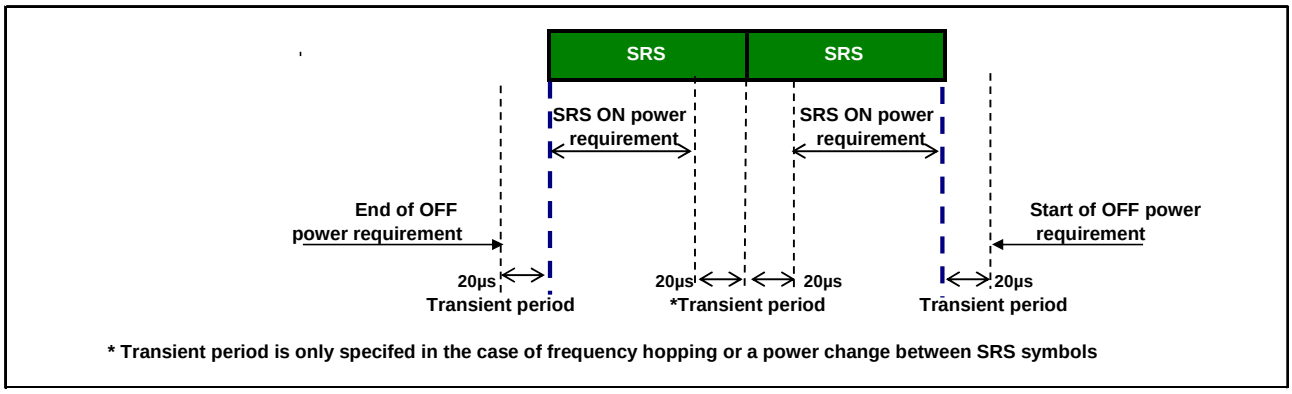


Figure 6.3.4.2.2.3-2: Dual SRS time mask for the case of UpPTS transmissions

6.3.4.2.2.4 Test description

6.3.4.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4.2.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3.

Table 6.3.4.2.2.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	Lowest, 5MHz, Highest	
SRS configuration		
	FDD	TDD
srs-BandwidthConfig	bw7	bw7 (for BW 1.4 MHz) bw5 (for BW 3 MHz) bw2 (for BW 5 MHz) bw0 (for BW 10, 15, 20 MHz)
srs-SubframeConfig	sc3	sc0
ackNackSRS-SimultaneousTransmission	FALSE	FALSE
srsMaxUpPts	N/A	N/A
srs-Bandwidth	bw3	bw3
srs-HoppingBandwidth	hbw3	hbw0
freqDomainPosition	0	0
Duration	TRUE	TRUE
srs-ConfigIndex	7	0
transmissionComb	0	0
cyclicShift	cs0	cs0

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4.2.2.4.3. Note that PDCCH DCI format 0 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.4.2.2.4.2 Test procedure

1. For FDD UE, the SS measure the UE transmission OFF power during the 13 symbols preceding the SRS symbol excluding a transient period of 20 µs according to Figure 6.3.4.2.2.3-1. For TDD UE, the SS measure the UE transmission OFF power during the 8 symbols preceding the two SRS symbols excluding a transient period of 20µs according to Figure 6.3.4.2.2.3-2.
2. Measure the output power of the transmitted SRS according to Figure 6.3.4.2.2.3-1 for FDD UE and according to Figure 6.3.4.2.2.3-2 for TDD UE, The transient periods are excluded from measurement accordingly.
3. Measure the UE transmission OFF power during the sub-frame following the SRS under test, excluding a transient period of 20 µs according to Figure 6.3.4.2.2.3-1 for FDD UE and according to Figure 6.3.4.2.2.3-2 for TDD UE.

6.3.4.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.4.2.2.4.3-1: *RadioResourceConfigCommonSIB-DEFAULT*: SRS measurement

Derivation Path: 36.508 clause 5.3.1 Table 5.3.1-2 RadioResourceConfigCommonSIB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigCommon-DEFAULT ::= SEQUENCE {			
rach-ConfigCommon	RACH-ConfigCommon-DEFAULT		
bcch-Config	BCCH-Config-DEFAULT		
pcch-Config	PCCH-Config-DEFAULT		
prach-Config	PRACH-ConfigSIB-DEFAULT		
pdsch-ConfigCommon	PDSCH-ConfigCommon-DEFAULT		
pusch-ConfigCommon	PUSCH-ConfigCommon-DEFAULT		
pucch-ConfigCommon	PUCCH-ConfigCommon-DEFAULT		
soundingRSUL-ConfigCommon	*SoundingRS-UL-ConfigCommon-DEFAULT*		
uplinkPowerControlCommon	UplinkPowerControlCommon-DEFAULT		
ul-CyclicPrefixLength	len1		
}			

Table 6.3.4.2.2.4.3-2: *SoundingRS-UL-ConfigCommon-DEFAULT*: SRS time mask measurement

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-21 SoundingRS-UL-ConfigCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
SoundingRS-UL-ConfigCommon-DEFAULT ::= SEQUENCE {			
setup SEQUENCE {			
srs-BandwidthConfig	bw7		FDD
	bw7		TDD (BW 1.4 MHz)
	bw5		TDD (BW 3 MHz)
	bw2		TDD (BW 5 MHz)
	bw0		TDD (BW 10, 15, 20 MHz)
srs-SubframeConfig	sc3	Periodicity of 5ms, with offset of 0.	FDD
	sc0	Periodicity of 5ms, with offset of 1.	TDD
ackNackSRS-SimultaneousTransmission	FALSE		
srsMaxUpPts	Not present		
}			
}			

Table 6.3.4.2.2.4.3-3: PhysicalConfigDedicated-DEFAULT: SRS time mask measurement

Derivation Path: 36.508 clause 5.5.1 Table 5.5.1.2-1: PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
soundingRS-UL-ConfigDedicated	*SoundingRSUL-ConfigDedicated-DEFAULT*		
}			

Table 6.3.4.2.2.4.3-4: *SoundingRSUL-ConfigDedicated-DEFAULT*: SRS time mask measurement

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-22 SoundingRS-UL-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
SoundingRS-UL-ConfigDedicated-DEFAULT ::= CHOICE {			
setup SEQUENCE {			
srs-Bandwidth	bw3	bw3 used to ensure that the bandwidth is constantly 4 RBs irrespective of channel bandwidth.	
srs-HoppingBandwidth	hbw3	This is selected so that hopping is disabled	FDD
	hbw0	This is selected so that hopping is enabled	TDD
freqDomainPosition	0		
Duration	TRUE	Indefinite duration	
srs-ConfigIndex	7	SRS periodicity of 10ms, Toffset=0.	FDD
	0	SRS periodicity of 2ms, Ksrs=0,1, this is two symbols UpPTS in first half subframe.	TDD
transmissionComb	0		
cyclicShift	cs0	No cyclic shift	
}			
}			

Table 6.3.4.2.2.4.3-5: TDD-Config-DEFAULT: SRS time mask measurement

Derivation Path: 36.508 331 clause 65.3.21 Table 5.3.1-1 (*SystemInformationBlockType1*)			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

Table 6.3.4.2.2.4.3-6: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
uplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	SRB1
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC

Table 6.3.4.2.2.4.3-7: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		SRB1
	0		RBC
}			

Condition	Explanation
FDD	FDD cell environment
TDD	TDD cell environment

6.3.4.2.2.5 Test requirement

The requirement for the power measured in steps (1), (2) and (3) of the test procedure shall not exceed the values specified in Table 6.3.4.2.2.5-1.

Table 6.3.4.2.2.5-1: SRS time mask

	Channel bandwidth / Output Power [dBm] / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected SRS Transmission ON Measured power	-2.6 dBm	-2.6 dBm	-2.6 dBm	-2.6 dBm	-2.6 dBm	-2.6 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4A ON/OFF time mask for CA

6.3.4A.0 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands and intra-band contiguous and non-contiguous carrier aggregation, the general output power ON/OFF time mask specified in subclause 6.3.4.1.3 is applicable for each component carrier during the ON power period and the transient periods. The OFF period as specified in subclause 6.3.4.1.3 shall only be applicable for each component carrier when all the component carriers are OFF.

The normative references for this requirement are TS 36.101 [2] clauses 6.3.4A and 6.3.4.

6.3.4A.1 General ON/OFF time mask for CA

6.3.4A.1.1 General ON/OFF time mask for CA (intra-band contiguous DL CA and UL CA)

6.3.4A.1.1.1 Test purpose

To verify that the general ON/OFF time mask for CA meets the requirements given in 6.3.4A.1.1.5.

The time mask for transmit ON/OFF for CA defines the ramping time allowed for the UE between transmit OFF power and transmit ON power for CA.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4A.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.3.4A.1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.4A.0.

6.3.4A.1.1.4 Test description

6.3.4A.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.4A.1.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexe A.2 and A3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.4A.1.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] clause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low range, High range					
Test CC Combination setting (N_{RB_agg}) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**UL Allocation**					
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50	N/A for this test	QPSK	75	P_25@0	S_50@0		
50	50		QPSK	100	P_50@0	S_50@0		
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	25		QPSK	125	P_100@0	S_25@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.4A.1.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4A.1.1.4.3.

6.3.4A.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.3.4A.1.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.4A.1.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. The each UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame.
5. For FDD: Measure the UE transmission OFF power for each component carrier during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe.
6. Measure the output power of the UE PUSCH transmission for each component carrier during one sub-frame, excluding a transient period of 20 µs at the beginning of the subframe.
7. Measure the UE transmission OFF power for each component carrier during one sub-frame following the PUSCH subframe, excluding a transient period of 20 µs at the beginning of the subframe.

6.3.4A.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.4A.1.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission for PCC	

Table 6.3.4A.1.1.4.3-2: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
UplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	UL CA

Table 6.3.4A.1.1.4.3-3: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		RBC
	0		UL CA
}			

Table 6.3.4A.1.1.4.3-4: UplinkPowerControlCommonSCell-r10: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE {			
p0-NominalPUSCH-r10	-105	Test point 1 to verify a UE relative low initial power transmission for SCC	

Table 6.3.4A.1.1.4.3-5: TDD-Config-DEFAULT: On/OFF time mask measurement

Derivation Path: 36.508 [7] clause 5.3.1, Table 5.3.1-1 (*SystemInformationBlockType1*)			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.3.4A.1.1.5 Test requirement

The requirement for the power measured in steps 5, 6 and 7 of the test procedure shall not exceed the values specified in Table 6.3.4.1.5-1.

6.3.4A.1.2 General ON/OFF time mask for CA (inter-band DL CA and UL CA)

6.3.4A.1.2.1 Test purpose

To verify that the general ON/OFF time mask for CA meets the requirements given in 6.3.4A.1.2.5.

The time mask for transmit ON/OFF for CA defines the ramping time allowed for the UE between transmit OFF power and transmit ON power for CA.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4A.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.3.4A.1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.4A.0.

6.3.4A.1.2.4 Test description

6.3.4A.1.2.4.1 Initial conditions

Same as in clause 6.3.4A.1.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.3.4A.1.1.4.1-1→ use Table 6.3.4A.1.2.4.1-1.
- Instead of clause 6.3.4A.1.1.4.3 use clause 6.3.4A.1.2.4.3.

Table 6.3.4A.1.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Low range for PCC and SCC High range for PCC and SCC						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/Afor this test	QPSK	31	P_6@0	S_25@0	-	-
6	50		QPSK	56	P_6@0	S_50@0	-	-
25	15		QPSK	40	P_25@0	S_15@0	-	-
25	25		QPSK	50	P_25@0	S_25@0	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

6.3.4A.1.2.4.2 Test procedure

Same test procedure as in clause 6.3.4A.1.1.4.2.

- Instead of Table 6.3.4A.1.1.4.1-1→ use Table 6.3.4A.1.2.4.1-1.
- Instead of clause 6.3.4A.1.1.4.3 use clause 6.3.4A.1.2.4.3.

6.3.4A.1.2.4.3 Message contents

The message contents are the same as in clause 6.3.4A.1.1.4.3.

6.3.4A.1.2.5 Test requirement

The requirement for the power measured in steps 5, 6 and 7 of the test procedure shall not exceed the values specified in Table 6.3.4A.1.2.5-1.

Table 6.3.4A.1.2.5-1: General ON/OFF time mask

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected Transmission ON Measured power	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4A.1.3 General ON/OFF time mask for CA (intra-band non-contiguous DL CA and UL CA)

6.3.4A.1.3.1 Test purpose

To verify that the general ON/OFF time mask for CA meets the requirements given in 6.3.4A.1.3.5.

The time mask for transmit ON/OFF for CA defines the ramping time allowed for the UE between transmit OFF power and transmit ON power for CA.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4A.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.3.4A.1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.4A.0.

6.3.4A.1.3.4 Test description

6.3.4A.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.4A.1.3.4.1-1. The details of the uplink and downlink

reference measurement channels (RMCs) are specified in Annexe A.2 and A3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.4A.1.3.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH								
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: Low Wgap, Maximum Wgap								
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC								
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	QPSK	P_25@0	QPSK	S_25@0
2	25	25	5	N/A	N/A	QPSK	P_25@0	QPSK	S_25@0
3	100	100	5	N/A	N/A	QPSK	P_100@0	QPSK	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.									

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.4A.1.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4A.1.3.4.3.

6.3.4A.1.3.4.2 Test procedure

Same test procedure as in clause 6.3.4A.1.1.4.2.

6.3.4A.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with exceptions as in clause 6.3.4A.1.1.4.3.

6.3.4A.1.3.5 Test requirement

The requirement for the power measured in steps 5, 6 and 7 of the test procedure shall not exceed the values specified in Table 6.3.4.1.5-1.

6.3.4B ON/OFF time mask for UL-MIMO

6.3.4B.1 General ON/OFF time mask for UL-MIMO

Editor's note: The measurement period in the minimum requirement is defined to be 1 subframe (14 symbols). Due to practical reasons the TDD measurement period for off power prior the PUSCH is 10 symbols. It is FFS, if this deviation is acceptable.

Editor's notes: The following items are missing or incomplete:

- The initial conditions and test procedure are subject to further investigation

6.3.4B.1.1 Test purpose

To verify that the general ON/OFF time mask for UL-MIMO meets the requirements given in 6.3.4B.1.5.

The time mask for transmit ON/OFF defines the ramping time allowed for each transmit antenna of UE between transmit OFF power and transmit ON power.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4B.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO

6.3.4B.1.3 Minimum conformance requirement

For UE with multiple transmit antenna connectors, the ON/OFF time mask requirements in subclause 6.3.4.1.3 apply to each transmit antenna connector.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the general ON/OFF time mask requirements specified in subclause 6.3.4.1.3 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4B

6.3.4B.1.4 Test description

6.3.4B.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4B.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2

Table 6.3.4B.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**	Low range, Mid range, High range	
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	Lowest, 5MHz, Highest	
Test Parameters for Channel Bandwidths		
	Downlink Configuration	**Uplink Configuration**

Ch BW	N/A for General On/Off Time Mask test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.4B.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.4B.1.4.3. Note that PDCCH DCI format 4 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.4B.1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH with DCI format 4 and TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.4B.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. The UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame.
2. For FDD: Measure the UE transmission OFF power during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe.
3. Measure the output power of the UE PUSCH transmission during one sub-frame, excluding a transient period of 20 µs at the beginning of the subframe.
4. Measure the UE transmission OFF power during one sub-frame following the PUSCH subframe, excluding a transient period of 20 µs at the beginning of the subframe.
5. Repeat step 2) until 4) for each of transmit antenna of the UE.

6.3.4B.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.4B.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.4B.1.4.3-2: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
UplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See clause 4.6.3	SRB1
	UplinkPowerControlDedicated-DEFAULT	See clause 4.6.3	RBC

Table 6.3.4B.1.4.3-3: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		SRB1
	0		RBC
}			

Table 6.3.4B.1.3-4: TDD-Config-DEFAULT: On/OFF time mask measurement

Derivation Path: 36.508 clause 5.3.1 Table 5.3.1-1 (*SystemInformationBlockType1*)			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.3.4B.1.5 Test requirement

The requirement for the power measured in steps (2), (3) and (4) of the test procedure shall not exceed the values specified in Table 6.3.4B.1.5-1.

Table 6.3.4B.1.5-1: General ON/OFF time mask

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected Transmission ON Measured power	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	7.5 dB ±7.8dB	7.5 dB ±7.8dB	7.5dB ±7.8dB	7.5dB ±7.8dB	7.5dB ±7.8dB	7.5dB ±7.8dB

6.3.4C ON/OFF time mask for DC

6.3.4C.1 General ON/OFF time mask for Dual Connectivity

6.3.4C.1.1 Test purpose

To verify that the general ON/OFF time mask meets the requirements given in 6.3.4A.1.2.5 in a synchronous Dual Connectivity scenario with maximum (33us) time offset between carriers.

The time mask for transmit ON/OFF for CA and DC defines the ramping time allowed for the UE between transmit OFF power and transmit ON power for CA and DC.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4C.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward that support Dual Connectivity.

6.3.4C.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.4A.0.

6.3.4C.1.4 Test description

6.3.4C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E UTRA CA configurations specified in table 5.4.2A.1-2 with support of Uplink CA. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.4C.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexe A.2 and A3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.4C.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Low range for MCG & SCG High range for MCG & SCG						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
MCG CC N_{RB}	**SCG CC N_{RB}**	**MCG & SCG RB allocation**		**N_{RB_alloc}**	**MCG & SCG RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/Afor this test	QPSK	31	P_6@0	S_25@0	-	-
6	50		QPSK	56	P_6@0	S_50@0	-	-
25	15		QPSK	40	P_25@0	S_15@0	-	-
25	25		QPSK	50	P_25@0	S_25@0	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for MCG CC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.4C.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-DC1 according to TS 36.508 [7] clause 5.2A.2A. Message contents are defined in clause 6.3.4C.1.4.3.

6.3.4C.1.4.2 Test procedure

1. Configure SCG CC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels with a time offset of +33 us compared to PCG CC
2. The SS shall configure SCG CC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.3.4C.1.4.3.

3. SS activates SCG CC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.4C.1.4.1-1 on both MCG CC and SCG CC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Each UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame.

5. For FDD: Measure the UE transmission OFF power for each component carrier during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe. In time domain, the measurement shall end at the subframe border of MCG CC.

6. Measure the output power of the UE PUSCH transmission for each component carrier during one sub-frame, excluding a transient period of 20 µs at the beginning of each subframe.

7. Measure the UE transmission OFF power for each component carrier during one sub-frame following the PUSCH subframe, excluding a transient period of 20 µs at the beginning of the subframe. In time domain, the measurement shall start 20 µs after the subframe border of SCG CC.

6.3.4C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.4C.1.4.3-1: UplinkPowerControlCommon

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE {			
p0-NominalPUSCH	-105		

Table 6.3.4C.1.4.3-2: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
UplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	UL CA

Table 6.3.4C.1.4.3-3: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		RBC
	0		UL CA
}			

Table 6.3.4C.1.4.3-4: UplinkPowerControlCommonSCell-r10

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE {			
p0-NominalPUSCH-r10	-105		

Table 6.3.4C.1.4.3-5: TDD-Config-DEFAULT

Derivation Path: 36.508 [7] clause 5.3.1, Table 5.3.1-1 (*SystemInformationBlockType1*)			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.3.4C.1.5 Test requirement

The requirement for the power measured in steps 5, 6 and 7 of the test procedure shall not exceed the values specified in Table 6.3.4A.1.2.5-1.

Table 6.3.4C.1.5-1: General ON/OFF time mask

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected Transmission ON Measured power	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4C.1_1 General ON/OFF time mask for asynchronous Dual Connectivity

6.3.4C.1_1.1 Test purpose

To verify that the general ON/OFF time mask meets the requirements given in 6.3.4A.1.2.5 in an asynchronous Dual Connectivity scenario with maximum (500us) time offset between carriers.

The time mask for transmit ON/OFF for CA and DC defines the ramping time allowed for the UE between transmit OFF power and transmit ON power for CA and DC.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4C.1_1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward that support asynchronous Dual Connectivity.

6.3.4C.1_1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.4A.0.

6.3.4C.1_1.4 Test description

6.3.4C.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E UTRA CA configurations specified in table 5.4.2A.1-2 with support of Uplink CA. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.4C.1_1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexe A.2 and A3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.4C.1_1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Low range for MCG & SCG High range for MCG & SCG						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
MCG CC N_{RB}	**SCG CC N_{RB}**	**MCG & SCG RB allocation**		**N_{RB_alloc}**	**MCG & SCG RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/Afor this test	QPSK	31	P_6@0	S_25@0	-	-
6	50		QPSK	56	P_6@0	S_50@0	-	-
25	15		QPSK	40	P_25@0	S_15@0	-	-
25	25		QPSK	50	P_25@0	S_25@0	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for MCG CC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.4C.1_1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-DC1 according to TS 36.508 [7] clause 5.2A.2A. Message contents are defined in clause 6.3.4C.1_1.4.3.

6.3.4C.1_1.4.2 Test procedure

1. Configure SCG CC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels with a time offset of +500 us compared to PCG CC

2. The SS shall configure SCG CC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.3.4C.1_1.4.3.

3. SS activates SCG CC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.4C.1_1.4.1-1 on both MCG CC and SCG CC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Each UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame.

5. For FDD: Measure the UE transmission OFF power for each component carrier during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe. In time domain, the measurement shall end at the subframe border of MCG CC.

6. Measure the output power of the UE PUSCH transmission for each component carrier during one sub-frame, excluding a transient period of 20 µs at the beginning of each subframe.

7. Measure the UE transmission OFF power for each component carrier during one sub-frame following the PUSCH subframe, excluding a transient period of 20 µs at the beginning of the subframe. In time domain, the measurement shall start 20 µs after the subframe border of SCG CC.

6.3.4C.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.4C.1_1.4.3-1: UplinkPowerControlCommon

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105		

Table 6.3.4C.1_1.4.3-2: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
UplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	UL CA

Table 6.3.4C.1_1.4.3-3: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		RBC
	0		UL CA
}			

Table 6.3.4C.1_1.4.3-4: UplinkPowerControlCommonSCell-r10

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE {			
p0-NominalPUSCH-r10	-105		

Table 6.3.4C.1_1.4.3-5: TDD-Config-DEFAULT

Derivation Path: 36.508 [7] clause 5.3.1, Table 5.3.1-1 (*SystemInformationBlockType1*)			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

Table 6.3.4C.1_1.4.3-6: SCG-Configuration-r12-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-19F: SCG-Configuration-r12-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
setup SEQUENCE {			PSCell_Mod, PSCell_Add_Split_DRB, PSCell_Add_SCG_DRB
scg-ConfigPartMCG-r12 SEQUENCE {			
scg-Counter-r12	0	INTEGER (0..65535)	
powerCoordinationInfo-r12 SEQUENCE {			
p-MeNB-r12	6 (30%)	INTEGER (1..16) mapped to 0..15 in Table 5.1.4.2-1 in TS 36.213 for power allocation for DC (0% - 100%)	
p-SeNB-r12	6 (30%)	INTEGER (1..16) mapped to 0..15 in Table 5.1.4.2-1 in TS 36.213 for power allocation for DC (0% - 100%)	
powerControlMode-r12	2	DC power control mode 2	
}			
}			

6.3.4C.1_1.5 Test requirement

The requirement for the power measured in steps 5, 6 and 7 of the test procedure shall not exceed the values specified in Table 6.3.4A.1.2.5-1.

Table 6.3.4C.1_1.5-1: General ON/OFF time mask

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected Transmission ON Measured power	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4E ON/OFF time mask for UE category 0

6.3.4E.1 General ON/OFF time mask for UE category 0

6.3.4E.1.1 Test purpose

Same test purpose as in clause 6.3.4.1.1.

6.3.4E.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.3.4E.1.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.4.1.3.

6.3.4E.1.4 Test description

6.3.4E.1.4.1 Initial conditions

Same initial conditions as in clause 6.3.4.1.4.1 with following exception:

- Instead of Table 6.3.4.1.4.1-1 → use Table 6.3.4E.1.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.3.4E.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**		Low range, Mid range, High range		
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**		Lowest, 5MHz, Highest		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for General On/Off Time Mask test case	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	36	36
15MHz		QPSK	36	36
20MHz		QPSK	36	36
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

6.3.4E.1.4.2 Test procedure

Same test procedure as in clause 6.3.4.1.4.2 with the following exception for HD-FDD:

- In step 2, measure the transmission OFF power as for FDD.

6.3.4E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.4E.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.4E.1.4.3-2: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
UplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	SRB1
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC

Table 6.3.4E.1.4.3-3: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		SRB1
	0		RBC
}			

Table 6.3.4E.1.4.3-4: TDD-Config-DEFAULT: On/OFF time mask measurement

Derivation Path: 36.508 clause 5.3.1 Table 5.3.1-1 (*SystemInformationBlockType1*)			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.3.4E.1.5 Test requirement

The requirement for the power measured in steps (2), (3) and (4) of the test procedure shall not exceed the values specified in Table 6.3.4E.1.5-1.

Table 6.3.4E.1.5-1: General ON/OFF time mask

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected Transmission ON Measured power	-14.8 dBm	-10.8 dBm	-8.6 dBm	-7 dBm	-7 dBm	-7 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4E.2 PRACH and SRS time mask for UE category 0

6.3.4E.2.1 PRACH time mask for UE category 0

6.3.4E.2.1.1 Test purpose

Same test purpose as in clause 6.3.4.2.1.1.

6.3.4E.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.3.4E.2.1.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.4.2.1.3.

6.3.4E.2.1.4 Test description

6.3.4E.2.1.4.1 Initial conditions

Same initial conditions as in clause 6.3.4.2.1.4.1 with the following exception:

- Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

6.3.4E.2.1.4.2 Test procedure

Same test procedure as in clause 6.3.4.2.1.4.2.

6.3.4E.2.1.4.3 Message contents

Same message contents as in clause 6.3.4.2.1.3.

6.3.4E.2.1.5 Test requirement

The requirement for the power measured in steps (3), (4) and (5) of the test procedure shall not exceed the values specified in Table 6.3.4E.2.1.5-1.

Table 6.3.4E.2.1.5-1: PRACH time mask

	Channel bandwidth / Output Power [dBm] / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected PRACH Transmission ON Measured power	-1 dBm	-1 dBm	-1 dBm	-1 dBm	-1 dBm	-1 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4E.2.2 SRS time mask for UE category 0

6.3.4E.2.2.1 Test purpose

Same test purpose as in clause 6.3.4.2.2.1.

6.3.4E.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.3.4E.2.2.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.4.2.2.3.

6.3.4E.2.2.4 Test description

6.3.4E.2.2.4.1 Initial conditions

Same initial conditions as in clause 6.3.4.2.2.4.1 with the following exception:

- Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

6.3.4E.2.2.4.2 Test procedure

Same test procedure as in clause 6.3.4.2.2.4.2.

6.3.4E.2.2.4.3 Message contents

Same message contents as in clause 6.3.4.2.2.4.3.

6.3.4E.2.2.5 Test requirement

The requirement for the power measured in steps (1), (2) and (3) of the test procedure shall not exceed the values specified in Table 6.3.4E.2.2.5-1.

Table 6.3.4E.2.2.5-1: SRS time mask

	Channel bandwidth / Output Power [dBm] / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Expected SRS Transmission ON Measured power	-2.6 dBm	-2.6 dBm	-2.6 dBm	-2.6 dBm	-2.6 dBm	-2.6 dBm
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB	± 7.5dB ± 7.8dB

6.3.4EA ON/OFF time mask for UE category M1

6.3.4EA.1 General ON/OFF time mask for UE category M1

6.3.4EA.1.1 Test purpose

Same test purpose as in clause 6.3.4.1.1.

6.3.4EA.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.3.4EA.1.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.4.1.3.

6.3.4EA.1.4 Test description

6.3.4EA.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4EA.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2

Table 6.3.4EA.1.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5 MHz				
Test Parameters for Channel Bandwidths					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for General On/Off Time Mask test case	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
5MHz		QPSK	6	6	0
Note 1: Denote where in the channel bandwidth the narrowband shall be placed. Narrowband and narrowband index are defined in TS 36.211, 5.2.4.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.4EA.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.3.4EA.1.4.3. Note that MPDCCH DCI format 6-0A sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.4EA.1.4.2 Test procedure

1. The SS sends uplink scheduling information via MPDCCH DCI format 6-0A with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.4EA.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. For FDD and TDD: The UL assignment is such that the UE transmits on UL sub-frame 2 of every radio frame. For HD-FDD: The UL assignment is such that the UE transmits on UL sub-frame 5 of every radio frame.
2. For FDD and HD-FDD: Measure the UE transmission OFF power during the sub-frame prior to the PUSCH subframe. For TDD: Measure the UE transmission OFF power during the 10 SCFDMA symbols prior to the PUSCH subframe.
3. Measure the output power of the UE PUSCH transmission during one sub-frame, excluding a transient period of 20 µs at the beginning of the subframe.
4. Measure the UE transmission OFF power during one sub-frame following the PUSCH subframe, excluding a transient period of 20 µs at the beginning of the subframe.

6.3.4EA.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA and the following exceptions:

Table 6.3.4EA.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.4EA.1.4.3-2: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
UplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	SRB1
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC

Table 6.3.4EA.1.4.3-3: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		SRB1
	0		RBC
}			

Table 6.3.4EA.1.4.3-4: TDD-Config-DEFAULT: On/OFF time mask measurement

Derivation Path: 36.508 clause 5.3.1 Table 5.3.1-1 (*SystemInformationBlockType1*)			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.3.4EA.1.5 Test requirement

The requirement for the power measured in steps (2), (3) and (4) of the test procedure shall not exceed the values specified in Table 6.3.4EA.1.5-1.

Table 6.3.4EA.1.5-1: General ON/OFF time mask

	Channel bandwidth / minimum output power / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	N/A	N/A	4.5 MHz	N/A	N/A	N/A
Expected Transmission ON Measured power	N/A	N/A	-14.8 dBm	N/A	N/A	N/A
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	N/A	N/A	± 7.5dB ± 7.8dB	N/A	N/A	N/A

6.3.4EA.2 PRACH and SRS ON/OFF time mask for UE category M1

6.3.4EA.2.1 PRACH time mask for UE category M1

6.3.4EA.2.1.1 Test purpose

Same test purpose as in clause 6.3.4.2.1.1.

6.3.4EA.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.3.4EA.2.1.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.4.2.1.3.

6.3.4EA.2.1.4 Test description

6.3.4EA.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4EA.2.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3.

Table 6.3.4EA.2.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5 MHz	
PRACH preamble format	FDD and HD-FDD	TDD
PRACH Configuration Index	3	51

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.3.4EA.2.1.4.3.

6.3.4EA.2.1.4.2 Test procedure

1. The SS shall signal a Random Access Preamble ID via a MPDCCH order to the UE and initiate a Non-contention based Random Access procedure.
2. The UE shall send the signalled preamble to the SS.
3. For FDD UE, the SS measure the UE transmission OFF power during the sub-frame preceding the PRACH preamble excluding a transient period of 20 µs according to Figure 6.3.4.2.1.3-1. For TDD UE, the SS measure the UE transmission OFF power starting (20us+the duration of 8 OFDM symbols) before the PRACH starts, and ending 20us before PRACH starts. Note, the nominal PRACH timing for TDD is not aligned with the sub frame and symbol raster.
4. Measure the output power of the transmitted PRACH preamble according to Figure 6.3.4.2.1.3-1.
5. Measure the UE transmission OFF power, starting 20 µs after the PRACH preamble ends for a measurement period of 980 µs.

6.3.4EA.2.1.4.3 Message contents

Same message contents as in clause 6.3.4.2.1.4.3 with the condition CEModeA.

6.3.4EA.2.1.5 Test requirement

The requirement for the power measured in steps (3), (4) and (5) of the test procedure shall not exceed the values specified in Table 6.3.4EA.2.1.5-1.

Table 6.3.4EA.2.1.5-1: PRACH time mask

	Channel bandwidth / Output Power [dBm] / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	N/A	N/A	4.5 MHz	N/A	N/A	N/A
Expected PRACH Transmission ON Measured power	N/A	N/A	-1 dBm	N/A	N/A	N/A
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	N/A	N/A	± 7.5dB ± 7.8dB	N/A	N/A	N/A

6.3.4EA.2.2 SRS time mask for UE category M1

6.3.4EA.2.2.1 Test purpose

Same test purpose as in clause 6.3.4.2.2.1.

6.3.4EA.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.3.4EA.2.2.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.4.2.2.3.

6.3.4EA.2.2.4 Test description

6.3.4EA.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4EA.2.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3.

Table 6.3.4EA.2.2.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5 MHz	
SRS configuration		
	FDD and HD-FDD	TDD
srs-BandwidthConfig	bw7	bw7
srs-SubframeConfig	sc3	sc0
ackNackSRS-SimultaneousTransmission	FALSE	FALSE
srsMaxUpPts	N/A	N/A
srs-Bandwidth	bw3	bw3
srs-HoppingBandwidth	hbw3	hbw0
freqDomainPosition	0	0
Duration	TRUE	TRUE
srs-ConfigIndex	7	0
transmissionComb	0	0
cyclicShift	cs0	cs0

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.3.4EA.2.2.4.3. Note that MPDCCH DCI format 6-0A sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.4EA.2.2.4.2 Test procedure

1. For FDD and HD-FDD UE, the SS measure the UE transmission OFF power during the 13 symbols preceding the SRS symbol excluding a transient period of 20 µs according to Figure 6.3.4.2.2.3-1. For TDD UE, the SS measure the UE transmission OFF power during the 8 symbols preceding the two SRS symbols excluding a transient period of 20µs according to Figure 6.3.4.2.2.3-2.
2. Measure the output power of the transmitted SRS according to Figure 6.3.4.2.2.3-1 for FDD and HD-FDD UE and according to Figure 6.3.4.2.2.3-2 for TDD UE, the transient periods are excluded from measurement accordingly.
3. Measure the UE transmission OFF power during the sub-frame following the SRS under test, excluding a transient period of 20 µs according to Figure 6.3.4.2.2.3-1 for FDD and HD-FDD UE and according to Figure 6.3.4.2.2.3-2 for TDD UE.

6.3.4EA.2.2.4.3 Message contents

Same message contents as in clause 6.3.4.2.2.4.3.

6.3.4EA.2.2.5 Test requirement

The requirement for the power measured in steps (1), (2) and (3) of the test procedure shall not exceed the values specified in Table 6.3.4EA.2.2.5-1.

Table 6.3.4EA.2.2.5-1: SRS time mask

	Channel bandwidth / Output Power [dBm] / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm For carrier frequency 3.0GHz < f ≤ 4.2GHz: ≤ -48.2 dBm					
Transmission OFF Measurement bandwidth	N/A	N/A	4.5 MHz	N/A	N/A	N/A
Expected SRS Transmission ON Measured power	N/A	N/A	-2.6 dBm	N/A	N/A	N/A
ON power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	N/A	N/A	± 7.5dB ± 7.8dB	N/A	N/A	N/A

6.3.4F ON/OFF time mask for category NB1

6.3.4F.1 General ON/OFF time mask for category NB1

6.3.4F.1.1 Test purpose

To verify that the general ON/OFF time mask meets the requirements given in 6.3.4F.1.5.

The time mask for transmit ON/OFF defines the ramping time allowed for the UE between transmit OFF power and transmit ON power.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4F.1.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.3.4F.1.3 Minimum conformance requirement

E-UTRA general ON/OFF time mask in subclause 6.3.4.1 applies for category NB1 UE with an exception that for 3.75kHz sub-carrier spacing the transmit OFF power is defined as mean power in one slot (2ms) and for 15kHz sub-carrier spacing the transmit OFF power is defined as mean power in one sub-frame (1ms), excluding any transient periods. The ON power is defined as the mean power over one RU excluding any transient periods.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4F.1.

6.3.4F.1.4 Test description

6.3.4F.1.4.1 Initial conditions

Initial conditions are set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4F.1.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annex A.2. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.3.4F.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	**Modulation**	**N_{tones}**	**Sub-carrier spacing (kHz)**
1		QPSK	1@0	15kHz

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to [Annex H.1 and H.3.0].

4. The UL Reference Measurement channel is set according to Table 6.3.4F.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.3.4F.1.4.3.

6.3.4F.1.4.2 Test procedure

1. SS sends uplink scheduling information via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.3.4F.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. (UE should be already transmitting P_{UMAX} after Initial Conditions setting)

2. Measure the UE transmission OFF power as the mean power in one sub-frame (1ms) prior to the NPUSCH RU, excluding a transient period of 20 µs at the beginning of the sub-frame.

3. Measure the output power of the UE NPUSCH transmission as the mean power in one RU, excluding a transient period of 20 µs at the beginning of the RU.

4. Measure the UE transmission OFF power power as the mean power in one sub-frame (1ms) following the NPUSCH RU, excluding a transient period of 20 µs at the beginning of the sub-frame.

6.3.4F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions.

Table 6.3.4F.1.4.3-1: P0-NominalNPUSCH-r13 configuration

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-14: UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	-117 (dBm)		
alpha-r13	al1 (1)		
deltaPreambleMsg3-r13	4		
}			

Table 6.3.4F.1.4.3-2: NPDSCH-ConfigCommon-NB-DEFAULT configuration

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-4: NPDSCH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	21 (dBm)		
}			

6.3.4F.1.5 Test requirement

The requirement for the power measured in steps (2), (3) and (4) of the test procedure shall not exceed the values specified in Table 6.3.4F.1.5-1.

Table 6.3.4F.1.5-1: General ON/OFF time mask for category NB1

	Channel bandwidth / minimum output power / measurement bandwidth
	200 kHz
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm
Transmission OFF Measurement bandwidth	180kHz
Expected Transmission ON Measured power	-11 dBm
ON power tolerance f ≤ 3.0GHz	± 7.5 dB

6.3.4F.2 NPRACH time mask for category NB1

6.3.4F.2.1 Test purpose

To verify that the NPRACH time mask meets the requirements given in 6.3.4F.2.5.

The time mask for NPRACH time mask defines the ramping time allowed for the UE between transmit OFF power and transmit ON power when transmitting the NPRACH.

Transmission of the wrong power increases interference to other channels, or increases transmission errors in the uplink channel.

6.3.4F.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of category NB1.

6.3.4F.2.3 Minimum conformance requirement

The NPRACH ON power is specified as the mean power over the NPRACH measurement period excluding any transient periods as shown in Figure 6.3.4F.2.3-1. The measurement period for different NPRACH preamble format is specified in Table 6.3.4F.2.3-1.

There are no additional requirements on UE transmit power beyond that which is required in subclause 6.2.2F and subclause 6.6.2F.3.

Table 6.3.4F.2.3-1: NPRACH ON power measurement period

NPRACH preamble format	**Measurement period (ms)**
0	5.6
1	6.4

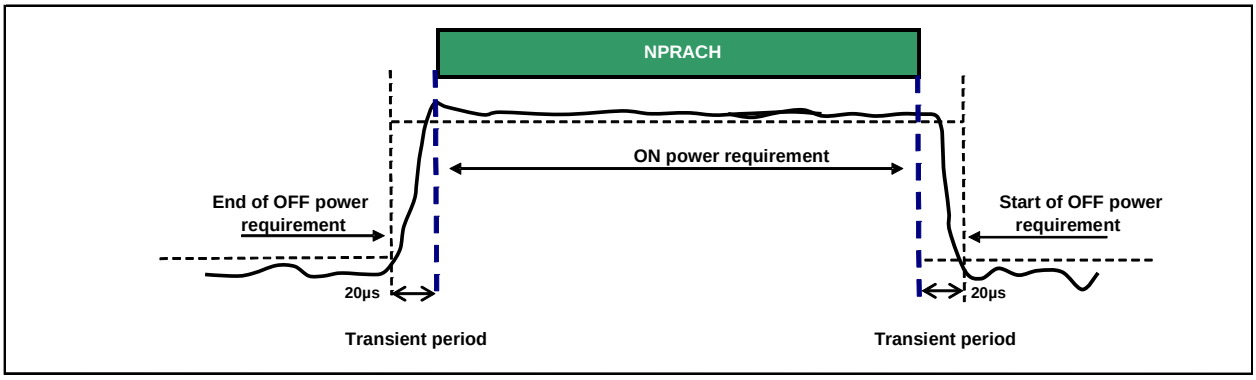


Figure 6.3.4F.2.3-1: NPRACH ON/OFF time mask

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4F.2.

6.3.4F.2.4 Test description

6.3.4F.2.4.1 Initial conditions

Initial conditions are set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.4F.2.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annex A.2.4.

Table 6.3.4F.2.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 8.1.1	Normal
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1	Frequency ranges defined in Annex K.1.1
NPRACH preamble format	0
	1

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to [Annex H.1 and H.3.0].
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.3.4F.2.4.3 with NPRACH Format 0.

6.3.4F.2.4.2 Test procedure

1. The SS shall set RS EPRE according to Table 6.3.4F.2.4.1-1.
2. The SS send the paging and UE shall send a preamble to the SS.
3. The SS measure the UE transmission OFF power during the sub-frame preceding the NPRACH preamble excluding a transient period of 20 µs according to Figure 6.3.4F.2.3-1.

4. Measure the output power of the transmitted NPRACH preamble according to Figure 6.3.4F.2.3-1.
5. Measure the UE transmission OFF power, starting 20 µs after the NPRACH preamble ends for a measurement period of 980 µs.
6. Switches off and on the UE and ensures the UE is in State 3A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.3.4F.1.4.3 with NPRACH Format 1.
7. Repeat test with step 1-4.

6.3.4F.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 8.1.6 with the following exceptions:

Table 6.3.4F.2.4.3-1: RACH-ConfigCommon-NB-DEFAULT*:* NPRACH measurement

Derivation Path: TS 36.508 [7] clause 8.1.6, Table 8.1.6.3-8 RACH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RACH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
powerRampingParameters-r13 SEQUENCE {			
powerRampingStep	dB0	0 dB	
preambleInitialReceivedTargetPower	-dBm-120	-120 dBm	NPRACH Format 0
	dBm-120	-120 dBm	NPRACH Format 1
}			
)			

Table 6.3.4F.2.4.3-2: NPDSCH-ConfigCommon-NB-DEFAULT configuration

Derivation Path: TS 36.508 [7] clause 8.1.6.3, Table 8.1.6.3-4 NPDSCH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	24 (dBm)		
}			

6.3.4F.2.5 Test requirement

The requirement for the power measured in steps (3), (4) and (5) of the test procedure shall not exceed the values specified in Table 6.3.4F.2.5-1.

Table 6.3.4F.2.5-1: NPRACH time mask for category NB1

	Channel bandwidth / minimum output power / measurement bandwidth
	200 kHz
Transmit OFF power	For carrier frequency f ≤ 3.0GHz: ≤ -48.5 dBm
Transmission OFF Measurement bandwidth	180 kHz
Expected NPRACH Transmission ON Measured power	-11 dBm
ON power tolerance f ≤ 3.0GHz	± 7.5 dB

6.3.4G ON/OFF time mask for V2X Communication

6.3.4G.1 General ON/OFF time mask for V2X Communication

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- RB allocation

- Connection diagram

- The UE test loop mode is TBD.

- Test procedure and requirements

6.3.4G.1.1 Test purpose

To verify that the general ON/OFF time mask meets the requirements given in 6.3.4G.1.5.

6.3.4G.1.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

6.3.4G.1.3 Minimum conformance requirements

For V2X Communications, additional requirements on ON/OFF time masks for V2X physical channels and signals are specified in this clause.

The General ON/OFF time mask in subclause 6.3.4D.1 [2] apply for E-UTRA V2X sidelink UE.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.4G.

6.3.4G.1.4 Test description

6.3.4G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table [5.4.2G.1-1]. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.3.4G.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2

Table 6.3.4G.1.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest		
Test Parameters for Channel Bandwidths			
	Downlink Configuration	**Uplink Configuration**	**Sidelink Configuration (PSDCH transmission)**
Ch BW	RB allocation	RB allocation	RB allocation
10MHz	[TBD]	[TBD]	[TBD]
20MHz	[TBD]	[TBD]	[TBD]

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 6.3.4G.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.4G.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message content exceptions are defined in clause 6.3.4G.1.4.3.
7. The SS continues with the generic procedures described in TS 36.508 [7] clause 5.2A.2.3 and 5.2A.3.3 and ensures the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3 and the UE test loop mode [TBD] is closed and the UE is set to announce V2X Communication.

6.3.4G.1.4.2 Test procedure

FFS

6.3.4G.1.4.3 Message contents

FFS

6.3.4G.1.5 Test requirement

FFS

6.3.5 Power Control

Power control is used to limit the interference level and compensate the channel fading. The UE power is defined as the mean power in a subframe or ON power duration, whichever is available.

The UE transmission can be in two contiguity modes, i.e. contiguous transmission and non-contiguous transmission. The former has a transmission gap of 0 and the later has a transmission gap larger than 0. The transmission gap is the time interval between the end of the last UE transmission subframe and the beginning of the next UE transmission subframe or the UpPTS (for TDD).

6.3.5.1 Power Control Absolute power tolerance

6.3.5.1.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value at the start of a contiguous transmission or non-contiguous transmission with a long transmission gap, i.e. transmission gap is larger than 20 ms.

6.3.5.1.2 Test applicability

This test applies to all types of E-UTRA Power Class 3 UE release 8 and forward.

6.3.5.1.3 Minimum conformance requirement

Absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap larger than 20ms.

The minimum requirement on absolute power tolerance is given in Table 6.3.5.1.3-1 over the power range bounded by the Maximum output power as defined in sub-clause 6.2.2 and the Minimum output power as defined in sub clause 6.3.2.

For operating bands under Note 2 in Table 6.2.2.3-1, the absolute power tolerance as specified in Table 6.3.5.1.3-1 is relaxed by reducing the lower limit by 1.5 dB when the transmission bandwidth is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} − 4 MHz and F_{UL_high}.

Table 6.3.5.1.3-1: Absolute power tolerance

Conditions	Tolerance
Normal conditions	± 9.0 dB
Extreme conditions	± 12.0 dB

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5.1.1.

6.3.5.1.4 Test description

6.3.5.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5.1.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**		Mid range		
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**		Lowest, 5MHz, Highest		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Power Control Absolute power tolerance test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.3.5.1.4.1-1.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5.1.4.3. Note that PDCCH DCI format 0 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.5.1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 0 with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.5.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Measure the initial output power of the first subframe of UE PUSCH first transmission. The transient periods of 20us are excluded.

3. Repeat for the two test points as indicated in section 6.3.5.1.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.5.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE {			
p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5.1.4.3-2: UplinkPowerControlCommon: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE {			
p0-NominalPUSCH	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5.1.4.3-3: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
uplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	SRB1
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC

Table 6.3.5.1.4.3-4: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		SRB1
	0		RBC
}			

6.3.5.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5.1.5-1 and 6.3.5.1.5-2.

Table 6.3.5.1.5-1: Absolute power tolerance: test point 1

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3						

Table 6.3.5.1.5-2: Absolute power tolerance: test point 2

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2.3						

6.3.5.2 Power Control Relative power tolerance

6.3.5.2.1 Test purpose

To verify the ability of the UE transmitter to set its output power relatively to the power in a target sub-frame relatively to the power of the most recently transmitted reference sub-frame if the transmission gap between these sub-frames is ≤ 20 ms.

6.3.5.2.2 Test applicability

This test applies to all types of E-UTRA Power Class 3 UE release 8 and forward.

6.3.5.2.3 Minimum conformance requirement

The UE shall meet the requirements specified in Table 6.3.5.2.3-1.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of two test patterns. The test patterns are a monotonically increasing power sweep and a monotonically decreasing power sweep over a range

bounded by the requirements of minimum power and maximum power specified in clauses 6.3.2.3 and 6.2.2.3. For these exceptions the power tolerance limit is a maximum of ±6.0 dB in Table 6.3.5.2.3-1.

Table 6.3.5.2.3-1 Relative Power Tolerance for Transmission (normal conditions)

Power step ΔP (Up or down) [dB]	All combinations of PUSCH and PUCCH transitions [dB]	All combinations of PUSCH/PUCCH and SRS transitions between sub-frames [dB]	PRACH [dB]
ΔP < 2	±2.5 (Note 3)	±3.0	±2.5
2 ≤ ΔP < 3	±3.0	±4.0	±3.0
3 ≤ ΔP < 4	±3.5	±5.0	±3.5
4 ≤ ΔP ≤ 10	±4.0	±6.0	±4.0
10 ≤ ΔP < 15	±5.0	±8.0	±5.0
15 ≤ ΔP	±6.0	±9.0	±6.0

Note 1: For extreme conditions an additional ± 2.0 dB relaxation is allowed

Note 2: For operating bands under Note 2 in Table 6.2.2.3-1, the relative power tolerance is relaxed by increasing the upper limit by 1.5 dB if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges; if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges, then the tolerance is relaxed by reducing the lower limit by 1.5 dB.

Note 3: For PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods for TDD: for a power step ΔP ≤ 1 dB, the relative power tolerance for transmission is ±1.0 dB.

The power step (ΔP) is defined as the difference in the calculated setting of the UE Transmit power between the target and reference sub-frames with the power setting according to Clause 5.1 of TS 36.213. The error is the difference between ΔP and the power change measured at the UE antenna port with the power of the cell-specific reference signals kept constant. The error shall be less than the relative power tolerance specified in Table 6.3.5.2.3-1.

The normative reference for this requirement is TS 36.101 clause 6.3.5.2.

6.3.5.2.4 Test description

6.3.5.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Power Control Relative power tolerance test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	See table 6.3.5.2.5-1 6.3.5.2.5-2 6.3.5.2.5-13	See table 6.3.5.2.5-1 6.3.5.2.5-2 6.3.5.2.5-13
3MHz		QPSK	See table 6.3.5.2.5-3 6.3.5.2.5-4 6.3.5.2.5-13	See table 6.3.5.2.5-3 6.3.5.2.5-4 6.3.5.2.5-13
5MHz		QPSK	See table 6.3.5.2.5-5 6.3.5.2.5-6 6.3.5.2.5-13	See table 6.3.5.2.5-5 6.3.5.2.5-6 6.3.5.2.5-13
10MHz		QPSK	See table 6.3.5.2.5-7 6.3.5.2.5-8 6.3.5.2.5-13	See table 6.3.5.2.5-7 6.3.5.2.5-8 6.3.5.2.5-13
15MHz		QPSK	See table 6.3.5.2.5-9 6.3.5.2.5-10 6.3.5.2.5-13	See table 6.3.5.2.5-9 6.3.5.2.5-10 6.3.5.2.5-13
20MHz		QPSK	See table 6.3.5.2.5-11 6.3.5.2.5-12 6.3.5.2.5-13	See table 6.3.5.2.5-11 6.3.5.2.5-12 6.3.5.2.5-13
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1 Note 2: The starting resource block shall be RB# 0.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to table 6.3.5.2.4.1-1

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5.2.4.3.

6.3.5.2.4.2 Test procedure

The procedure is separated in various subtests to verify different aspects of relative power control. The power patterns of the subtests are described in figure 6.3.5.2.4.2-1.

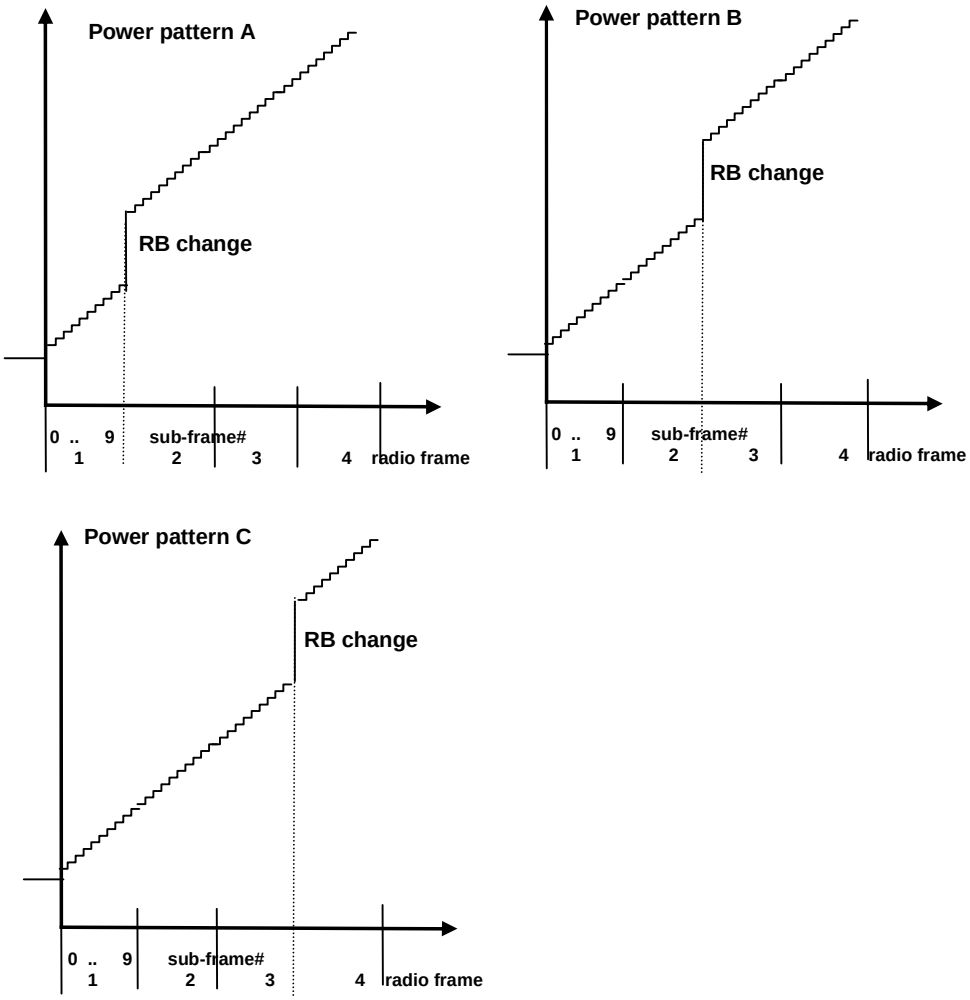


Figure 6.3.5.2.4.2-1: FDD ramping up test power patterns

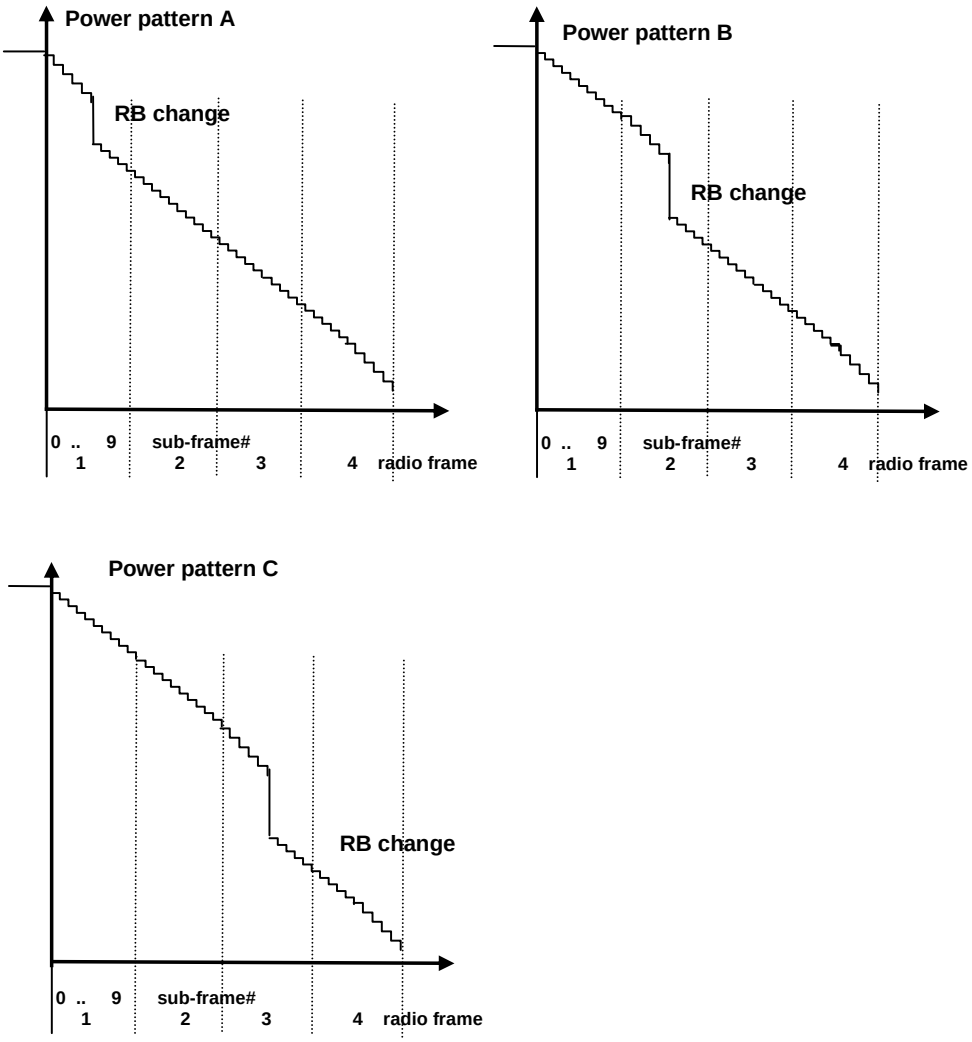


Figure 6.3.5.2.4.2-2: FDD ramping down test power patterns

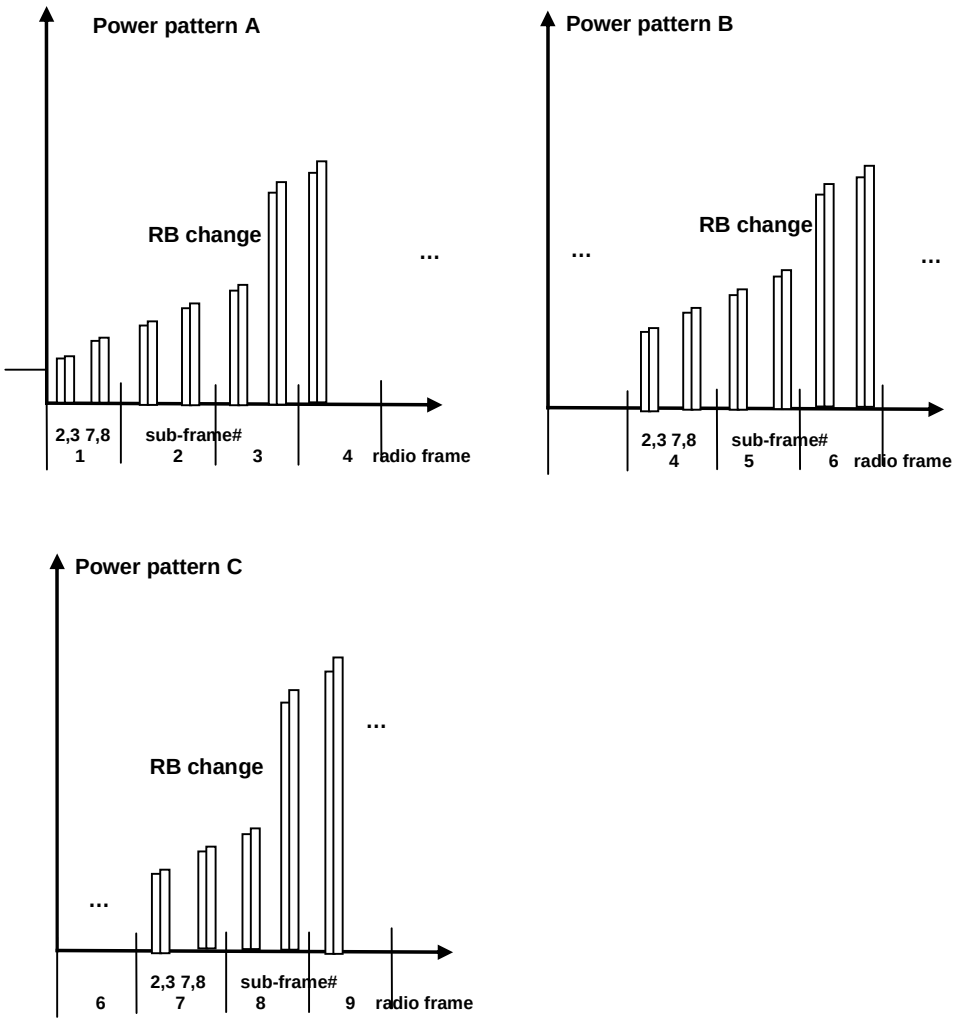


Figure 6.3.5.2.4.2-3: TDD ramping up test power patterns

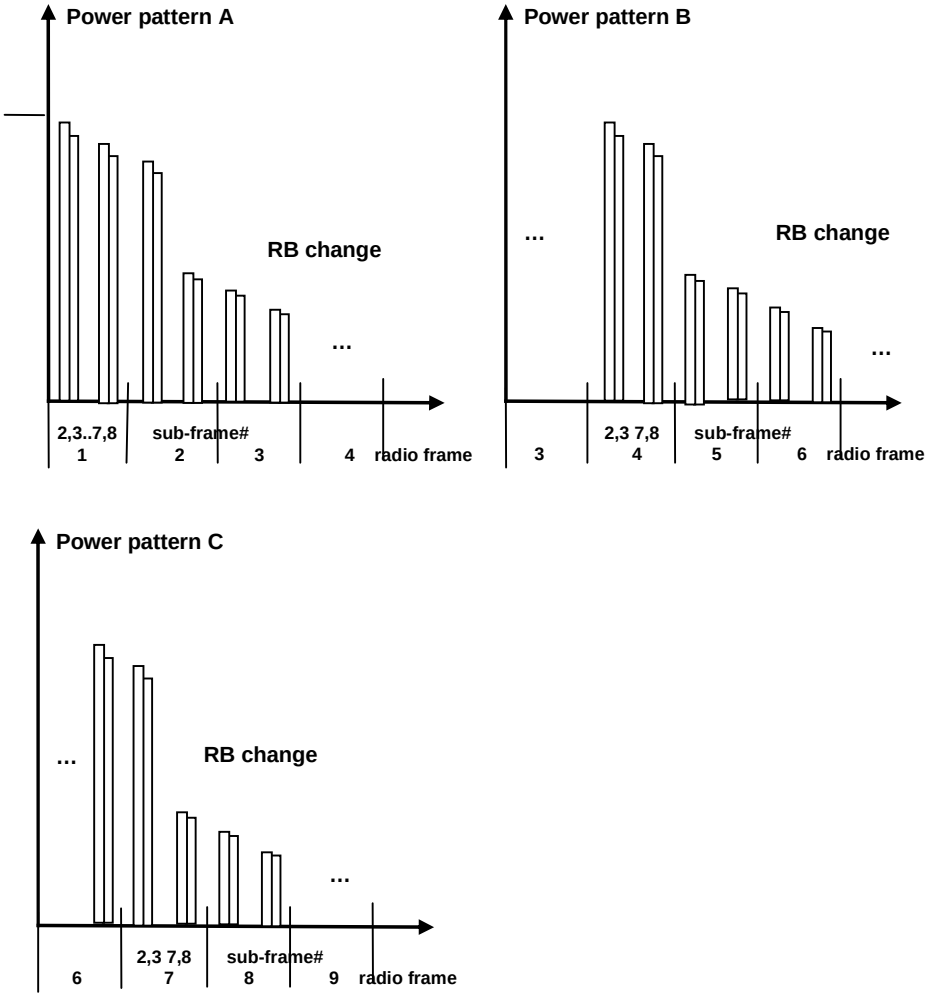


Figure 6.3.5.2.4.2-4: TDD ramping down test power patterns

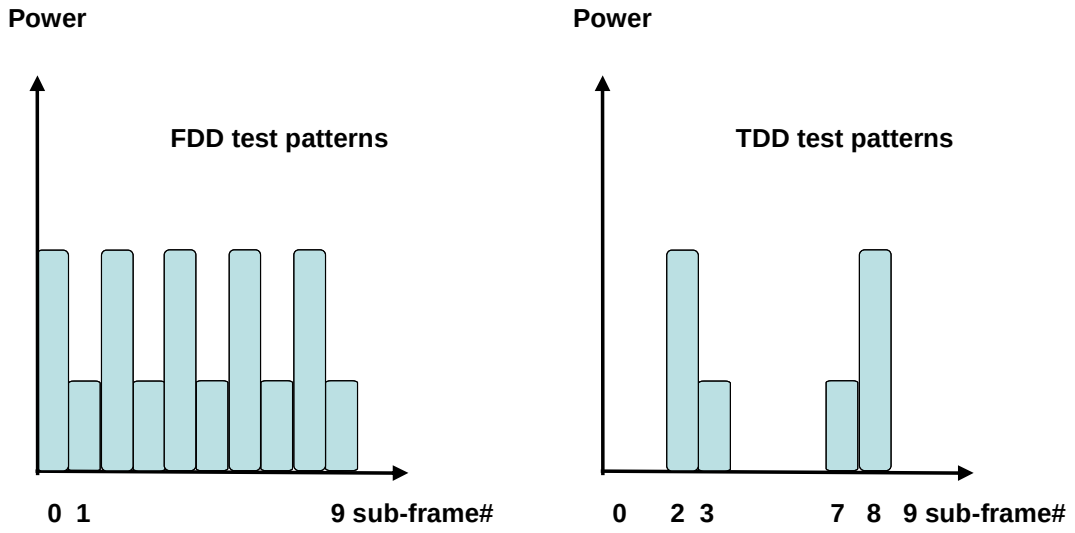


Figure 6.3.5.2.4.2-5: Alternating Test Power patterns

1. Sub test: ramping up pattern

   1.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -36.8dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at -36.5dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

   1.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5.2.5-1 thru 6.3.5.2.5-12 depending on channel bandwidth. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a +1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

   1.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

   1.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5.2.5-1 thru Table 6.3.5.2.5-12 to force bigger UE power steps at various points in the power range.

2. Sub test: ramping down pattern

   2.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at +18.0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at +17.7dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

   2.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5.2.5-1 thru 6.3.5.2.5-12 depending on channel bandwidth. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a -1dB

TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

2.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

2.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5.2.5-1 thru Table 6.3.5.2.5-12 to force bigger UE power steps at various points in the power range.

3. Sub test: alternating pattern

3.1 SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -10dBm +/- 3.2 dB for carrier frequency $f \leq 3.0$GHz or at -10dBm +/- 3.5 dB for carrier frequency 3.0GHz $< f \leq$ 4.2GHz. The initial uplink RB allocation is defined as the smaller uplink RB allocation value specified in tables 6.3.5.2.5-13. The power level and RB allocation are reset for each sub-test.

3.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5.2.4.2-5for 10 sub-frames with an uplink RB allocation alternating pattern as defined in table 6.3.5.2.5-13 while transmitting 0dB TPC command for PUSCH via the PDCCH.

3.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements specified in clause 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.3.5.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5.2.5 Test requirement

Each UE power step measured in the test procedure 6.3.5.2.4.2 should satisfy the test requirements specified in Table 6.3.5.2.5-1, thru 6.3.5.2.5-13 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns. For these exceptions the power tolerance limit is a maximum of ±6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5.2.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 6 RBs	TPC=+1dB	8.78	4 ≤ ΔP < 10	8.78 ± (4.7) Note 2 8.78 +6.2/-4.7 Note 3
Subframes after RB change	Fixed = 6	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 5	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 5 to 1 RBs	TPC=-1dB	7.99	4 ≤ ΔP < 10	7.99 ± (4.7) Note 2 7.99 +4.7/-6.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 4 RBs	TPC=+1dB	7.02	4 ≤ ΔP < 10	7.02 ± (4.7) Note 2 7.02 +6.2/-4.7 Note 3
Subframes after RB change	Fixed =4	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 15	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 15 to 1 RBs	TPC=-1dB	12.76	10 ≤ ΔP < 15	12.76 ± (5.7) Note 2 12.76 +5.7/-7.2 Note 4
Subframes after RB change	Fixed =1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern **A** the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 20	TPC=+1dB	14.01	10 ≤ ΔP < 15	14.01 ± (5.7) Note 2 14.01 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 20	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 25	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 25 to 1	TPC=-1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +5.7/-7.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 25	TPC=+1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 25	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 50 (UE-Categories ≥2) Fixed = 48 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 50 to 1 (UE-Categories ≥2) Change from 48 to 1 (UE cat 1)	TPC=-1dB	17.99 17.81	15 ≤ Δ	17.99 ± (6.7) Note 2 17.99 +6.7/-8.2 Note 4 17.81 ± (6.7) Note 2 17.81 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 50	TPC=+1dB	17.99	15 ≤ ΔP	17.99±(6.7) Note 2 17.99 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 50	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 75 (UE-Categories ≥2) Fixed = 50 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 75 to 1 (UE-Categories ≥2) Change from 50 to 1 (UE Cat 1)	TPC=-1dB	19.75 17.99	15 ≤ ΔP	19.75 ± (6.7) Note 2 19.75 +6.7/-8.2 Note 4 17.99 ± (6.7) Note 2 17.99 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 75	TPC=+1dB	19.75	15 ≤ ΔP	19.75 ± (6.7) Note 2 19.75 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 75	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 100 (UE-Categories ≥2) Fixed = 75 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 100 to 1 (UE-Categories ≥2) Change from 75 to 1 (UE Cat 1)	TPC=-1dB	21.0 19.75	15 ≤ ΔP	21.0 ± (6.7) Note 2 21.0 +6.7/-8.2 Note 4 19.75 ± (6.7) Note 2 19.75 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5.2.5-13: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) (Alternating pattern)

Sub-test	Uplink RB allocation	TPC command	Expected power step size (Up or down) ΔP [dB]	Power step size range (Up or down) ΔP [dB]	PUSCH [dB]
1.4 MHz	Alternating 1 and 6	TPC=0dB	7.78	4 ≤ ΔP < 10	7.78 ± (6.7) Note 1,2 7.78 +8.2/-6.7 Note 3 7.78 +6.7/-8.2 Note 4
3 MHz	Alternating 1 and 15	TPC=0dB	11.76	10 ≤ ΔP < 15	11.76 ± (6.7) Note 1,2 11.76 +8.2/-6.7 Note 3 11.76 +6.7/-8.2 Note 4
5 MHZ	Alternating 1 and 25	TPC=0dB	13.98	10 ≤ ΔP < 15	13.98 ± (6.7) Note 1,2 13.98 +8.2/-6.7 Note 3 13.98 +6.7/-8.2 Note 4
10 MHZ	Alternating 1 and 50 (UE-Categories ≥2) Alternating 1 and 48 (UE Cat 1)	TPC=0dB	16.99 16,81	15 ≤ ΔP	16.99 ± (6.7) Note 1,2 16.99 +8.2/-6.7 Note 3 16.99 +6.7/-8.2 Note 4 16.81 ± (6.7) Note 1,2 16.81 +8.2/-6.7 Note 3 16.81 +6.7/-8.2 Note 4
15 MHZ	Alternating 1 and 75 (UE-Categories ≥2) Alternating 1 and 50 (UE Cat 1)	TPC=0dB	18.75 16.99	15 ≤ ΔP	18.75 ± (6.7) Note 1,2 18.75 +8.2/-6.7 Note 3 18.75 +6.7/-8.2 Note 4 16.99 ± (6.7) Note 1,2 16.99 +8.2/-6.7 Note 3 16.99 +6.7/-8.2 Note 4
20 MHZ	Alternating 1 and 100 (UE-Categories ≥2) Alternating 1 and 75 (UE Cat 1)	TPC=0dB	20.00 18.75	15 ≤ ΔP	20.00 ± (6.7) Note 1,2 20.00 +8.2/-6.7 Note 3 20.00 +6.7/-8.2 Note 4 18.75 ± (6.7) Note 1,2 18.75 +8.2/-6.7 Note 3 18.75 +6.7/-8.2 Note 4

Note 1: Test tolerance +/- 6.7 dB was selected to allow PA switch possible exceptions to occur.
Note 2: When neither Note 3 nor Note 4 applies.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

6.3.5.3 Aggregate power control tolerance

6.3.5.3.1 Test purpose

To verify the ability of the UE to maintain its power level in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in TS 36.213 are constant.

6.3.5.3.2 Test applicability

This test applies to all types of E-UTRA Power Class 3 UE release 8 and forward.

6.3.5.3.3 Minimum conformance requirement

The UE shall meet the requirements specified in Table 6.3.5.3.3-1 for relative power control over the power range bounded by the minimum output power as defined in sub clause 6.3.2 and the maximum output power in subclause 6.2.2.

Table 6.3.5.3.3-1: Power control tolerance

TPC command	UL channel	Aggregate power tolerance within 21 ms
0 dB	PUCCH	±2.5 dB
0 dB	PUSCH	±3.5 dB
Note 1: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5.3.1.

6.3.5.3.4 Test description

6.3.5.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5.3.4.1-1: Test Configuration Table: PUCCH sub-test

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1				Normal
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**				Mid range
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**				Lowest, 5MHz, Highest
Test Parameters for Channel Bandwidths				
	Downlink Configuration			**Uplink Configuration**
Ch BW	Mod'n	RB allocation		FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a/1b
		FDD	TDD	

1.4MHz	QPSK	3	3	
3MHz	QPSK	4	4	
5MHz	QPSK	8	8	
10MHz	QPSK	16	16	
15MHz	QPSK	25	25	
20MHz	QPSK	30	30	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

Table 6.3.5.3.4.1-2: Test Configuration Table: PUSCH sub-test

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal			
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**	Mid range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for PUSCH sub-test	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and DL Reference Measurement channels are set according to Table 6.3.5.3.4.1-1 (PUCCH sub-test) and Table 6.3.5.3.4.1-2 (PUSCH sub-test).

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5.3.4.3.

6.3.5.3.4.2 Test procedure

The procedure is separated in two subtests to verify PUCCH and PUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5.3.4.2-1.

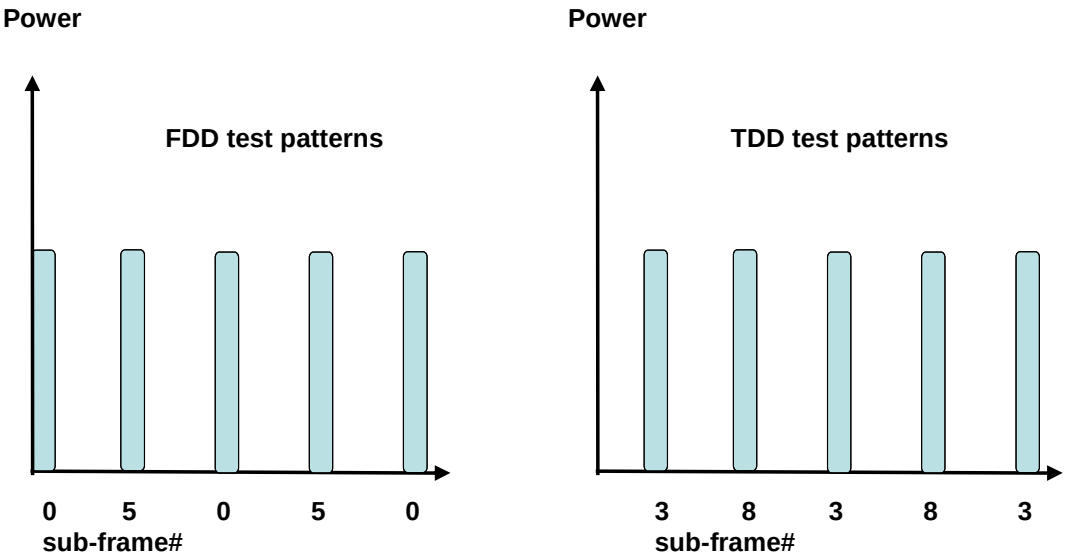


Figure 6.3.5.3.4.2-1 Test uplink transmission

1. PUCCH sub test:

1.1 The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.3.5.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. Send the appropriate TPC commands for PUCCH to the UE to ensure that the UE transmits PUCCH at 0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.2. Every 5 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the PDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 4 subframes. The downlink transmission is scheduled in the appropriate sub-frames to make the UE transmit PUCCH as described in figure 6.3.5.3.4.2-1.

1.3. Measure the power of 5 consecutive PUCCH transmissions to verify the UE transmitted PUCCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

2. PUSCH sub test:

2.1. The SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency f ≤ 3.0GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.2. Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5.3.4.2-1.

2.3. Measure the power of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

6.3.5.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5.3.5 Test requirement

The requirement for the power measurements made in step (1.3) and (2.3) of the test procedure shall not exceed the values specified in Table 6.3.5.3.5-1. The power measurement period shall be 1 sub-frame excluding transient periods.

Table 6.3.5.3.5-1: Power control tolerance

TPC command	UL channel	Test requirement measured power
0 dB	PUCCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 3.2 dB of the 1st measurement.
0 dB	PUSCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 4.2 dB of the 1st measurement.
Note 1: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

6.3.5_1 Power Control for HPUE

Same text as in clause 6.3.5.

6.3.5_1.1 Power Control Absolute power tolerance for HPUE

6.3.5_1.1.1 Test purpose

Same test purpose as in clause 6.3.5.1.1.

6.3.5_1.1.2 Test applicability

This test applies to all types of E-UTRA Power Class 1 or Power Class 2 UE release 10 and forward.

6.3.5_1.1.3 Minimum conformance requirement

Same minimum conformance requirement as in clause 6.3.5.1.3 with the following exceptions:

- Instead of sub-clause 6.2.2 → use sub-clause 6.2.2_1

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5.1.1.

6.3.5_1.1.4 Test description

Same test description as in clause 6.3.5.1.4 with the following exceptions:

- For test point 2, instead of Table 6.3.5.1.4.3-2 → use Table 6.3.5_1.1.4.3-1 or 6.3.5_1.1.4.3-2

Table 6.3.5_1.1.4.3-1: UplinkPowerControlCommon: Test point 2 for Power Class 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE {			
p0-NominalPUSCH	-85	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5_1.1.4.3-2: UplinkPowerControlCommon: Test point 2 for Power Class 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-90	Test point 2 to verify a UE relative high initial power transmission	

6.3.5_1.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Tables 6.3.5_1.1.5-1, 6.3.5_1.1.5-2, 6.3.5_1.1.5-3, and 6.3.5_1.1.5-4.

Table 6.3.5_1.1.5-1: Absolute power tolerance: test point 1 for Power Class 1

	Channel bandwidth / expected output power (dBm)	
	5 MHz	**10 MHz**
Expected Measured power Normal conditions	-8.6 dBm	-5.6 dBm
Power tolerance	± 10.0dB	± 10.0dB
Expected Measured power Extreme conditions	-8.6 dBm	-5.6 dBm
Power tolerance	± 13.0dB	± 13.0dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3		

Table 6.3.5_1.1.5-2: Absolute power tolerance: test point 1 for Power Class 2

	Channel bandwidth / expected output power (dBm)			
	5 MHz	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz	± 10.0dB	± 10.0dB	± 10.0dB	± 10.0dB
Expected Measured power Extreme conditions	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz	± 13.0dB	± 13.0dB	± 13.0dB	± 13.0dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.3				

Table 6.3.5_1.1.5-3: Absolute power tolerance: test point 2 for Power Class 1

	Channel bandwidth / expected output power (dBm)	
	5 MHz	**10 MHz**
Expected Measured power Normal conditions	11.4 dBm	14.4 dBm
Power tolerance	± 10.0dB	± 10.0dB
Expected Measured power Extreme conditions	11.4 dBm	14.4 dBm
Power tolerance	± 13.0dB	± 13.0dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined by the power class in sub-clause 6.2.2_1.3.		

Table 6.3.5_1.1.5-4: Absolute power tolerance: test point 2 for Power Class 2

	Channel bandwidth / expected output power (dBm)			
	5 MHz	10 MHz	15 MHz	20 MHz
Expected Measured power Normal conditions	6.4 dBm	9.4 dBm	11.2 dBm	12.4 dBm
Power tolerance f ≤ 3.0GHz	± 10.0dB	± 10.0dB	± 10.0dB	± 10.0dB
Expected Measured power Extreme conditions	6.4 dBm	9.4 dBm	11.2 dBm	12.4 dBm
Power tolerance f ≤ 3.0GHz	± 13.0dB	± 13.0dB	± 13.0dB	± 13.0dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined by the power class in sub-clause 6.2.2_1.3				

6.3.5_1.2 Power Control Relative power tolerance for HPUE

6.3.5_1.2.1 Test purpose

Same test purpose as in clause 6.3.5.2.1.

6.3.5_1.2.2 Test applicability

This test applies to all types of E-UTRA Power Class 1 or Power Class 2 UE release 10 and forward.

6.3.5_1.2.3 Minimum conformance requirement

Same minimum conformance requirement as in clause 6.3.5.2.3 with the following exceptions

- Instead of clause 6.2.2.3 → use sub-clause 6.2.2_1.3

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5.2.

6.3.5_1.2.4 Test description

Same test description as in clause 6.3.5.2.4 with the following exceptions:

- Power Class 1: In clause 6.3.5.2.4.2, test step 2.1, setting the UE PUSCH power at +26dBm +/-3.2dB instead of +18.0dBm +/-3.2dB
- Power Class 2: In clause 6.3.5.2.4.2, test step 2.1, setting the UE PUSCH power at +21dBm +/-3.2dB instead of +18.0dBm +/-3.2dB

6.3.5_1.2.5 Test requirement

Same test requirement as in clause 6.3.5.2.5.

6.3.5_1.3 Aggregate power control tolerance for HPUE

6.3.5_1.3.1 Test purpose

Same test purpose as in clause 6.3.5.3.1.

6.3.5_1.3.2 Test applicability

This test applies to all types of E-UTRA Power Class 1 or Power Class 2 UE release 10 and forward.

6.3.5_1.3.3 Minimum conformance requirement

Same minimum conformance requirement as in clause 6.3.5.3.3 with the following exception:

- Instead of sub-clause 6.2.2 → use sub-clause 6.2.2_1

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5.3.1.

6.3.5_1.3.4 Test description

Same test description as in clause 6.3.5.3.4.

6.3.5_1.3.5 Test requirement

Same test requirement as in clause 6.3.5.3.5.

6.3.5A Power Control for CA

6.3.5A.1 Power Control Absolute power tolerance for CA

6.3.5A.1.0 Minimum conformance requirements

The absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms. The requirement can be tested by time aligning any transmission gaps on the component carriers.

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the absolute power control tolerance is specified on each component carrier exceed the minimum output power as defined in subclause 6.3.2A and the total power is limited by maximum output power as defined in subclause 6.2.2A. The requirements defined in Table 6.3.5A.1.0-1 shall apply on each component carrier with all component carriers active. The requirements can be tested by time aligning any transmission gaps on all the component carriers.

For intra-band contiguous carrier aggregation bandwidth class B and C and intra-band non-contiguous carrier aggregation the absolute power control tolerance per component carrier is given in Table 6.3.5A.1.0-1.

Table 6.3.5A.1.0-1: Absolute power tolerance for CA

Conditions	Tolerance
Normal	± 9.0 dB
Extreme	± 12.0 dB

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5A.1.

6.3.5A.1.1 Power Control Absolute power tolerance for CA (intra-band contiguous DL CA and UL CA)

6.3.5A.1.1.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms.

6.3.5A.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.3.5A.1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.5A.1.0

6.3.5A.1.1.4 Test description

6.3.5A.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.1.1.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.1.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] clause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] clause [4.3.1] for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Mid range					
Test CC Combination setting (NRB_agg) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50	N/A for this test	QPSK	75	P_25@0	S_50@0		
50	50		QPSK	100	P_50@0	S_50@0		
75	75		QPSK	150	P_75@0	S_75@0		
100	25		QPSK	125	P_100@0	S_25@0		
100	50		QPSK	150	P_100@0	S_50@0		
100	75		QPSK	175	P_100@0	S_75@0		
100	100		QPSK	200	P_100@0	S_100@0		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.								
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.5A.1.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.1.1.4.3. Any PDCCH DCI format 0 sent to the UE during the configuration should have TPC command 0dB.

6.3.5A.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for UplinkPowerControlCommonSCell-r10 are defined in clause 6.3.5A.1.1.4.3. Any PDCCH DCI format 0 sent to the UE during the configuration should have TPC command 0dB.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.5A.1.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Measure the initial output power of the first subframe of the UE PUSH first transmission for each component carrier. The transient periods of 20us are excluded.

6. Repeat for the two test points as indicated in section 6.3.5A.1.1.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5A.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

Table 6.3.5A.1.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5A.1.1.4.3-2: UplinkPowerControlCommonSCell-r10: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { p0-NominalPUSCH-r10	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5A.1.1.4.3-3: UplinkPowerControlCommon: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5A.1.1.4.3-4: UplinkPowerControlCommonSCell-r10: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { p0-NominalPUSCH-r10	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5A.1.1.4.3-5: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
uplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	UL CA

Table 6.3.5A.1.1.4.3-6: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		RBC
	0		UL CA
}			

6.3.5A.1.1.5 Test requirement

For intra-band contiguous carrier aggregation bandwidth class C, the absolute power control tolerance per component carrier measured in step (5) of the test procedure is not to exceed the values specified in Table 6.3.5A.1.1.5-1 and 6.3.5A.1.1.5-2. The test requirement tables are originated from tables 6.3.5.1.5-1 and 6.3.5.1.5-2.

Table 6.3.5A.1.1.5-1: Absolute power tolerance for intra-band contiguous CA: test point 1

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.A.13						

Table 6.3.5A.1.1.5-2: Absolute power tolerance for intra-band contiguous CA: test point 2

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Expected Measured power Normal conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2A.1.3						

6.3.5A.1.2 Power Control Absolute power tolerance for CA (inter-band DL CA and UL CA)

6.3.5A.1.2.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms.

6.3.5A.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.3.5A.1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.5A.1.0.

6.3.5A.1.2.4 Test description

6.3.5A.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.1.2.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.1.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/A for this test	QPSK	31	P_6@0	S_25@0	-	-
6	50		QPSK	56	P_6@0	S_50@0	-	-
25	15		QPSK	40	P_25@0	S_15@0	-	-
25	25		QPSK	50	P_25@0	S_25@0	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.5A.1.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.1.2.4.3. Any PDCCH DCI format 0 sent to the UE during the configuration should have TPC command 0dB.

6.3.5A.1.2.4.2 Test procedure

Same test procedure as in clause 6.3.5A.1.1.4.2 with the following exceptions.

- Instead of Table 6.3.5A.1.1.4.1-1→ use Table 6.3.5A.1.2.4.1-1.

- Instead of clause 6.3.5A.1.1.4.3→ use clause 6.3.5A.1.2.4.3.

6.3.5A.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

Table 6.3.5A.1.2.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5A.1.2.4.3-2: UplinkPowerControlCommonSCell-r10: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { p0-NominalPUSCH-r10	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5A.1.2.4.3-3: UplinkPowerControlCommon: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5A.1.2.4.3-4: UplinkPowerControlCommonSCell-r10: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { p0-NominalPUSCH-r10	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5A.1.2.4.3-5: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
uplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	UL CA

Table 6.3.5A.1.2.4.3-6: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		RBC
	0		UL CA
}			

6.3.5A.1.2.5 Test requirement

The absolute power control tolerance per component carrier measured in step (5) of the test procedure is not to exceed the values specified in Table 6.3.5A.1.2.5-1 and 6.3.5A.1.2.5-2. The test requirement tables are originated from tables 6.3.5.1.5-1 and 6.3.5.1.5-2.

Table 6.3.5A.1.2.5-1: Absolute power tolerance for inter-band CA: test point 1

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.A.23						

Table 6.3.5A.1.2.5-2: Absolute power tolerance for inter-band CA: test point 2

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2A.2.3						

6.3.5A.1.3 Power Control Absolute power tolerance for CA (intra-band non-contiguous DL CA and UL CA)

6.3.5A.1.3.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms.

6.3.5A.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.3.5A.1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.5A.1.0.

6.3.5A.1.3.4 Test description

6.3.5A.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.1.3.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.1.3.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1				NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.				Refer to test points A: Low Wgap, Maximum Wgap					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC					
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	QPSK	P_25@0	QPSK	S_25@0
2	25	25	5	N/A	N/A	QPSK	P_25@0	QPSK	S_25@0
3	100	100	5	N/A	N/A	QPSK	P_100@0	QPSK	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.									

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.5A.1.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.1.3.4.3. Any PDCCH DCI format 0 sent to the UE during the configuration should have TPC command 0dB.

6.3.5A.1.3.4.2 Test procedure

Same test procedure as in clause 6.3.5A.1.1.4.2 with the following exceptions.

- Instead of Table 6.3.5A.1.1.4.1-1→ use Table 6.3.5A.1.3.4.1-1.
- Instead of clause 6.3.5A.1.1.4.3→ use clause 6.3.5A.1.3.4.3.

6.3.5A.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

Table 6.3.5A.1.3.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5A.1.3.4.3-2: UplinkPowerControlCommonSCell-r10: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { p0-NominalPUSCH-r10	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5A.1.3.4.3-3: UplinkPowerControlCommon: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5A.1.3.4.3-4: UplinkPowerControlCommonSCell-r10: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25A UplinkPowerControlCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE { p0-NominalPUSCH-r10	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5A.1.3.4.3-5: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
uplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	UL CA

Table 6.3.5A.1.3.4.3-6: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		RBC
	0		UL CA
}			

6.3.5A.1.3.5 Test requirement

The absolute power control tolerance per component carrier measured in step (5) of the test procedure is not to exceed the values specified in Table 6.3.5A.1.3.5-1 and 6.3.5A.1.3.5-2. The test requirement tables are originated from tables 6.3.5.1.5-1 and 6.3.5.1.5-2.

Table 6.3.5A.1.3.5-1: Absolute power tolerance for inter-band CA: test point 1

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2A.3.3						

Table 6.3.5A.1.3.5-2: Absolute power tolerance for inter-band CA: test point 2

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 62.2A.3.3						

6.3.5A.1.4

6.3.5A.1.5 Power Control Absolute power tolerance for CA(SRS carrier based switching)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Value for *p0-Nominal-PeriodicSRS-r14* and *p0-Nominal-AperiodicSRS-r14* in 6.3.5A.1.5 4.3 is left FFS.

- Expected Measured power and the test tolerance in 6.3.5A.1.5.5 is left FFS.

- Annexes A, F.1.2, and F.3.2 is left FFS.

6.3.5A.1.5.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on component carriers (to which SRS switching occurs) larger than 40ms.

6.3.5A.1.5.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward that support SRS carrier based switching.

6.3.5A.1.5.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.5A.1.0

6.3.5A.1.5.4 Test description

6.3.5A.1.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in subclause 5.4.2A.1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.1.5.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.1.5.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.		Mid range			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC			
Test Parameters for CA Configurations					
CA Configuration / N_{RB_agg}		**DL Allocation**	**UL Allocation**		
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	**SRS N_{RB}**
6	25	N/A for this test	31	N/A for this test	24
6	50		56		48
25	15		40		12
25	25		50		24
25	50		75		48
50	50		100		48
50	100		150		96
75	75		150		72
100	75		175		72
100	50		150		48
100	100		200		96
100	25		125		24
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.5A.1.5.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.1.5.4.3. Any PDCCH DCI format 3B sent to the UE during the configuration should have SRS TPC command 0dB.

6.3.5A.1.5.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for RadioResourceConfigCommonSCell-r10 are defined in clause 6.3.5A.1.5.4.3. Any PDCCH DCI format 3B sent to the UE during the configuration should have SRS TPC command 0dB.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Measure the initial output power of the first subframe of the SRS first transmission for each component carrier. The transient periods of 20us are excluded.

5. Repeat for the two test points as indicated in section 6.3.5A.1.5.4.3. The timing of the execution between the two test points shall be larger than 40ms.

6.3.5A.1.5.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

Table 6.3.5A.1.5.4.3-1: RadioResourceConfigCommonSCell-r10: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A RadioResourceConfigCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigCommonSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r14 SEQUENCE {			SRS-Switching
uplinkPowerControlCommonPUSCH-LessCell-v14xy SEQUENCE {			
p0-Nominal-PeriodicSRS-r14	FFS	Test point 1 to verify a UE relative low initial power transmission	
p0-Nominal-AperiodicSRS-r14	FFS	Test point 1 to verify a UE relative low initial power transmission	
}			
}			
}			

Table 6.3.5A.1.5.4.3-2: RadioResourceConfigCommonSCell-r10: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A RadioResourceConfigCommonSCell-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigCommonSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r14 SEQUENCE {			SRS-Switching
uplinkPowerControlCommonPUSCH-LessCell-v14xy SEQUENCE {			
p0-Nominal-PeriodicSRS-r14	FFS	Test point 2 to verify a UE relative high initial power transmission	
p0-Nominal-AperiodicSRS-r14	FFS	Test point 2 to verify a UE relative high initial power transmission	
}			
}			
}			

6.3.5A.1.5.5 Test requirement

The absolute power control tolerance per component carrier measured in step (4) of the test procedure is not to exceed the values specified in Table 6.3.5A.1.5.5-1 and 6.3.5A.1.5.5-2.

Table 6.3.5A.1.5.5-1: Absolute power tolerance for SRS carrier based switching: test point 1

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	FFS dBm	FFS dBm	FFS dBm	FFS dBm	FFS dBm	FFS dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± (9+TT)dB	± (9+TT)dB	± (9+TT)dB	± (9+TT)dB	± (9+TT)dB	± (9+TT)dB
Expected Measured power Extreme conditions	FFS dBm	FFS dBm	FFS dBm	FFS dBm	FFS dBm	FFS dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± (12+TT)dB	± (12+TT) dB	± (12+TT)dB	± (12+TT) dB	± (12+TT)dB	± (12+TT) dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.A.0						

Table 6.3.5A.1.5.5-2: Absolute power tolerance for SRS carrier based switching: test point 2

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	FFS dBm	FFS dBm	FFS dBm	FFS dBm	FFS dBm	FFS dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± (9+TT)dB	± (9+TT)dB	± (9+TT)dB	± (9+TT)dB	± (9+TT)dB	± (9+TT)dB
Expected Measured power Extreme conditions	FFS dBm	FFS dBm	FFS dBm	FFS dBm	FFS dBm	FFS dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± (12+TT)dB	± (12+TT) dB	± (12+TT)dB	± (12+TT) dB	± (12+TT)dB	± (12+TT) dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2A.0						

6.3.5A.2 Power Control Relative power tolerance for CA

6.3.5A.2.0 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the relative power tolerance is specified when the power of the target and reference sub-frames on each component carrier exceed the minimum output power as defined in TS 36.101 [2] subclause 6.3.2A and the total power is limited by P_{UMAX} as defined in TS 36.101 [2] subclause 6.2.5A. The requirements shall apply on each component carrier with all component carriers active. The UE transmitter shall have the capability of changing the output power independently on all component carriers in the uplink and:

a) the requirements for all combinations of PUSCH and PUCCH transitions per component carrier is given in Table 6.3.5A.2.0-1.

b) for SRS the requirements for combinations of PUSCH/PUCCH and SRS transitions between subframes given in Table 6.3.5A.2.0-1 apply per component carrier when the target and reference subframes are configured for either simultaneous SRS or simultaneous PUSCH.

c) for RACH the requirements apply for the primary cell and are given in Table 6.3.5A.2.0-1.

For intra-band contiguous carrier aggregation bandwidth class B and C and intra-band non-contiguous carrier aggregation, the requirements apply when the power of the target and reference sub-frames on each component carrier exceed -20 dBm and the total power is limited by P_{UMAX} as defined in TS 36.101 [2] subclause 6.2.5A. For the purpose of these requirements, the power in each component carrier is specified over only the transmitted resource blocks.

The UE shall meet the following requirements for transmission on both assigned component carriers when the average transmit power per PRB is aligned across both assigned carriers in the reference sub-frame:

a) for all possible combinations of PUSCH and PUCCH transitions per component carrier, the corresponding requirements given in Table 6.3.5A.2.0-1;

b) for SRS transitions on each component carrier, the requirements for combinations of PUSCH/PUCCH and SRS transitions given in Table 6.3.5A.2.0-1 with simultaneous SRS of constant SRS bandwidth allocated in the target and reference subframes;

c) for RACH on the primary component carrier, the requirements given in Table 6.3.5A.2.0-1 for PRACH.

For a) and b) above, the power step ΔP between the reference and target subframes shall be set by a TPC command and/or an uplink scheduling grant transmitted by means of an appropriate DCI Format.

For a), b) and c) above, two exceptions are allowed for each component carrier for a power per carrier ranging from -20 dBm to $P_{UMAX,c}$ as defined in TS 36.101 [2] subclause 6.2.5. For these exceptions the power tolerance limit is ±6.0 dB in Table 6.3.5A.2.0-1.

Table 6.3.5A.2.0-1: Relative Power Tolerance for Transmission (normal conditions)

Power step ΔP (Up or down) [dB]	All combinations of PUSCH and PUCCH transitions [dB]	All combinations of PUSCH/PUCCH and SRS transitions between sub-frames [dB]	PRACH [dB]
ΔP < 2	±2.5 (Note 3)	±3.0	±2.5
2 ≤ ΔP < 3	±3.0	±4.0	±3.0
3 ≤ ΔP < 4	±3.5	±5.0	±3.5
4 ≤ ΔP ≤ 10	±4.0	±6.0	±4.0
10 ≤ ΔP < 15	±5.0	±8.0	±5.0
15 ≤ ΔP	±6.0	±9.0	±6.0

Note 1: For extreme conditions an additional ± 2.0 dB relaxation is allowed

Note 2: For operating bands under Note 2 in Table 6.2.2.3-1, the relative power tolerance is relaxed by increasing the upper limit by 1.5 dB if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges; if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or FUL_high - 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges, then the tolerance is relaxed by reducing the lower limit by 1.5 dB.

Note 3: For PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods for TDD: for a power step ΔP ≤ 1 dB, the relative power tolerance for transmission is ±1.0 dB.

The power step (ΔP) is defined as the difference in the calculated setting of the UE Transmit power between the target and reference sub-frames with the power setting according to Clause 5.1 of TS 36.213 [10]. The error is the difference between ΔP and the power change measured at the UE antenna port with the power of the cell-specific reference signals kept constant. The error shall be less than the relative power tolerance specified in Table 6.3.5A.2.0-1.

For sub-frames not containing an SRS symbol, the power change is defined as the relative power difference between the mean power of the original reference sub-frame and the mean power of the target subframe not including transient durations. The mean power of successive sub-frames shall be calculated according to TS 36.101 [2] Figure 6.3.4.3-1 and TS 36.101 [2] Figure 6.3.4.1-1 if there is a transmission gap between the reference and target sub-frames.

The normative reference for this requirement is TS 36.101 [2] clauses 6.3.5A.2 and 6.3.5.2.

6.3.5A.2.1 Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA)

6.3.5A.2.1.1 Test purpose

To verify the ability of the UE transmitter to change the output power in both assigned component carrier in the uplink with a defined power step sizes between sub-frames on the two respective component carrier.

6.3.5A.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.3.5A.2.1.3 Minimum conformance requirement

The minimum conformance requirements are defined in clause 6.3.5A.2.0.

6.3.5A.2.1.4 Test description

6.3.5A.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.2.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.2.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508 [7] clause 4.1			Normal						
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**					
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations** (Note 3) **(L_{CRB} @ RB_{start})**				
25	50	N/A for this test	QPSK	6 13 2 16	P_5@20 P_5@20 P_1@24 P_8@17	S_1@0 S_8@0 S_1@0 S_8@0	-	-	
50	50		QPSK	6 13 2 16	P_5@45 P_5@45 P_1@49 P_8@42	S_1@0 S_8@0 S_1@0 S_8@0	-	-	
75	75		QPSK	6 13 2 16	P_5@70 P_5@70 P_1@74 P_8@67	S_1@0 S_8@0 S_1@0 S_8@0	-	-	
100	25		QPSK	6 13 2 16	P_5@95 P_5@95 P_1@99 P_8@92	S_1@0 S_8@0 S_1@0 S_8@0	-	-	
100	50		QPSK	6 13 2 16	P_5@95 P_5@95 P_1@99 P_8@92	S_1@0 S_8@0 S_1@0 S_8@0	-	-	
100	75		QPSK	6 13 2 16	P_5@95 P_5@95 P_1@99 P_8@92	S_1@0 S_8@0 S_1@0 S_8@0	-	-	
100	100		QPSK	6 13 2 16	P_5@95 P_5@95 P_1@99 P_8@92	S_1@0 S_8@0 S_1@0 S_8@0	-	-	
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, only the first of those is tested, according to the order in the Test Configuration Table list. Note 3: The UL allocation is changed as part of the test procedure. The Test Configuration Table entries list the combinations used, with the sequence of usage as determined by the test procedure for each sub-test.									

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to table 6.3.5A.2.1.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.2.1.4.3.

6.3.5A.2.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clause 8.3.3.2).

4. The procedure is separated in various subtests to verify different aspects of relative power control. The power changes of the subtests are shown by diagrams in the Test Procedure. In this test case, the term P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } defined in TS 36.101 [2] clause 6.2.5A is used, to ensure the UE is not tested outside its power capability.

5. Sub test: SCC power increase

5.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC with powers nearest to $PCC_{RefSet,\ 0}$ and $SCC_{RefSet,\ 0}$ respectively, as defined in Table 6.3.5A.2.1.4.2-1. The powers and allocations are chosen so the average transmit power per PRB is aligned across both assigned carriers in the reference sub-frame. Measure $PCC_{RefMeas,\ 0}$ and $SCC_{RefMeas,\ 0}$ in the Reference subframe, and after the SCC allocation is increased, measure $PCC_{TargetMeas,\ 0}$ and $SCC_{TargetMeas,\ 0}$ in the Target subframe.

Table 6.3.5A.2.1.4.2-1: Power settings and RB allocations for SCC power increase, step n=0

PCC		SCC	
Parameter	**Value**	**Parameter**	**Value**
Reference subframe			
$PCC_{RefSet,\ 0}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet,\ 0}$) +7	$SCC_{RefSet,\ 0}$, dBm/$N_{RB\ alloc}$	-17
PCC allocation, $N_{RB\ alloc}$	5	SCC allocation, $N_{RB\ alloc}$	1
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{RefMeas,\ 0}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{RefMeas,\ 0}$
Target subframe			
$PCC_{TargetSet,\ 0}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet,\ 0}$) +7	$SCC_{TargetSet,\ 0}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet,\ 0}$) +9
PCC allocation, $N_{RB\ alloc}$	5	SCC allocation, $N_{RB\ alloc}$	8
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{TargetMeas,\ 0}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas,\ 0}$

5.2. Calculate the Total uplink power across both CCs in dBm as $10\log_{10}(($$PCC_{TargetMeas,\ n}$ in mW) + ($SCC_{TargetMeas,\ n}$ in mW)). If (P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } - Total uplink power) > 1dB, continue to step 5.3. Otherwise, go to step 5.6.

5.3. For the PCC, calculate the change in power as ($PCC_{TargetMeas,\ n}$ - $PCC_{RefMeas,\ n}$) and compare to the PCC Test requirement specified in Table 6.3.5A.2.1.5-1. If the result meets the normal Test requirement, continue to step 5.4. If the result does not meet the normal Test requirement but meets the exception Test requirement, increment the PCC exception counter by 1 and continue to step 5.4, Otherwise, fail the UE for this subtest.

5.4. For the SCC, calculate the change in power as ($SCC_{TargetMeas,\ n}$ - $SCC_{RefMeas,\ n}$) and compare to the SCC Test requirement specified in Table 6.3.5A.2.1.5-1. If the result meets the normal Test requirement, continue to step 5.5. If the result does not meet the normal Test requirement but meets the exception Test requirement, increment the SCC exception counter by 1 and continue to step 5.5, Otherwise, fail the UE for this subtest.

5.5. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC with powers nearest to $PCC_{RefSet,\ n+1}$ and $SCC_{RefSet,\ n+1}$ respectively, as defined in Table 6.3.5A.2.1.4.2-2. Measure $PCC_{RefMeas,\ n}$ and $SCC_{RefMeas,\ n}$.in the Reference

subframe, and after the SCC allocation is increased, measure $PCC_{TargetMeas, n}$ and $SCC_{TargetMeas, n}$.in the Target subframe. Repeat steps 5.2 to 5.4.

Table 6.3.5A.2.1.4.2-2: Power settings and RB allocations for SCC power increase, step n+1

PCC		SCC	
Parameter	**Value**	**Parameter**	**Value**
Reference subframe			
$PCC_{RefSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) +7	$SCC_{RefSet, n+1}$, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, n}$ +2dB)
PCC allocation, $N_{RB\ alloc}$	5	SCC allocation, $N_{RB\ alloc}$	1
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{RefMeas, n+1}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{RefMeas, n+1}$
Target subframe			
$PCC_{TargetSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) +7	$SCC_{TargetSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) +9
PCC allocation, $N_{RB\ alloc}$	5	SCC allocation, $N_{RB\ alloc}$	8
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{TargetMeas, n+1}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, n+1}$

5.6. If the PCC exception counter is ≤ 2 and the SCC exception counter is ≤ 2, and the requirements specified in Table 6.3.5A.2.1.5-1 are all met, pass the UE for this subtest.

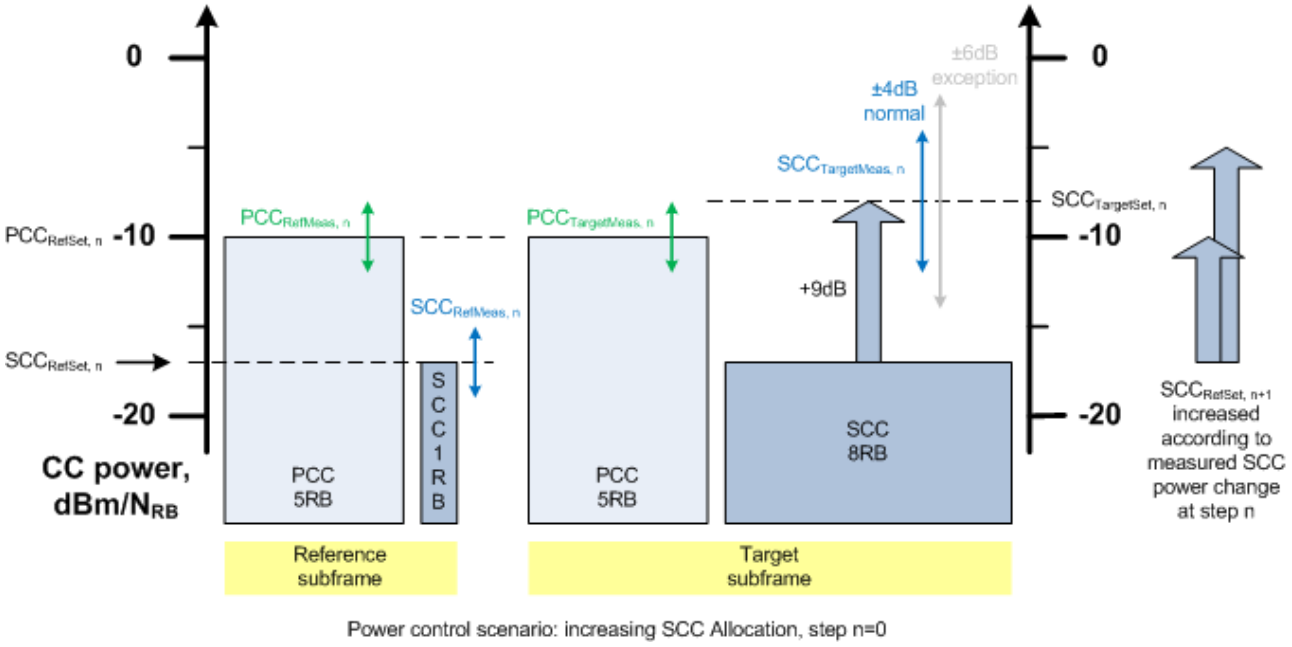


Figure 6.3.5A.2.1.4.2-1: SCC power increase

6. Sub test: SCC power decrease

6.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC with powers nearest to $PCC_{RefSet, 0}$ and $SCC_{RefSet, 0}$ respectively, as defined in Table 6.3.5A.2.1.4.2-3.The powers and allocations are chosen so the average transmit power per PRB is aligned across both assigned carriers in the reference sub-frame. Measure $PCC_{RefMeas, 0}$ and

$SCC_{RefMeas, 0}$ in the Reference subframe, and after the SCC allocation is decreased, measure $PCC_{TargetMeas, 0}$ and $SCC_{TargetMeas, 0}$ in the Target subframe.

Table 6.3.5A.2.1.4.2-3: Power settings and RB allocations for SCC power decrease, step n=0

PCC		SCC	
Parameter	**Value**	**Parameter**	**Value**
Reference subframe			
$PCC_{RefSet, 0}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, 0}$) -2	$SCC_{RefSet, 0}$, dBm/$N_{RB\ alloc}$	P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } - 5
PCC allocation, $N_{RB\ alloc}$	5	SCC allocation, $N_{RB\ alloc}$	8
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{RefMeas, 0}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{RefMeas, 0}$
Target subframe			
$PCC_{TargetSet, 0}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, 0}$) -2	$SCC_{TargetSet, 0}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, 0}$) -9
PCC allocation, $N_{RB\ alloc}$	5	SCC allocation, $N_{RB\ alloc}$	1
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{TargetMeas, 0}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, 0}$

6.2. If the uplink (power for each CC – (-20dBm)) is > 1dB, continue to step 6.3. Otherwise, go to step 6.6.

6.3. For the PCC, calculate the change in power as ($PCC_{TargetMeas, n}$ - $PCC_{RefMeas, n}$) and compare to the PCC Test requirement specified in Table 6.3.5A.2.1.5-2. If the result meets the normal Test requirement, continue to step 6.4. If the result does not meet the normal Test requirement but meets the exception Test requirement, increment the PCC exception counter by 1 and continue to step 6.4, Otherwise, fail the UE for this subtest.

6.4. For the SCC, calculate the change in power as ($SCC_{TargetMeas, n}$ - $SCC_{RefMeas, n}$) and compare to the SCC Test requirement specified in Table 6.3.5A.2.1.5-2. If the result meets the normal Test requirement, continue to step 6.5. If the result does not meet the normal Test requirement but meets the exception Test requirement, increment the SCC exception counter by 1 and continue to step 6.5, Otherwise, fail the UE for this subtest.

6.5. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC with powers nearest to $PCC_{RefSet, n+1}$ and $SCC_{RefSet, n+1}$ respectively, as defined in Table 6.3.5A.2.1.4.2-4. Measure $PCC_{RefMeas, n}$ and $SCC_{RefMeas, n}$.in the Reference subframe, and after the SCC allocation is decreased, measure $PCC_{TargetMeas, n}$ and $SCC_{TargetMeas, n}$.in the Target subframe. Repeat steps 6.2 to 6.4.

Table 6.3.5A.2.1.4.2-4: Power settings and RB allocations for SCC power decrease, step n+1

PCC		SCC	
Parameter	**Value**	**Parameter**	**Value**
Reference subframe			
$PCC_{RefSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) -2	$SCC_{RefSet, n+1}$, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, n}$ -2dB
PCC allocation, $N_{RB\ alloc}$	5	SCC allocation, $N_{RB\ alloc}$	8
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{RefMeas, n+1}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{RefMeas, n+1}$
Target subframe			
$PCC_{TargetSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) -2	$SCC_{TargetSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) -9
PCC allocation, $N_{RB\ alloc}$	5	SCC allocation, $N_{RB\ alloc}$	1
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{TargetMeas, n+1}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, n+1}$

6.6. If the PCC exception counter is ≤ 2 and the SCC exception counter is ≤ 2, and the requirements specified in Table 6.3.5A.2.1.5-2 are all met, pass the UE for this subtest.

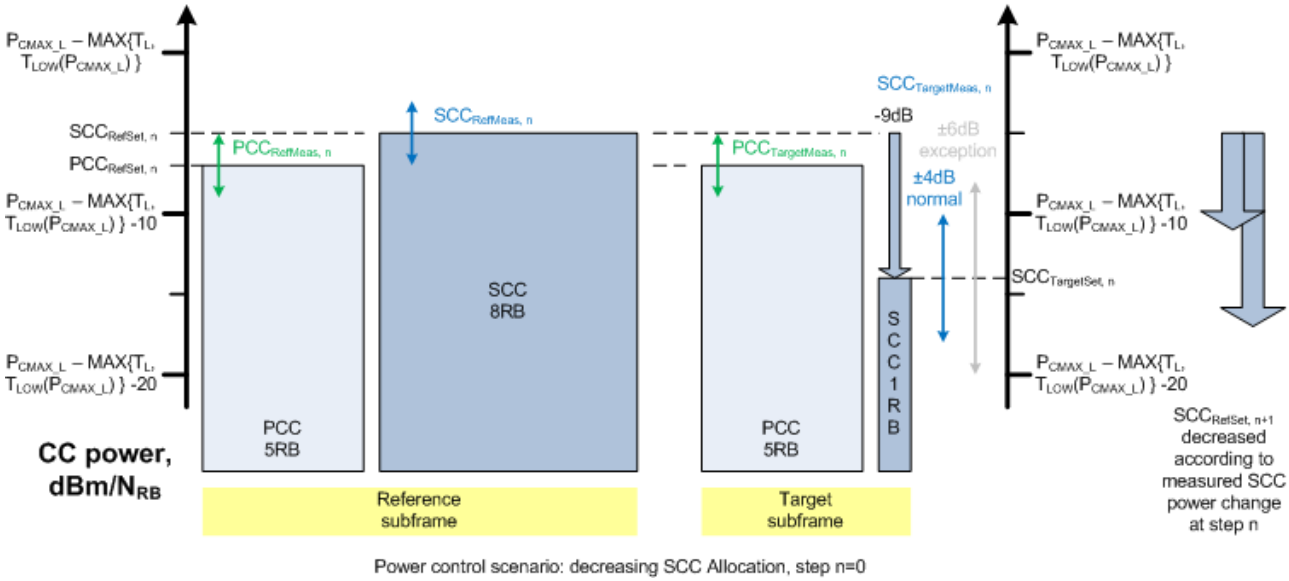


Figure 6.3.5A.2.1.4.2-2: SCC power decrease

7. Sub test: PCC and SCC power increase together

7.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC with powers nearest to $PCC_{RefSet, 0}$ and $SCC_{RefSet, 0}$ respectively, as defined in Table 6.3.5A.2.1.4.2-5. The powers and allocations are chosen so the average transmit power per PRB is aligned across both assigned carriers in the reference sub-frame. Measure $PCC_{RefMeas, 0}$ and $SCC_{RefMeas, 0}$ in the Reference subframe, and after the PCC and SCC allocation are increased, measure $PCC_{TargetMeas, 0}$ and $SCC_{TargetMeas, 0}$ in the Target subframe.

Table 6.3.5A.2.1.4.2-5: Power settings and RB allocations for PCC and SCC power increase, step n=0

PCC		SCC	
Parameter	**Value**	**Parameter**	**Value**
Reference subframe			
$PCC_{RefSet, 0}$, dBm/$N_{RB\ alloc}$	-17	$SCC_{RefSet, 0}$, dBm/$N_{RB\ alloc}$	-17
PCC allocation, $N_{RB\ alloc}$	1	SCC allocation, $N_{RB\ alloc}$	1
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{RefMeas, 0}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{RefMeas, 0}$
Target subframe			
$PCC_{TargetSet, 0}$, dBm/$N_{RB\ alloc}$	($PCC_{RefSet, 0}$) +9	$SCC_{TargetSet, 0}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, 0}$) +9
PCC allocation, $N_{RB\ alloc}$	8	SCC allocation, $N_{RB\ alloc}$	8
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{TargetMeas, 0}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, 0}$

7.2. Calculate the Total uplink power across both CCs in dBm as $10\log_{10}((PCC_{TargetMeas, n}$ in mW) + ($SCC_{TargetMeas, n}$ in mW)). If (P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } - Total uplink power) > 1dB, continue to step 7.3. Otherwise, go to step 7.6.

7.3. For the PCC, calculate the change in power as ($PCC_{TargetMeas, n}$ - $PCC_{RefMeas, n}$) and compare to the PCC Test requirement specified in Table 6.3.5A.2.1.5-3. If the result meets the normal Test requirement, continue to step 7.4. If the result does not meet the normal Test requirement but meets the exception Test requirement, increment the PCC exception counter by 1 and continue to step 7.4, Otherwise, fail the UE for this subtest.

7.4. For the SCC, calculate the change in power as ($SCC_{TargetMeas, n}$ - $SCC_{RefMeas, n}$) and compare to the SCC Test requirement specified in Table 6.3.5A.2.1.5-3. If the result meets the normal Test requirement, continue to step 7.5. If the result does not meet the normal Test requirement but meets the exception Test requirement, increment the SCC exception counter by 1 and continue to step 7.5, Otherwise, fail the UE for this subtest.

7.5. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC with powers nearest to $PCC_{RefSet, n+1}$ and $SCC_{RefSet, n+1}$ respectively, as defined in Table 6.3.5A.2.1.4.2-6. Measure $PCC_{RefMeas, n}$ and $SCC_{RefMeas, n}$.in the Reference subframe, and after the PCC and SCC allocation are increased, measure $PCC_{TargetMeas, n}$ and $SCC_{TargetMeas, n}$.in the Target subframe. Repeat steps 7.2 to 7.4.

Table 6.3.5A.2.1.4.2-6: Power settings and RB allocations for PCC and SCC power increase, step n+1

PCC		SCC	
Parameter	**Value**	**Parameter**	**Value**
Reference subframe			
$PCC_{RefSet, n+1}$, dBm/$N_{RB\ alloc}$	(Max ($PCC_{TargetMeas, n}$, $SCC_{TargetMeas, n}$)) +2dB	$SCC_{RefSet, n+1}$, dBm/$N_{RB\ alloc}$	(Max ($PCC_{TargetMeas, n}$, $SCC_{TargetMeas, n}$)) +2dB
PCC allocation, $N_{RB\ alloc}$	1	SCC allocation, $N_{RB\ alloc}$	1
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{RefMeas, n+1}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{RefMeas, n+1}$
Target subframe			
$PCC_{TargetSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) +9	$SCC_{TargetSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) +9
PCC allocation, $N_{RB\ alloc}$	8	SCC allocation, $N_{RB\ alloc}$	8
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{TargetMeas, n+1}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, n+1}$

7.6. If the PCC exception counter is ≤ 2 and the SCC exception counter is ≤ 2, and the requirements specified in Table 6.3.5A.2.1.5-3 are all met, pass the UE for this subtest.

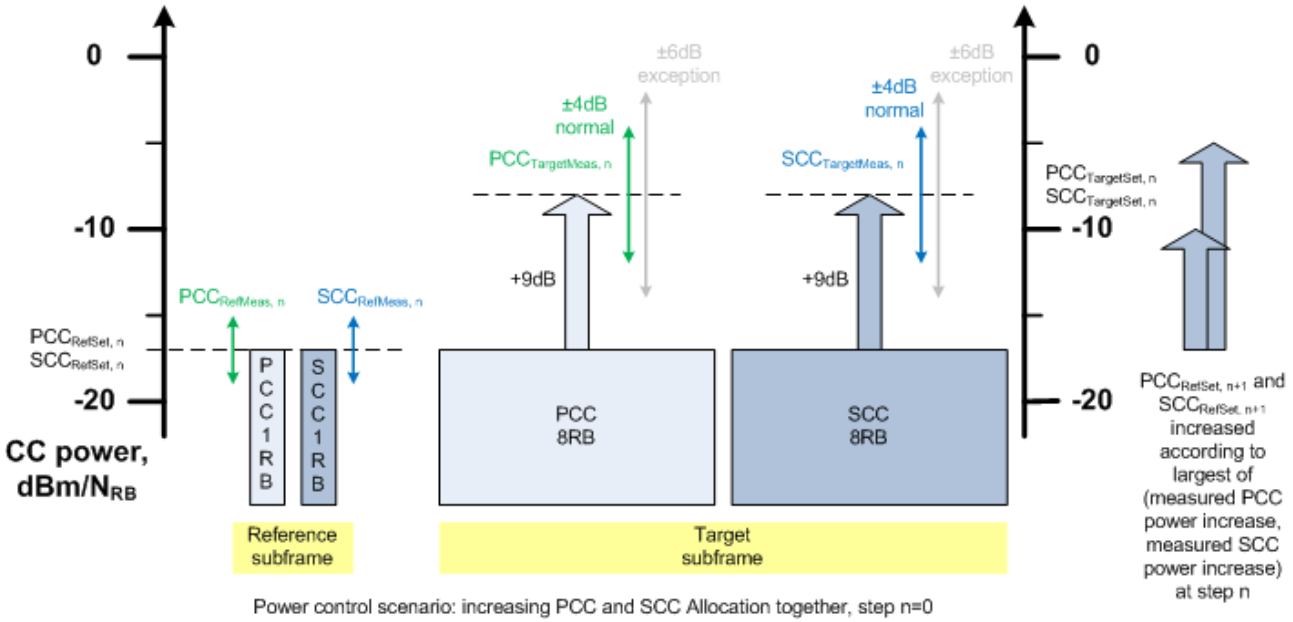


Figure 6.3.5A.2.1.4.2-3: PCC and SCC power increase together

8. Sub test: PCC and SCC power decrease together

8.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC with powers nearest to $PCC_{RefSet, 0}$ and $SCC_{RefSet, 0}$ respectively, as defined in Table 6.3.5A.2.1.4.2-7. The powers and allocations are chosen so the average transmit power per PRB is aligned across both assigned carriers in the reference sub-frame. Measure $PCC_{RefMeas, 0}$ and $SCC_{RefMeas, 0}$ in the Reference subframe, and after the PCC and SCC allocation are decreased, measure $PCC_{TargetMeas, 0}$ and $SCC_{TargetMeas, 0}$ in the Target subframe.

Table 6.3.5A.2.1.4.2-7: Power settings and RB allocations for PCC and SCC power decrease, step n=0

PCC		SCC	
Parameter	**Value**	**Parameter**	**Value**
Reference subframe			
$PCC_{RefSet, 0}$, dBm/$N_{RB\ alloc}$	P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } - 6	$SCC_{RefSet, 0}$, dBm/$N_{RB\ alloc}$	P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } - 6
PCC allocation, $N_{RB\ alloc}$	8	SCC allocation, $N_{RB\ alloc}$	8
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{RefMeas, 0}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{RefMeas, 0}$
Target subframe			
$PCC_{TargetSet, 0}$, dBm/$N_{RB\ alloc}$	($PCC_{RefSet, 0}$) -9	$SCC_{TargetSet, 0}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, 0}$) -9
PCC allocation, $N_{RB\ alloc}$	1	SCC allocation, $N_{RB\ alloc}$	1
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{TargetMeas, 0}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, 0}$

8.2. If the uplink (power for each CC – (-20dBm)) is > 1dB, continue to step 8.3. Otherwise, go to step 8.6.

8.3. For the PCC, calculate the change in power as ($PCC_{TargetMeas, n}$ - $PCC_{RefMeas, n}$) and compare to the PCC Test requirement specified in Table 6.3.5A.2.1.5-4. If the result meets the normal Test requirement, continue to step 8.4. If the result does not meet the normal Test requirement but meets the exception Test requirement, increment the PCC exception counter by 1 and continue to step 8.4, Otherwise, fail the UE for this subtest.

8.4. For the SCC, calculate the change in power as ($SCC_{TargetMeas, n}$ - $SCC_{RefMeas, n}$) and compare to the SCC Test requirement specified in Table 6.3.5A.2.1.5-4. If the result meets the normal Test requirement, continue to step 8.5. If the result does not meet the normal Test requirement but meets the exception Test requirement, increment the SCC exception counter by 1 and continue to step 8.5, Otherwise, fail the UE for this subtest.

8.5. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC with powers nearest to $PCC_{RefSet, n+1}$ and $SCC_{RefSet, n+1}$ respectively, as defined in Table 6.3.5A.2.1.4.2-8. Measure $PCC_{RefMeas, n}$ and $SCC_{RefMeas, n}$.in the Reference subframe, and after the PCC and SCC allocation are **decreased**, measure $PCC_{TargetMeas, n}$ and $SCC_{TargetMeas, n}$.in the Target subframe. Repeat steps 8.2 to 8.4.

Table 6.3.5A.2.1.4.2-8: Power settings and RB allocations for PCC and SCC power decrease, step n+1

PCC		SCC	
Parameter	**Value**	**Parameter**	**Value**
Reference subframe			
$PCC_{RefSet, n+1}$, dBm/$N_{RB\ alloc}$	(Min ($PCC_{TargetMeas, n}$, $SCC_{TargetMeas, n}$)) -2dB	$SCC_{RefSet, n+1}$, dBm/$N_{RB\ alloc}$	(Min ($PCC_{TargetMeas, n}$, $SCC_{TargetMeas, n}$)) -2dB
PCC allocation, $N_{RB\ alloc}$	8	SCC allocation, $N_{RB\ alloc}$	8
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{RefMeas, n+1}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{RefMeas, n+1}$
Target subframe			
$PCC_{TargetSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) -9	$SCC_{TargetSet, n+1}$, dBm/$N_{RB\ alloc}$	($SCC_{RefSet, n+1}$) -9
PCC allocation, $N_{RB\ alloc}$	1	SCC allocation, $N_{RB\ alloc}$	1
Measured power, dBm/$N_{RB\ alloc}$	$PCC_{TargetMeas, n+1}$	Measured power, dBm/$N_{RB\ alloc}$	$SCC_{TargetMeas, n+1}$

8.6. If the PCC exception counter is ≤ 2 and the SCC exception counter is ≤ 2, and the requirements specified in Table 6.3.5A.2.1.5-4 are all met, pass the UE for this subtest.

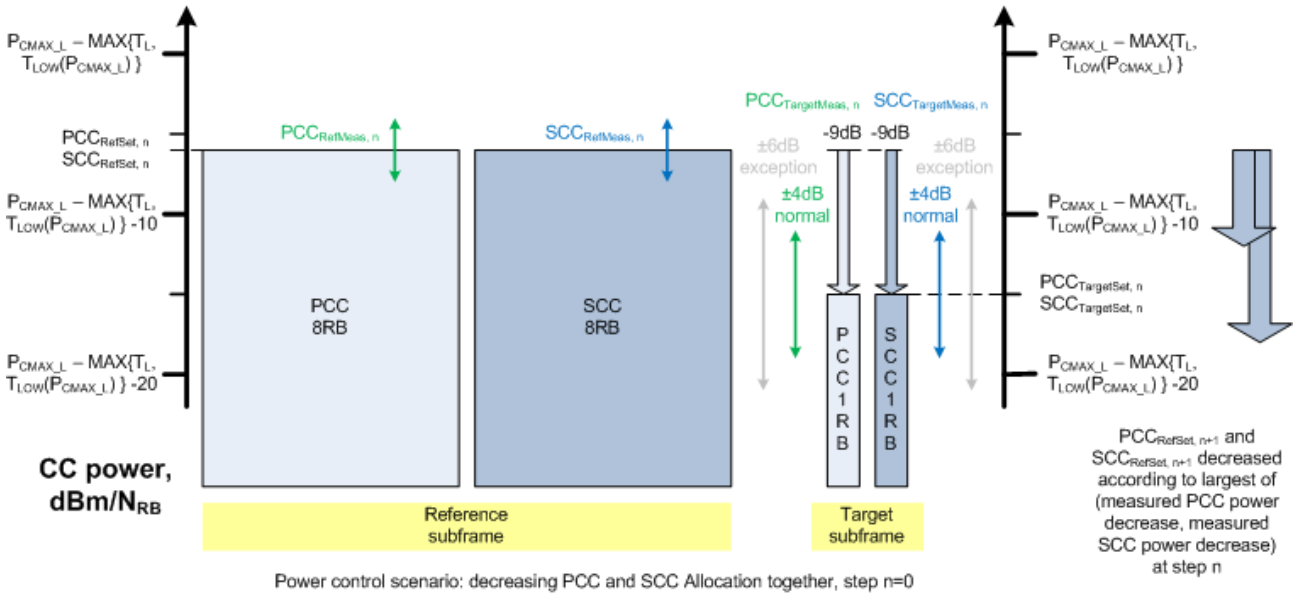


Figure 6.3.5A.2.1.4.2-4: PCC and SCC power decrease together

6.3.5A.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5A.2.1.5 Test requirement

For intra-band contiguous carrier aggregation bandwidth class C, the relative power control tolerance per component carrier measured in steps 5, 6 , 7 and 8 of the test procedure should satisfy the applicable test requirements specified in Tables 6.3.5A.2.1.5-1 to 6.3.5A.2.1.5-4 for normal conditions.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each subtest, and are counted during the Test Procedure.

Table 6.3.5A.2.1.5-1: Test requirements for SCC power increase

Parameter	Condition	Unit	Minimum	Maximum
($PCC_{TargetMeas, n}$ - $PCC_{RefMeas, n}$)	Normal	dB	-1.7dB	+1.8dB
	Exception	dB	-6.7dB	+6.8dB
($SCC_{TargetMeas, n}$ - $SCC_{RefMeas, n}$)	Normal	dB	+4.2dB	+13.7dB
	Exception	dB	+2.2dB	+15.8dB

Table 6.3.5A.2.1.5-2: Test requirements for SCC power decrease

Parameter	Condition	Unit	Minimum	Maximum
($PCC_{TargetMeas, n}$ - $PCC_{RefMeas, n}$)	Normal	dB	-1.8dB	+1.7dB
	Exception	dB	-6.8dB	+6.7dB
($SCC_{TargetMeas, n}$ - $SCC_{RefMeas, n}$)	Normal	dB	-13.8dB	-4.2dB
	Exception	dB	-15.8dB	-2.2dB

Table 6.3.5A.2.1.5-3: Test requirements for PCC and SCC power increase together

Parameter	Condition	Unit	Minimum	Maximum
($PCC_{TargetMeas, n}$ - $PCC_{RefMeas, n}$)	Normal	dB	+4.3dB	+13.8dB
	Exception	dB	+2.3dB	+15.8dB
($SCC_{TargetMeas, n}$ - $SCC_{RefMeas, n}$)	Normal	dB	+4.3dB	+13.8dB
	Exception	dB	+2.3dB	+15.8dB

Table 6.3.5A.2.1.5-4: Test requirements for PCC and SCC power decrease together

Parameter	Condition	Unit	Minimum	Maximum
($PCC_{TargetMeas, n}$ - $PCC_{RefMeas, n}$)	Normal	dB	-13.8dB	-4.3dB
	Exception	dB	-15.8dB	-2.3dB
($SCC_{TargetMeas, n}$ - $SCC_{RefMeas, n}$)	Normal	dB	-13.8dB	-4.3dB
	Exception	dB	-15.8dB	-2.3dB

6.3.5A.2.2 Power Control Relative power tolerance for CA (inter-band DL CA and UL CA)

6.3.5A.2.2.1 Test purpose

To verify the ability of the UE transmitter to change the output power in both assigned component carrier in the uplink with a defined power step sizes between sub-frames on the two respective component carrier.

6.3.5A.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.3.5A.2.2.3 Minimum conformance requirement

The minimum conformance requirements are defined in clause 6.3.5A.2.0.

6.3.5A.2.2.4 Test description

6.3.5A.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.1.2.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.2.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations(Note 3) (L_{CRB} @ RB_{start})**			
6	25	N/A for this test	QPSK	31	See table 6.3.5A.2.2.5-1 6.3.5A.2.2.5-2	See table 6.3.5A.2.2.5-5 6.3.5A.2.2.5-6	-	-
6	50		QPSK	56	See table 6.3.5A.2.2.5-1 6.3.5A.2.2.5-2	See table 6.3.5A.2.2.5-7 6.3.5A.2.2.5-8	-	-
25	15		QPSK	40	See table 6.3.5A.2.2.5-5 6.3.5A.2.2.5-6	See table 6.3.5A.2.2.5-3 6.3.5A.2.2.5-4	-	-
25	25		QPSK	50	See table 6.3.5A.2.2.5-5 6.3.5A.2.2.5-6	See table 6.3.5A.2.2.5-5 6.3.5A.2.2.5-6	-	-
25	50		QPSK	75	See table 6.3.5A.2.2.5-5 6.3.5A.2.2.5-6	See table 6.3.5A.2.2.5-7 6.3.5A.2.2.5-8	-	-
50	50		QPSK	100	See table 6.3.5A.2.2.5-7 6.3.5A.2.2.5-8	See table 6.3.5A.2.2.5-7 6.3.5A.2.2.5-8	-	-
50	100		QPSK	150	See table 6.3.5A.2.2.5-7 6.3.5A.2.2.5-8	See table 6.3.5A.2.2.5-11 6.3.5A.2.2.5-12	-	-
75	75		QPSK	150	See table 6.3.5A.2.2.5-9 6.3.5A.2.2.5-10	See table 6.3.5A.2.2.5-9 6.3.5A.2.2.5-10	-	-
100	75		QPSK	175	See table 6.3.5A.2.2.5-11 6.3.5A.2.2.5-12	See table 6.3.5A.2.2.5-9 6.3.5A.2.2.5-10	-	-
100	100		QPSK	200	See table 6.3.5A.2.2.5-11 6.3.5A.2.2.5-12	See table 6.3.5A.2.2.5-11 6.3.5A.2.2.5-12	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, only the first of those is tested, according to the order in the Test Configuration Table list.

Note 3: The UL allocation is changed as part of the test procedure. The Test Configuration Table entries list the combinations used, with the sequence of usage as determined by the test procedure for each sub-test.

Note 4: The starting resource block shall be RB# 0.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.3.5A.1.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.2.2.4.3.

6.3.5A.2.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clause 8.3.3.2).
4. The procedure is separated in various subtests to verify different aspects of relative power control on both PCC and SCC individually. The power patterns of the subtests are shown in figure 6.3.5A.2.2.4.2-1 to 6.3.5A.2.2.4.2-4. In this test case, the term $P_{CMAX_L} - MAX\{T_L, T_{LOW}(P_{CMAX_L})\}$ defined in TS 36.101 [2] clause 6.2.5A is used, to ensure the UE is not tested outside its power capability.

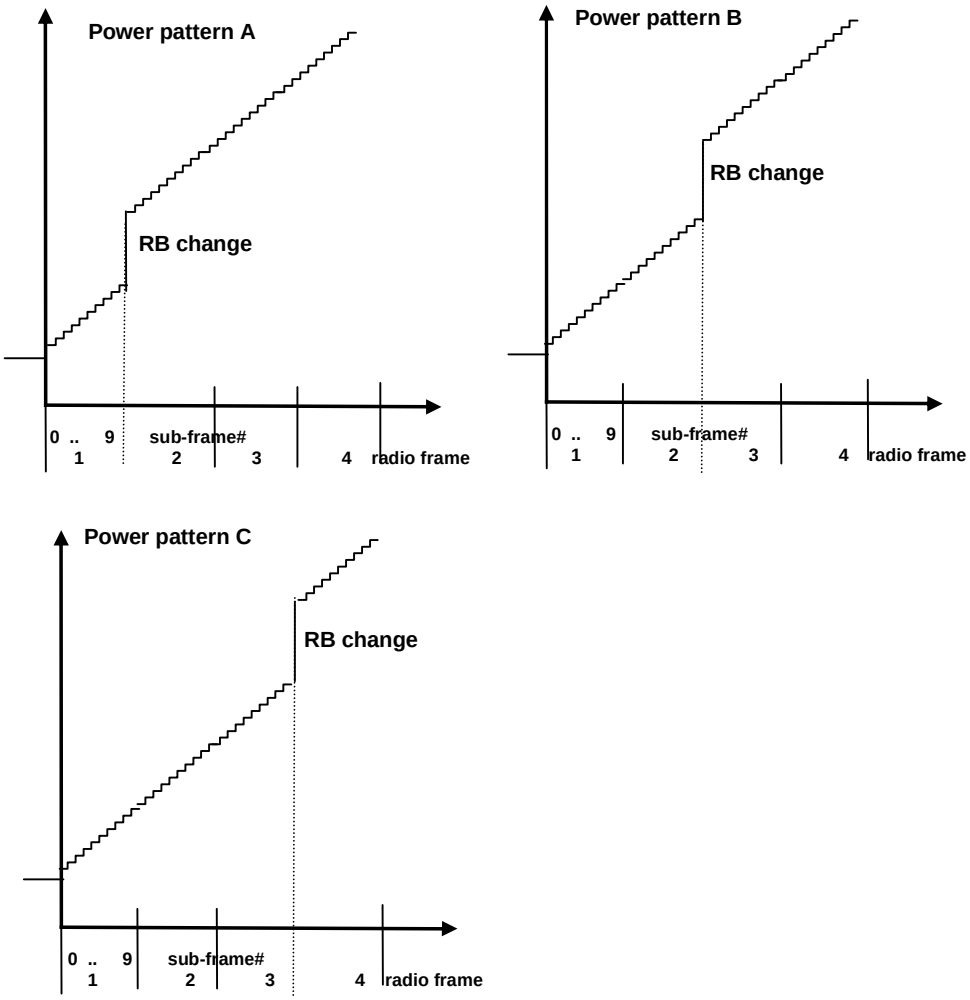


Figure 6.3.5A.2.2.4.2-1: FDD ramping up test power patterns

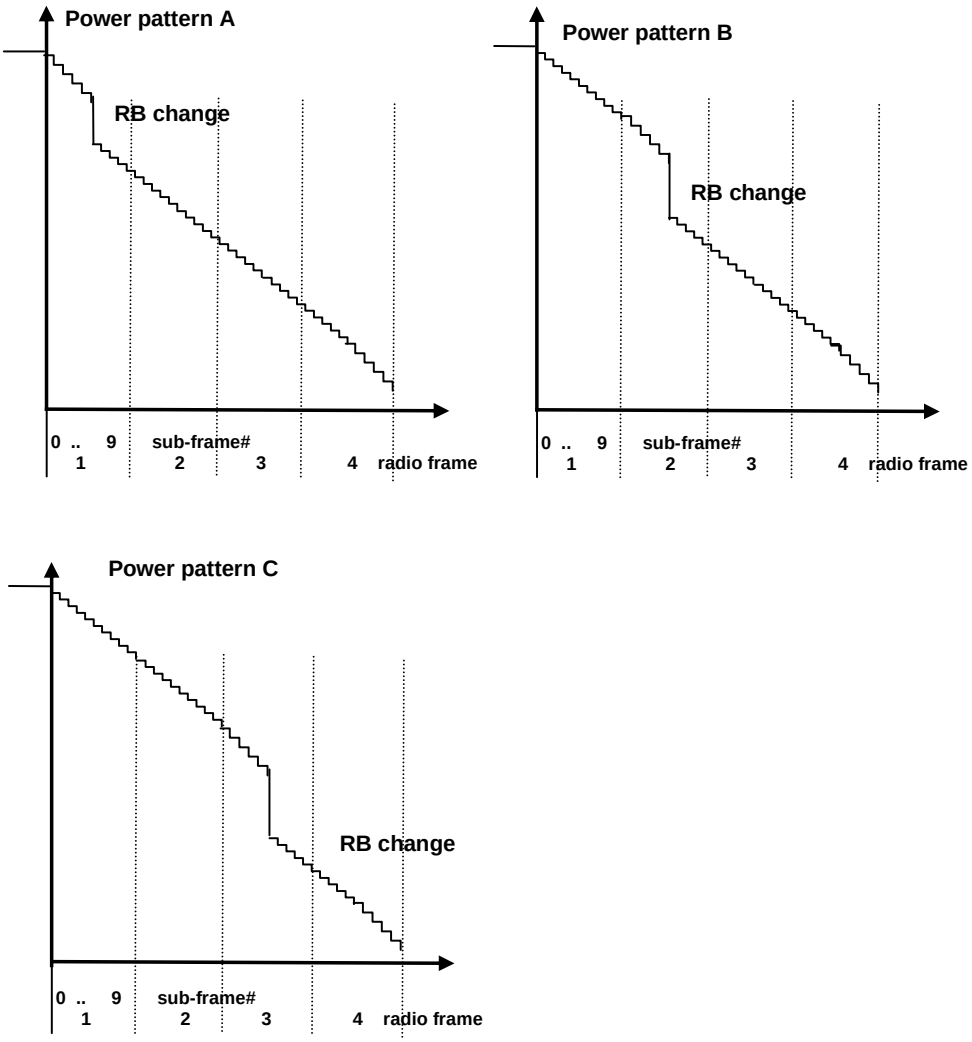


Figure 6.3.5A.2.2.4.2-2: FDD ramping down test power patterns

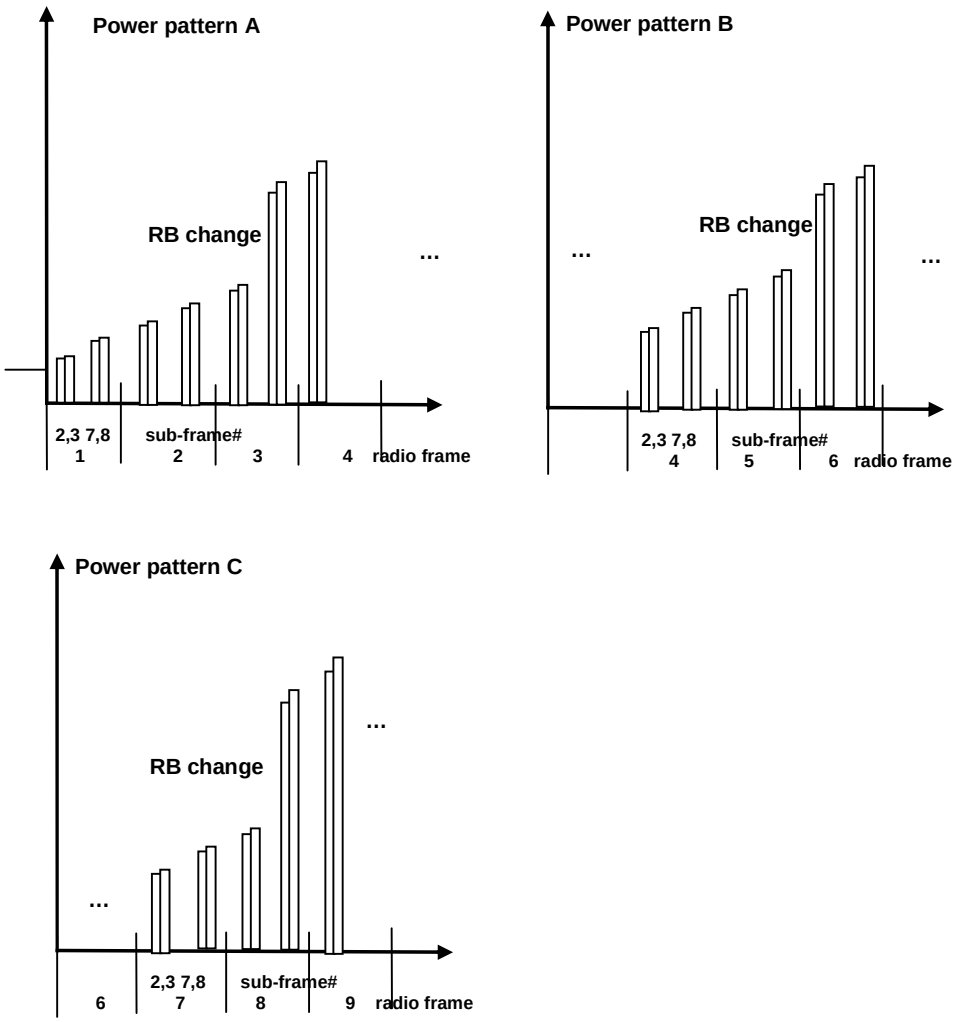


Figure 6.3.5A.2.2.4.2-3: TDD ramping up test power patterns

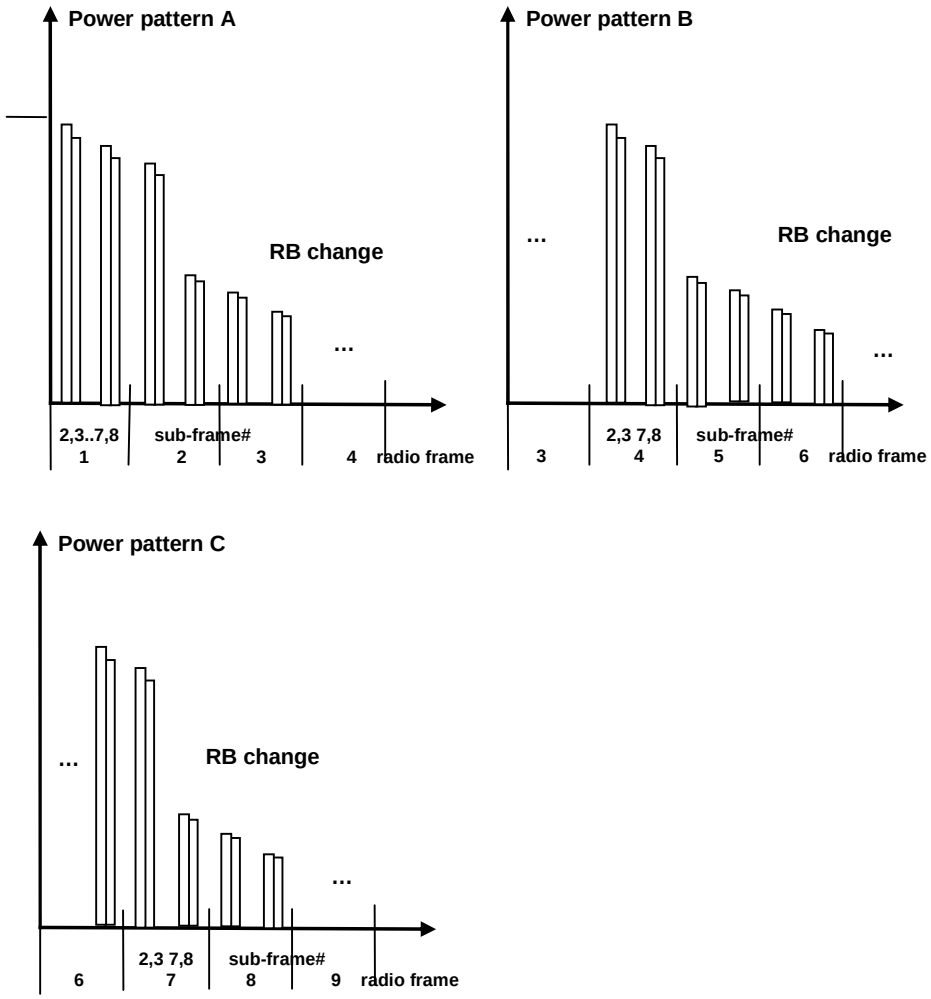


Figure 6.3.5A.2.2.4.2-4: TDD ramping down test power patterns

5. Sub test: ramping up pattern

5.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC at -36.8dBm +/- 3.2 dB for carrier frequency $f \leq 3.0$GHz or at -36.5dBm +/- 3.5 dB for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

5.2. Schedule the UE's PUSCH data transmission on each component carrier as described in Figure 6.3.5A.2.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5A.2.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5A.2.2.5-1 thru 6.3.5A.2.2.5-12 depending on CC combinations. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a +1dB TPC command on both PCC and SCC separately. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

5.3. Measure the power of PUSCH transmissions on both PCC and SCC separately to verify the UE relative power control meet test requirements 6.3.5A.2.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded. Calculate the Total uplink power across both CCs. If (P_{CMAX_L} − MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } - Total uplink power) < 0.7dB, stop ramping, exclude the last measurement and go to step 5.4.5.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5A.2.2.5-1 thru Table 6.3.5A.2.2.5-12 to force bigger UE power steps at various points in the power range.

6. Sub test: ramping down pattern

6.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the PCC and on the SCC at +15.0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at +14.7dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

6.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5A.2.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5A.2.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5A.2.2.5-1 thru 6.3.5A.2.2.5-12 depending on CC combinations. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a -1dB TPC command on both PCC and SCC separately. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

6.3. Measure the power of PUSCH transmissions on both PCC and SCC separately to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5A.2.2.5-1 thru Table 6.3.5A.2.2.5-12 to force bigger UE power steps at various points in the power range.

6.3.5A.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5A.2.2.5 Test requirement

Each UE power step measured in the test procedure 6.3.5A.2.2.4.2 should satisfy the test requirements specified in Table 6.3.5A.2.2.5-1, thru 6.3.5A.2.2.5-12 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns on both PCC and SCC separately. For these exceptions the power tolerance limit is a maximum of ±6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5A.2.2.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 6 RBs	TPC=+1dB	8.78	4 ≤ ΔP < 10	8.78 ± (4.7) Note 2 8.78 +6.2/-4.7 Note 3
Subframes after RB change	Fixed = 6	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 5	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 5 to 1 RBs	TPC=-1dB	7.99	4 ≤ ΔP < 10	7.99 ± (4.7) Note 2 7.99 +4.7/-6.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 4 RBs	TPC=+1dB	7.02	4 ≤ ΔP < 10	7.02 ± (4.7) Note 2 7.02 +6.2/-4.7 Note 3
Subframes after RB change	Fixed =4	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 15	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 15 to 1 RBs	TPC=-1dB	12.76	10 ≤ ΔP < 15	12.76 ± (5.7) Note 2 12.76 +5.7/-7.2 Note 4
Subframes after RB change	Fixed =1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern **A** the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 20	TPC=+1dB	14.01	10 ≤ ΔP < 15	14.01 ± (5.7) Note 2 14.01 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 20	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 25	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 25 to 1	TPC=-1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +5.7/-7.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 25	TPC=+1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 25	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 50 (UE-Categories ≥2) Fixed = 48 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 50 to 1 (UE-Categories ≥2) Change from 48 to 1 (UE cat 1)	TPC=-1dB	17.99 17.81	15 ≤ Δ	17.99 ± (6.7) Note 2 17.99 +6.7/-8.2 Note 4 17.81 ± (6.7) Note 2 17.81 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 50	TPC=+1dB	17.99	15 ≤ ΔP	17.99±(6.7) Note 2 17.99 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 50	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 75 (UE-Categories ≥2) Fixed = 50 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 75 to 1 (UE-Categories ≥2) Change from 50 to 1 (UE Cat 1)	TPC=-1dB	19.75 17.99	15 ≤ ΔP	19.75 ± (6.7) Note 2 19.75 +6.7/-8.2 Note 4 17.99 ± (6.7) Note 2 17.99 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 75	TPC=+1dB	19.75	15 ≤ ΔP	19.75 ± (6.7) Note 2 19.75 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 75	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5A.2.2.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 100 (UE-Categories ≥2) Fixed = 75 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 100 to 1 (UE-Categories ≥2) Change from 75 to 1 (UE Cat 1)	TPC=-1dB	21.0 19.75	15 ≤ ΔP	21.0 ± (6.7) Note 2 21.0 +6.7/-8.2 Note 4 19.75 ± (6.7) Note 2 19.75 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

6.3.5A.2.3 Power Control Relative power tolerance for CA (intra-band non-contiguous DL CA and UL CA)

6.3.5A.2.3.1 Test purpose

To verify the ability of the UE transmitter to change the output power in both assigned component carrier in the uplink with a defined power step sizes between sub-frames on the two respective component carrier.

6.3.5A.2.3.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.3.5A.2.3.3 Minimum conformance requirement

The minimum conformance requirements are defined in clause 6.3.5A.2.0.

6.3.5A.2.3.4 Test description

6.3.5A.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.2.3.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.2.3.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: Low Wgap , Maximum Wgap
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC (Note 2)

Test Parameters for CA Configurations									
ID	CA Configuration / N_{RB_agg}		W_{gap} [MHz]	DL Allocation		UL Allocation			
	PCC N_{RB}	SCCs N_{RB}		CC MOD	PCC & SCC RB allocation	CC MOD	NRB_alloc	PCC N_{RB_alloc} (L_{CRB} @ RB_{start})	SCC N_{RB_alloc} (L_{CRB} @ RB_{start})
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	QPSK	6 13 2 16	P_5@0 P_5@0 P_1@0 P_8@0	S_1@0 S_8@0 S_1@0 S_8@0
2	25	25	5	N/A	N/A	QPSK	6 13 2 16	P_5@0 P_5@0 P_1@0 P_8@0	S_1@0 S_8@0 S_1@0 S_8@0
3[4]	50	50	25	N/A	N/A	QPSK	6 13 2 16	P_5@0 P_5@0 P_1@0 P_8@0	S_1@0 S_8@0 S_1@0 S_8@0
4[5]	100	100	5	N/A	N/A	QPSK	6 13 2 16	P_5@0 P_5@0 P_1@0 P_8@0	S_1@0 S_8@0 S_1@0 S_8@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.
Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.
Note 3: The UL allocation is changed as part of the test procedure. The Test Configuration Table entries list the combinations used, with the sequence of usage as determined by the test procedure for each sub-test.
Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration
Note 5: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.3.5A.2.3.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.2.3.4.3.

6.3.5A.2.3.4.2 Test procedure

Same test procedure as in clause 6.3.5A.2.1.4.2 with the following exceptions.

- Instead of Table 6.3.5A.2.1.4.1-1→ use Table 6.3.5A.2.3.4.1-1.
- Instead of clause 6.3.5A.2.1.4.3→ use clause 6.3.5A.2.3.4.3.

6.3.5A.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5A.2.3.5 Test requirement

For intra-band non-contiguous carrier aggregation, the relative power control tolerance per component carrier measured in steps 5, 6 , 7 and 8 of the test procedure should satisfy the applicable test requirements specified in Tables 6.3.5A.2.3.5-1 to 6.3.5A.2.3.5-4 for normal conditions.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each subtest, and are counted during the Test Procedure.

Table 6.3.5A.2.3.5-1: Test requirements for SCC power increase

Parameter	Condition	Unit	Minimum	Maximum
$(PCC_{TargetMeas,\ n} - PCC_{RefMeas,\ n})$	Normal	dB	-1.7dB	+1.8dB
	Exception	dB	-6.7dB	+6.8dB
$(SCC_{TargetMeas,\ n} - SCC_{RefMeas,\ n})$	Normal	dB	+4.2dB	+13.7dB
	Exception	dB	+2.2dB	+15.8dB

Table 6.3.5A.2.3.5-2: Test requirements for SCC power decrease

Parameter	Condition	Unit	Minimum	Maximum
$(PCC_{TargetMeas,\ n} - PCC_{RefMeas,\ n})$	Normal	dB	-1.8dB	+1.7dB
	Exception	dB	-6.8dB	+6.7dB
$(SCC_{TargetMeas,\ n} - SCC_{RefMeas,\ n})$	Normal	dB	-13.8dB	-4.2dB
	Exception	dB	-15.8dB	-2.2dB

Table 6.3.5A.2.3.5-3: Test requirements for PCC and SCC power increase together

Parameter	Condition	Unit	Minimum	Maximum
$(PCC_{TargetMeas,\ n} - PCC_{RefMeas,\ n})$	Normal	dB	+4.3dB	+13.8dB
	Exception	dB	+2.3dB	+15.8dB
$(SCC_{TargetMeas,\ n} - SCC_{RefMeas,\ n})$	Normal	dB	+4.3dB	+13.8dB
	Exception	dB	+2.3dB	+15.8dB

Table 6.3.5A.2.3.5-4: Test requirements for PCC and SCC power decrease together

Parameter	Condition	Unit	Minimum	Maximum
($PCC_{TargetMeas, n}$ - $PCC_{RefMeas, n}$)	Normal	dB	-13.8dB	-4.3dB
	Exception	dB	-15.8dB	-2.3dB
($SCC_{TargetMeas, n}$ - $SCC_{RefMeas, n}$)	Normal	dB	-13.8dB	-4.3dB
	Exception	dB	-15.8dB	-2.3dB

6.3.5A.3 Aggregate power control tolerance for CA

6.3.5A.3.0 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the aggregate power tolerance is specified on each component carrier exceed the minimum output power as defined in subclause 6.3.2A and the total power is limited by maximum output power as defined in subclause 6.2.2A. The requirements defined in Table 6.3.5A.3.0-1 shall apply on each component carrier with both component carriers active. The requirements can be tested by time aligning any transmission gaps on both the component carriers.

For intra-band contiguous carrier aggregation bandwidth class B and C and intra-band non-contiguous carrier aggregation, the aggregate power tolerance per component carrier is given in Table 6.3.5A.3.0-1 with either simultaneous PUSCH or simultaneous PUCCH-PUSCH (if supported by the UE) configured. The average power per PRB shall be aligned across both assigned carriers before the start of the test. The requirement can be tested with the transmission gaps time aligned between component carriers.

Table 6.3.5A.3.0-1: Aggregate power control tolerance

TPC command	UL channel	Aggregate power tolerance within 21 ms
0 dB	PUCCH	±2.5 dB
0 dB	PUSCH	±3.5 dB
NOTE: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5A.3.1.

6.3.5A.3.1 Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA)

6.3.5A.3.1.1 Test purpose

To verify the ability of a UE to maintain its power in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in [TS 36.213] are constant on all active component carriers.

6.3.5A.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.3.5A.3.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.5A.3.0

6.3.5A.3.1.4 Test description

6.3.5A.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.3.1.4.1-1and table 6.3.5A.3.1.4.1-2. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.3.1.4.1-1: Test Configuration Table: PUCCH sub-test

<table>
<tr><th colspan="5">Initial Conditions</th></tr>
<tr><td colspan="3">Test Environment as specified in TS 36.508 [7] subclause 4.1</td><td colspan="2">Normal</td></tr>
<tr><td colspan="3">Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.</td><td colspan="2">Mid range</td></tr>
<tr><td colspan="3">Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.</td><td colspan="2">Lowest N_{RB_agg}
Highest N_{RB_agg}</td></tr>
<tr><td colspan="5">Test Parameters for CA Configurations</td></tr>
<tr><td colspan="2">CA Configuration / N_{RB_agg}</td><td colspan="2">DL Allocation</td><td>Uplink Configuration</td></tr>
<tr><td>PCC N_{RB}</td><td>SCCs N_{RB}</td><td>CC Mod</td><td>PCC & SCC RB allocation</td><td rowspan="8">FDD: PUCCH format = Format 1b with channel selection/Format 3
TDD: PUCCH format = Format 1b with channel selection/Format 3</td></tr>
<tr><td>25</td><td>50</td><td>QPSK</td><td>25+50</td></tr>
<tr><td>50</td><td>50</td><td>QPSK</td><td>50+50</td></tr>
<tr><td>75</td><td>75</td><td>QPSK</td><td>75+75</td></tr>
<tr><td>100</td><td>25</td><td>QPSK</td><td>100+25</td></tr>
<tr><td>100</td><td>50</td><td>QPSK</td><td>100+50</td></tr>
<tr><td>100</td><td>75</td><td>QPSK</td><td>100+75</td></tr>
<tr><td>100</td><td>100</td><td>QPSK</td><td>100+100</td></tr>
<tr><td colspan="5">Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg , only the first of those is tested, according to the order on the Test Configuration Table list.</td></tr>
</table>

Table 6.3.5A.3.1.4.1-2: Test Configuration Table: PUSCH sub-test

Initial Conditions								
Test Environment as specified in TS 36.508 [7] clause 4.1			Normal					
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Mid range					
Test CC Combination setting (NRB_agg) as specified in clause 5.4.2A.1 for the CA Configuration			Lowest N_{RB_agg} Highest N_{RB_agg}					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
2575	75	N/A	QPSK	150	P_75@0	S_75@0		
100	25		QPSK	125	P_100@0	S_25@0		
100	50		QPSK	150	P_100@0	S_50@0		
100	75		QPSK	175	P_100@0	S_75@0		
100	100		QPSK	200	P_100@0	S_100@0		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and DL Reference Measurement channel is set according to Table 6.3.5A.3.1.4.1-1 (PUCCH sub-test) and Table 6.3.5A.3.1.4.1-2 (PUSCH sub-test).

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.3.1.4.3.

6.3.5A.3.1.4.2 Test procedure

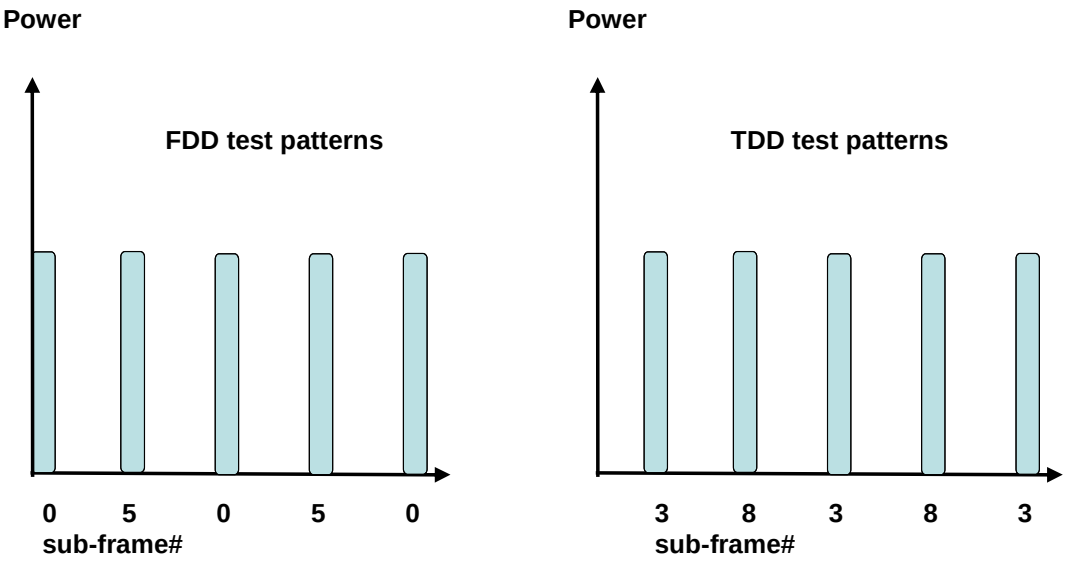


Figure 6.3.5A.3.1.4.2-1: Test uplink transmission

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. The procedure is separated in two subtests to verify PUCCH and PUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5A.3.1.4.2-1.
5. PUCCH sub test:

   5.1 The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.3.5A.3.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH on PCC. Send the appropriate TPC commands for PUCCH to the UE to ensure that the UE transmits PUCCH at 0dBm +/- 3.2 dB for carrier frequency $f \leq 3.0$GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz $< f \leq 4.2$GHz.

   5.2 Every 5 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the PDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 4 subframes. The downlink transmission is scheduled in the appropriate sub-frames to make the UE transmit PUCCH as described in figure 6.3.5A.3.1.4.2-1.

   5.3 Measure the power of 5 consecutive PUCCH transmissions on PCC to verify the UE transmitted PUCCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

6. PUSCH sub test:

   6.1 The SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.5A.3.1.4.1-2 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency $f \leq 3.0$GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz $< f \leq 4.2$GHz.

   6.2 Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5A.3.1.4.2-1.

6.3 Measure the power on both PCC and SCC of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms on each component carrier. The transient periods of 20us are excluded from the power measurement.

6.3.5A.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5A.3.1.5 Test requirement

For intra-band contiguous carrier aggregation bandwidth class C, the aggregate power control tolerance per component carrier measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5A.3.1.5-1.

Table 6.3.5A.3.1.5-1: Aggregate power control tolerance for intra-band contiguous CA

TPC command	UL channel	Aggregate power tolerance within 21 ms
0 dB	PUCCH	±3.2 dB
0 dB	PUSCH	±4.2 dB
NOTE: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

6.3.5A.3.2 Aggregate power control tolerance for CA (inter-band DL CA and UL CA)

6.3.5A.3.2.1 Test purpose

To verify the ability of a UE to maintain its power in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in TS 36.213 are constant on all active component carriers.

6.3.5A.3.2.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.3.5A.3.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.5A.3.0.

6.3.5A.3.2.4 Test description

6.3.5A.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.3.2.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.3.2.4.1-1: Test Configuration Table: PUSCH

Initial Conditions								
Test Environment as specified in TS 36.508 [7] clause 4.1			Normal					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.			Mid range for PCC and SCC					
Test CC Combination setting (N_{RB_agg}) as specified in clause 5.4.2A.1 for the CA Configuration			Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/A for this test	QPSK	31	P_6@0	S_25@0	-	-
6	50		QPSK	56	P_6@0	S_50@0	-	-
25	15		QPSK	40	P_25@0	S_15@0	-	-
25	25		QPSK	50	P_25@0	S_25@0	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
25	75		QPSK	100	P_25@0	S_75@0	-	-
25	100		QPSK	125	P_25@0	S_100@0	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
50	75		QPSK	125	P_50@0	S_75@0	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channel is set according to Table 6.3.5A.3.2.4.1-1 (PUSCH).
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.3.2.4.3.

6.3.5A.3.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. The uplink transmission patterns are described in figure 6.3.5A.3.1.4.2-1.
5. The SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.5A.3.2.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency $f \leq 3.0$GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz $< f \leq 4.2$GHz.

6. Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5A.3.1.4.2-1.

7. Measure the power on both PCC and SCC of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms on each component carrier. The transient periods of 20us are excluded from the power measurement.

6.3.5A.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5A.3.2.5 Test requirement

For inter-band carrier aggregation, the aggregate power control tolerance per component carrier measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5A.3.2.5-1.

Table 6.3.5A.3.2.5-1: Aggregate power control tolerance for inter-band CA

TPC command	UL channel	Aggregate power tolerance within 21 ms
0 dB	PUSCH	±4.2 dB
NOTE: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

6.3.5A.3.3 Aggregate power control tolerance for CA (intra-band non-contiguous DL CA and UL CA)

6.3.5A.3.3.1 Test purpose

To verify the ability of a UE to maintain its power in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in TS 36.213 [10] are constant on all active component carriers.

6.3.5A.3.3.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.3.5A.3.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.3.5A.3.0

6.3.5A.3.3.4 Test description

6.3.5A.3.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.3.5A.3.3.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5A.3.3.4.1-1: Test Configuration Table: PUSCH

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Refer to test points A: N/A (Range is not relevant), Maximum Wgap						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC						
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A		QPSK	P_25@0	QPSK	S_25@0
2	50	50	25			QPSK	P_50@0	QPSK	S_50@0
3	100	100	5			QPSK	P_100@0	QPSK	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.									

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channel is set according to Table 6.3.5A.3.3.4.1-1 (PUSCH).
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5A.3.3.4.3.

6.3.5A.3.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. The uplink transmission patterns are described in figure 6.3.5A.3.1.4.2-1.
5. The SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.3.5A.3.3.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency $f \leq 3.0$GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

6. Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5A.3.1.4.2-1.

7. Measure the power on both PCC and SCC of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms on each component carrier. The transient periods of 20us are excluded from the power measurement.

6.3.5A.3.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5A.3.3.5 Test requirement

For intra-band non-contiguous carrier aggregation, the aggregate power control tolerance per component carrier measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5A.3.3.5-1.

Table 6.3.5A.3.3.5-1: Aggregate power control tolerance for intra-band non-contiguous CA

TPC command	UL channel	Aggregate power tolerance within 21 ms
0 dB	PUSCH	±4.2 dB
NOTE: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

6.3.5B Power Control for UL- MIMO

6.3.5B.1 Power Control Absolute Power Tolerance for UL- MIMO

6.3.5B.1.1 Test purpose

To verify the ability of the UE transmitter for UL-MIMO to set its initial output power to a specific value at the start of a contiguous transmission or non-contiguous transmission with a long transmission gap, i.e. transmission gap is larger than 20 ms.

6.3.5B.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL- MIMO.

6.3.5B.1.3 Minimum conformance requirement

For UE with multiple transmit antenna connectors, the power control tolerance applies to the sum of output power at each transmit antenna connector.

The power control requirements specified in subclause 6.3.5 apply to UE with two transmit antenna connectors with UL-MIMO configurations specified in Table 6.2.2B.3-2 for closed-loop spatial multiplexing scheme, wherein

- The Maximum output power requirements for UL-MIMO are specified in subclause 6.2.2B
- The Minimum output power requirements for UL-MIMO are specified in subclause 6.3.2B

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5B.

6.3.5B.1.4 Test description

6.3.5B.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5B.1.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5B.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Power Control Absolute power tolerance test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.3.5B.1.4.1-1.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5B.1.4.3. Note that PDCCH DCI format 4 sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.5B.1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 4 with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.5B.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Measure the initial sum power of the first subframe of UE PUSCH first transmission at each UE antenna connector. The transient periods of 20us are excluded.

3. Repeat for the two test points as indicated in section 6.3.5B.1.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5B.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.5B.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5B.1.4.3-2: UplinkPowerControlCommon: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5B.1.4.3-3: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH			
uplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See clause 4.6.3	SRB1
	UplinkPowerControlDedicated-DEFAULT	See clause 4.6.3	RBC

Table 6.3.5B.1.4.3-4: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		SRB1
	0		RBC
}			

6.3.5B.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5B.1.5-1 and 6.3.5B.1.5-2.

Table 6.3.5B.1.5-1: Absolute power tolerance: test point 1

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Expected Measured power Normal conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2B3						

Table 6.3.5B.1.5-2: Absolute power tolerance: test point 2

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2B.3						

6.3.5B.2 Power Control Relative power tolerance for UL-MIMO

6.3.5B.2.1 Test purpose

To verify the ability of the UE transmitter to set its output power relatively to the power in a target sub-frame relatively to the power of the most recently transmitted reference sub-frame if the transmission gap between these sub-frames is $\leq$ 20 ms.

6.3.5B.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL MIMO.

6.3.5B.2.3 Minimum conformance requirement

For UE with multiple transmit antenna connectors, the power control tolerance applies to the sum of output power at each transmit antenna connector.

The power control requirements specified in clause 6.3.5 apply to UE with two transmit antenna connectors with UL-MIMO configurations specified in Table 6.2.2B.3-2 for closed-loop spatial multiplexing scheme, wherein:

- The Maximum output power requirements for UL-MIMO are specified in clause 6.2.2B
- The Minimum output power requirements for UL-MIMO are specified in clause 6.3.2B

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5B.

6.3.5B.2.4 Test description

6.3.5B.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5B.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5B.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] clause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1	Low range			
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Power Control Relative power tolerance test case	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	See table 6.3.5B.2.5-1 6.3.5B.2.5-2 6.3.5B.2.5-13	See table 6.3.5B.2.5-1 6.3.5B.2.5-2 6.3.5B.2.5-13
3MHz		QPSK	See table 6.3.5B.2.5-3 6.3.5B.2.5-4 6.3.5B.2.5-13	See table 6.3.5B.2.5-3 6.3.5B.2.5-4 6.3.5B.2.5-13
5MHz		QPSK	See table 6.3.5B.2.5-5 6.3.5B.2.5-6 6.3.5B.2.5-13	See table 6.3.5B.2.5-5 6.3.5B.2.5-6 6.3.5B.2.5-13
10MHz		QPSK	See table 6.3.5B.2.5-7 6.3.5B.2.5-8 6.3.5B.2.5-13	See table 6.3.5B.2.5-7 6.3.5B.2.5-8 6.3.5B.2.5-13
15MHz		QPSK	See table 6.3.5B.2.5-9 6.3.5B.2.5-10 6.3.5B.2.5-13	See table 6.3.5B.2.5-9 6.3.5B.2.5-10 6.3.5B.2.5-13
20MHz		QPSK	See table 6.3.5B.2.5-11 6.3.5B.2.5-12 6.3.5B.2.5-13	See table 6.3.5B.2.5-11 6.3.5B.2.5-12 6.3.5B.2.5-13
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1 Note 2: The starting resource block shall be RB# 0.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to table 6.3.5B.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5B.2.4.3.

6.3.5B.2.4.2 Test procedure

The procedure is separated in various subtests to verify different aspects of relative power control. The power patterns of the subtests are described in figure 6.3.5B.2.4.2-1.

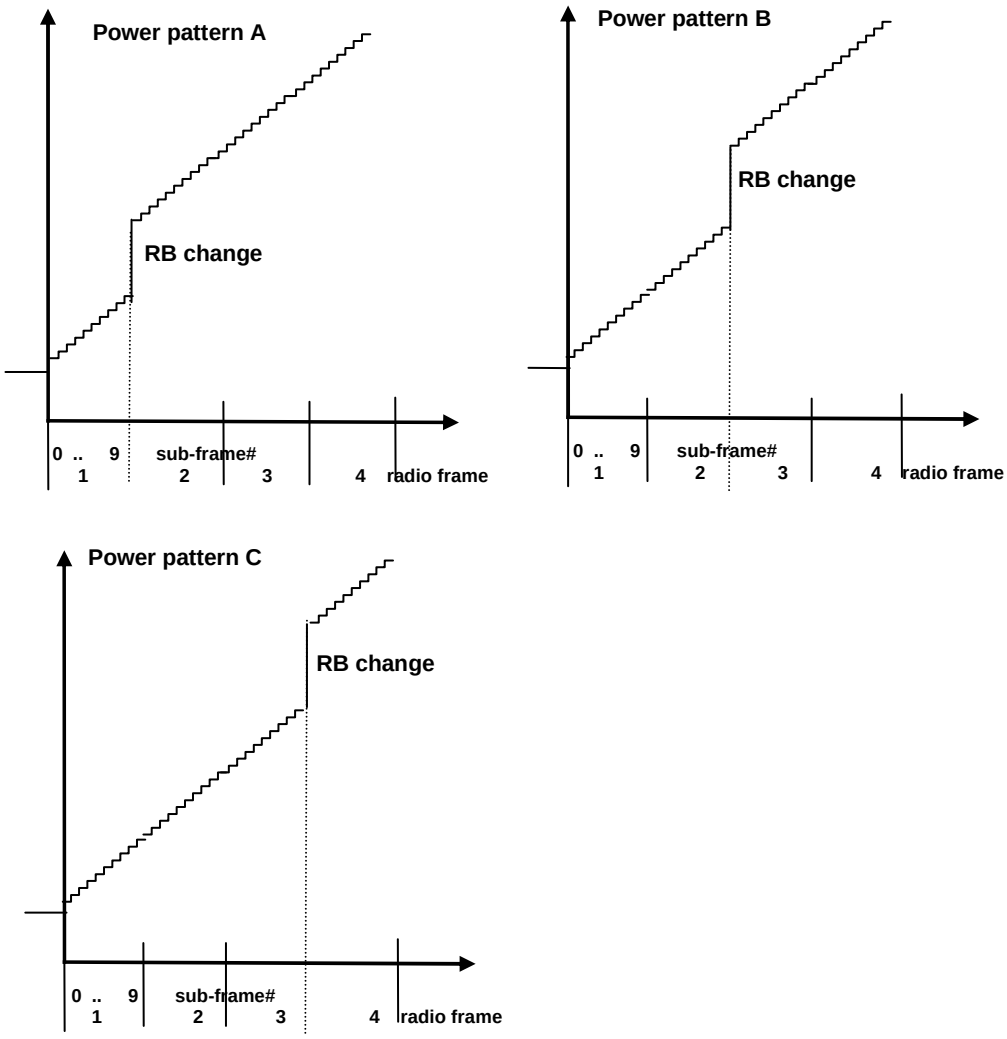


Figure 6.3.5B.2.4.2-1: FDD ramping up test power patterns

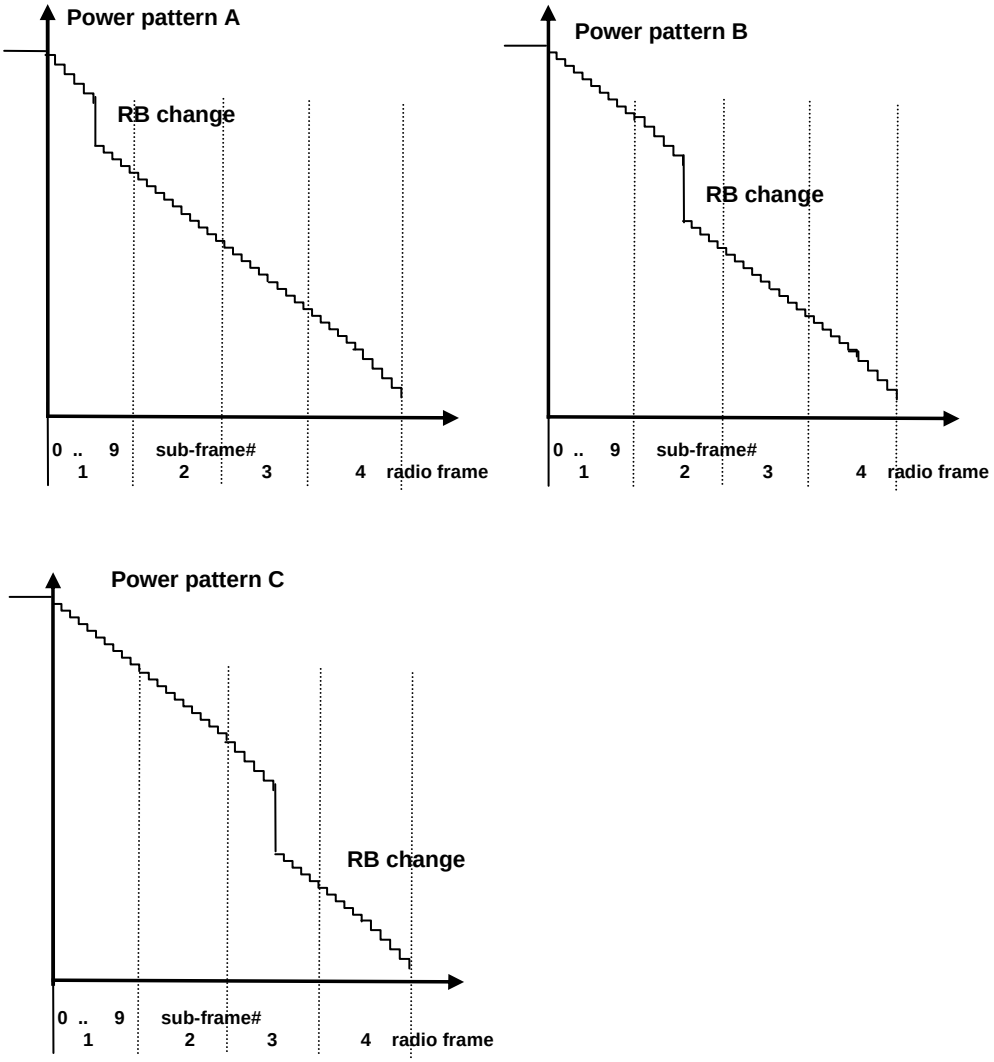


Figure 6.3.5B.2.4.2-2: FDD ramping down test power patterns

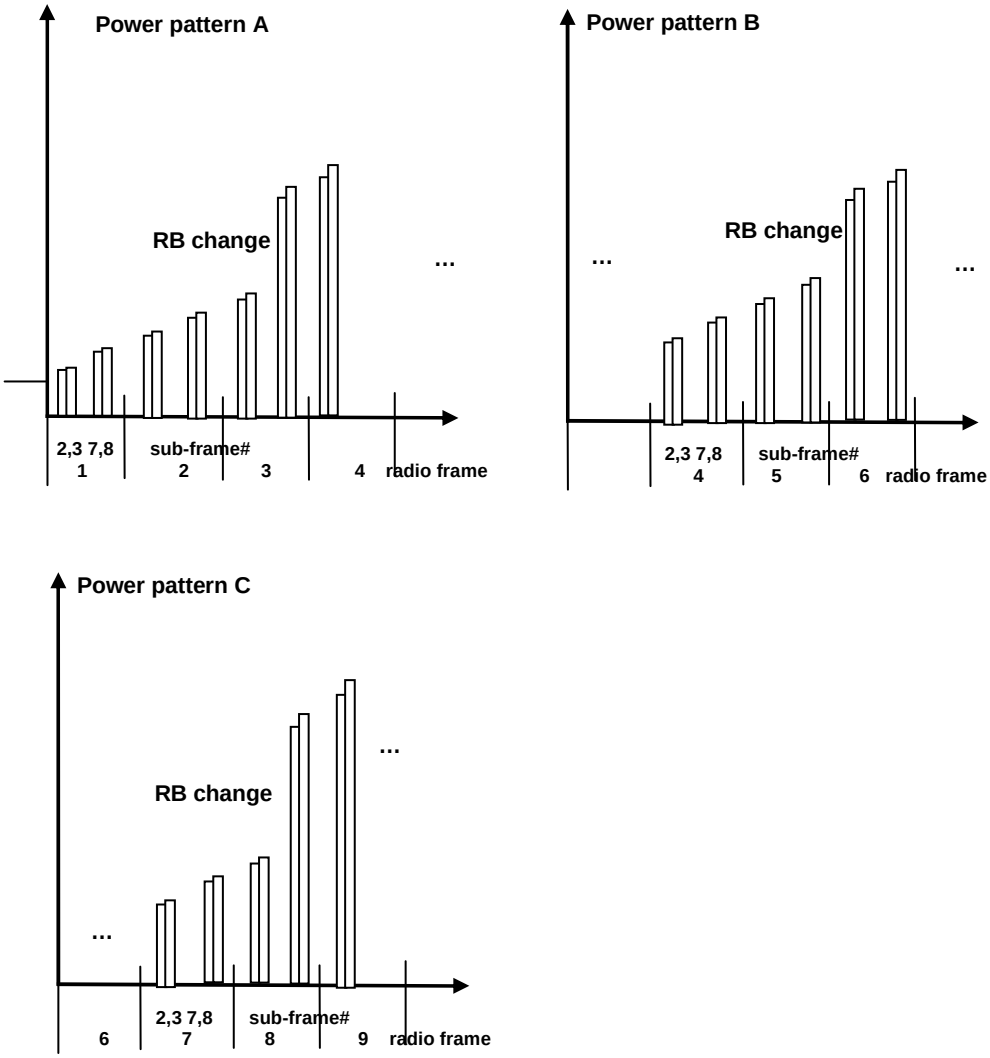


Figure 6.3.5B.2.4.2-3: TDD ramping up test power patterns

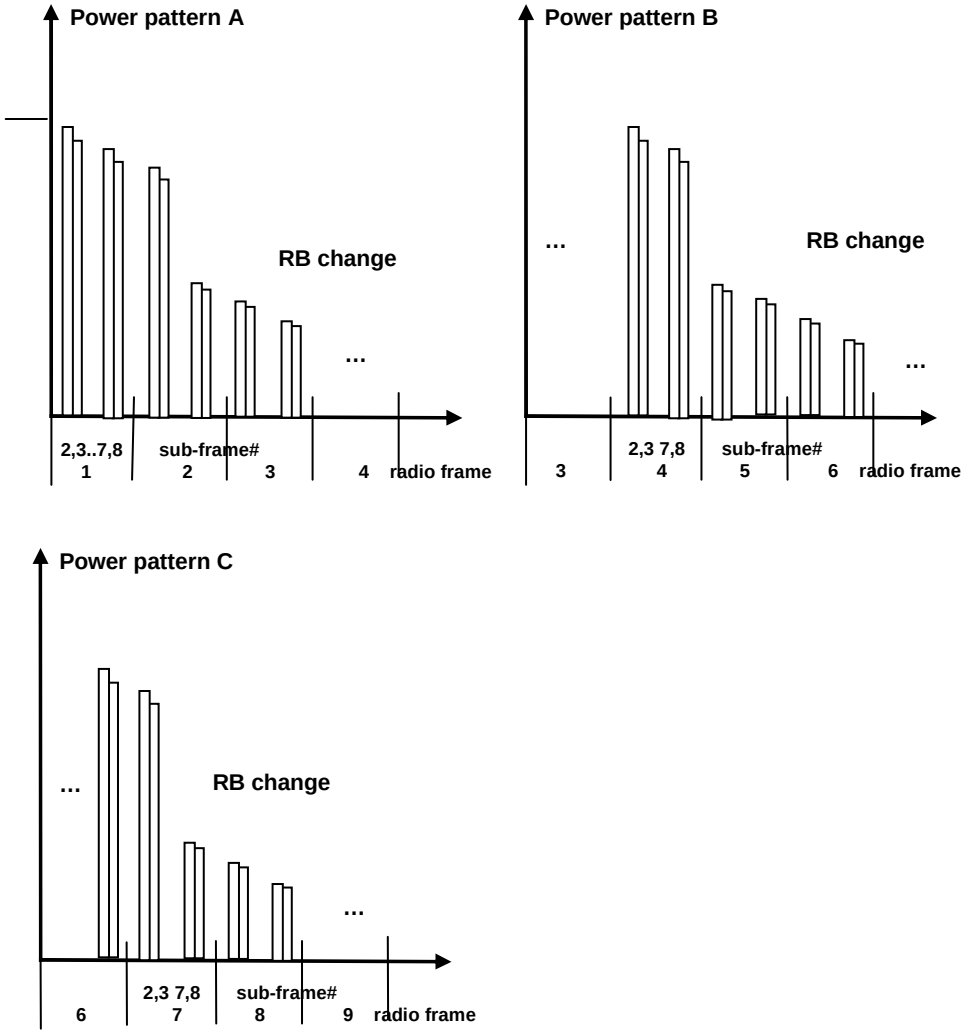


Figure 6.3.5B.2.4.2-4: TDD ramping down test power patterns

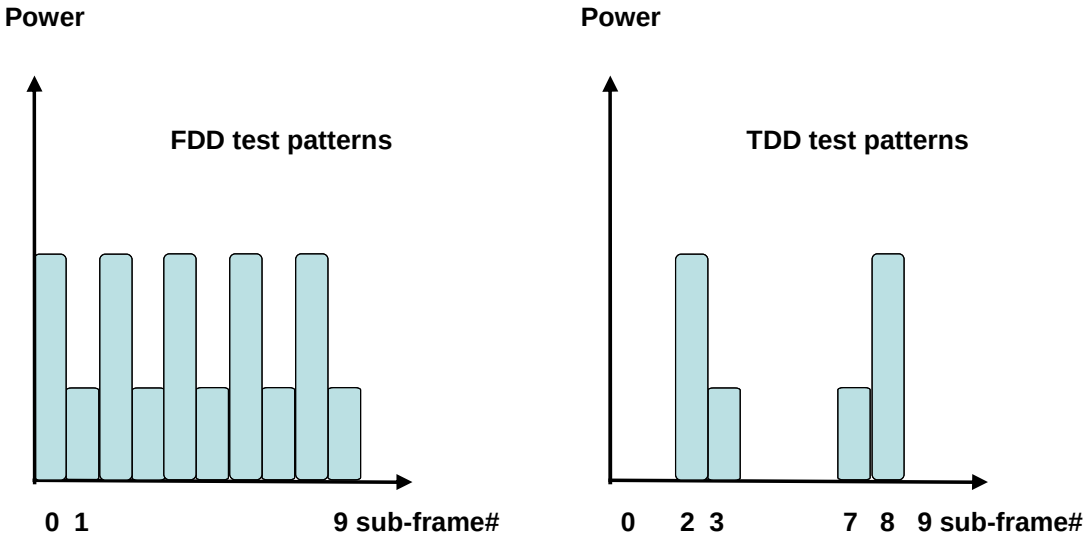


Figure 6.3.5B.2.4.2-5: Alternating Test Power patterns

1. Sub test: ramping up pattern

   1.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.5B.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -36.8dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at -36.5dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

   1.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5B.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5B.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5B.2.5-1 thru 6.3.5B.2.5-12 depending on channel bandwidth. On the PDCCH format 4 for the scheduling of the PUSCH the SS will transmit a +1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

   1.3. Measure the mean sum power at each antenna connector for PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5B.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

   1.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5B.2.5-1 thru Table 6.3.5B.2.5-12 to force bigger UE power steps at various points in the power range.

2. Sub test: ramping down pattern

   2.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.5B.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at +18.0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at +17.7dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

   2.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5B.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5B.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5B.2.5-1 thru 6.3.5B.2.5-12 depending on channel bandwidth. On the PDCCH format 4 for the scheduling of the PUSCH the SS will transmit a -1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

   2.3. Measure the mean sum power at each antenna connector for PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5B.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

   2.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5B.2.5-1 thru Table 6.3.5B.2.5-12 to force bigger UE power steps at various points in the power range.

3. Sub test: alternating pattern

   3.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.5B.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -10dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at -10dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz. The initial uplink RB allocation is defined as the smaller uplink RB allocation value specified in tables 6.3.5B.2.5-13. The power level and RB allocation are reset for each sub-test.

   3.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5B.2.4.2-5for 10 sub-frames with an uplink RB allocation alternating pattern as defined in table 6.3.5B.2.5-13 while transmitting 0dB TPC command for PUSCH via the PDCCH.

3.3. Measure the mean sum power of each antenna connector for PUSCH transmissions to verify the UE relative power control meet test requirements specified in clause 6.3.5B.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.3.5B.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

6.3.5B.2.5 Test requirement

Each UE power step measured in the test procedure 6.3.5B.2.4.2 should satisfy the test requirements specified in Table 6.3.5B.2.5-1, thru 6.3.5B.2.5-13 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns. For these exceptions the power tolerance limit is a maximum of ±6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5B.2.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 1.4MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 1 to 6 RBs	TPC=+1dB	8.78	4 ≤ ΔP < 10	8.78 ±4.7 Note 2 8.78 +6.2/-4.7 Note 3
Subframes after RB change	Fixed = 6	TPC=+1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 1.4MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 5	TPC=-1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 5 to 1 RBs	TPC=-1dB	7.99	4 ≤ ΔP < 1	7.99 ± 4.7 Note 2 7.99 +4.7/-6.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.
Note 2: When Note 4 does not apply.
Note 3: N/A.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 3MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 1 to 4 RBs	TPC=+1dB	7.02	4 ≤ ΔP < 10	7.02 ± 4.7 Note 2 7.02 +6.2/-4.7 Note 3
Subframes after RB change	Fixed =4	TPC=+1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 3MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 15	TPC=-1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 15 to 1 RBs	TPC=-1dB	12.76	10 ≤ ΔP < 15	12.76 ± 5.7 Note 2 12.76 +5.7/-7.2 Note 4
Subframes after RB change	Fixed =1	TPC=-1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes.
Pattern A the position of RB uplink allocation change is after 16 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.
Note 2: When Note 4 does not apply.
Note 3: N/A.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 5MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 1 to 20	TPC=+1dB	14.01	10 ≤ ΔP < 15	14.01 ± 5.7 Note 2 14.01 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 20	TPC=+1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 5MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 25	TPC=-1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 25 to 1	TPC=-1dB	14.98	10 ≤ ΔP < 15	14.98 ± 5.7 Note 2 14.98 +5.7/-7.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.
Note 2: When Note 4 does not apply.
Note 3: N/A.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions - Note 5) channel bandwidth 10MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 1 to 25	TPC=+1dB	14.98	10 ≤ ΔP < 15	14.98 ± 5.7 Note 2 14.98 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 25	TPC=+1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 50 (UE-Categories ≥2) Fixed = 48 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 50 to 1 (UE-Categories ≥2) Change from 48 to 1 (UE cat 1)	TPC=-1dB	17.99 17.81	15 ≤ Δ	17.99 ± 6.7 Note 2 17.99 +6.7/-8.2 Note 4 17.81 ± 6.7 Note 2 17.81 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.
Note 2: When Note 3 does not apply.
Note 3: N/A.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 1 to 50	TPC=+1dB	17.99	15 ≤ ΔP	17.99±6.7 Note 2 17.99 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 50	TPC=+1dB	1	ΔP < 2	1 ±1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 75 (UE-Categories ≥2) Fixed = 50 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 75 to 1 (UE-Categories ≥2) Change from 50 to 1 (UE Cat 1)	TPC=-1dB	19.75 17.99	15 ≤ ΔP	19.75 ± 6.7 Note 2 19.75 +6.7/8.2 ±TT Note 4 17.99 ± 6.7 Note 2 17.99 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.
Note 2: When Note 4 does not apply.
Note 3: N/A.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 1 to 75	TPC=+1dB	19.75	15 ≤ ΔP	19.75 ± 6.7 Note 2 19.75 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 75	TPC=+1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes.
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 100 (UE-Categories ≥2) Fixed = 75 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± 1.7
RB change	Change from 100 to 1 (UE-Categories ≥2) Change from 75 to 1 (UE Cat 1)	TPC=-1dB	21.0 19.75	15 ≤ ΔP	21.0 ± 6.7 Note 2 21.0 +6.7/-8.2 Note 4 19.75 ± 6.7 Note 2 19.75 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± 1.7

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes.
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes.
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes.
Note 2: When Note 4 does not apply.
Note 3: N/A.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5B.2.5-13: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) (Alternating pattern)

Sub-test	Uplink RB allocation	TPC command	Expected power step size (Up or down) ΔP [dB]	Power step size range (Up or down) ΔP [dB]	PUSCH [dB]
1.4 MHz	Alternating 1 and 6	TPC=0dB	7.78	4 ≤ ΔP < 10	7.78 ± 6.7 Note 1,2 7.78 +8.2/-6.7 Note 3 7.78 +6.7/-8.2 Note 4
3 MHz	Alternating 1 and 15	TPC=0dB	11.76	10 ≤ ΔP < 15	11.76 ± 6.76.7 Note 1,2 11.76 +8.2/-6.7 Note 3 11.76 +6.7/-8.2 Note 4
5 MHZ	Alternating 1 and 25	TPC=0dB	13.98	10 ≤ ΔP < 15	13.98 ± 6.7 Note 1 13.98 +8.2/-6.7 Note 2 13.98 +6.7/-8.2 Note 3
10 MHZ	Alternating 1 and 50 (UE-Categories ≥2) Alternating 1 and 48 (UE Cat 1)	TPC=0dB	16.99 16,81	15 ≤ ΔP	16.99 ± 6.7 Note 1,2 16.99 +8.2/-6.7 Note 3 16.99 +6.7/-8.2 Note 4 16.81 ± 6.7 Note 1,2 16.81 +8.2/-6.7 Note 3 16.81 +6.7/-8.2 Note 4
15 MHZ	Alternating 1 and 75 (UE-Categories ≥2) Alternating 1 and 50 (UE Cat 1)	TPC=0dB	18.75 16.99	15 ≤ ΔP	18.75 ± 6.7 Note 1,2 18.75 +8.2/-6.7 Note 3 18.75 +6.7/-8.2 Note 4 16.99 ± 6.7 Note 1,2 16.99 +8.2/-6.7 Note 3 16.99 +6.7/-8.2 Note 4
20 MHZ	Alternating 1 and 100 (UE-Categories ≥2) Alternating 1 and 75 (UE Cat 1)	TPC=0dB	20.00 18.75	15 ≤ ΔP	20.00 ± 6.7 Note 1,2 20.00 +8.2/-6.7 Note 3 20.00 +6.7/-8.2 Note 4 18.75 ± 6.7 Note 1,2 18.75 +8.2/-6.7 Note 3 18.75 +6.7/-8.2 Note 4

Note 1: Test tolerance +/- 6.7 dB was selected to allow PA switch possible exceptions to occur.
Note 2: When neither Note 3 nor Note 4 applies.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} - 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

6.3.5B.3 Aggregate power control tolerance for UL-MIMO

6.3.5B.3.1 Test purpose

To verify the ability of the UE with UL-MIMO to maintain its power level in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in TS 36.213 are constant.

6.3.5B.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL MIMO.

6.3.5B.3.3 Minimum conformance requirement

For UE with multiple transmit antenna connectors, the power control tolerance applies to the sum of output power at each transmit antenna connector.

The power control requirements specified in clause 6.3.5 apply to UE with two transmit antenna connectors with UL-MIMO configurations specified in Table 6.2.2B.3-2 for closed-loop spatial multiplexing scheme, wherein:

- The Maximum output power requirements for UL-MIMO are specified in clause 6.2.2B.
- The Minimum output power requirements for UL-MIMO are specified in clause 6.3.2B.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5B.

6.3.5B.3.4 Test description

6.3.5B.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5B.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5B.3.4.1-1: Test Configuration Table: PUCCH sub-test

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1			Normal	
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**			Mid range	
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**			Lowest, 5MHz, Highest	
Test Parameters for Channel Bandwidths				
	Downlink Configuration			**Uplink Configuration**
Ch BW	Mod'n	RB allocation		FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a/1b
		FDD	TDD	
1.4MHz	QPSK	3	3	
3MHz	QPSK	4	4	
5MHz	QPSK	8	8	
10MHz	QPSK	16	16	
15MHz	QPSK	25	25	
20MHz	QPSK	30	30	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

Table 6.3.5B.3.4.1-2: Test Configuration Table: PUSCH sub-test

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal			
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**	Mid range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for PUSCH sub-test	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.5B.3.4.1-1 (PUCCH sub-test) and Table 6.3.5B.3.4.1-2 (PUSCH sub-test).
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5B.3.4.3.

6.3.5B.3.4.2 Test procedure

The procedure is separated in two subtests to verify PUCCH and PUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5B.3.4.2-1.

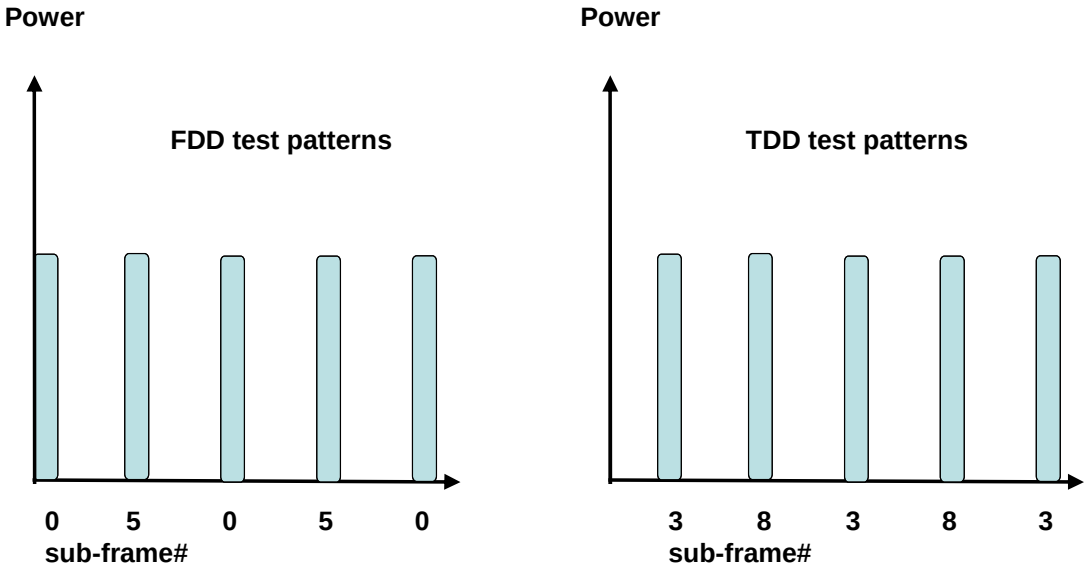


Figure 6.3.5B.3.4.2-1 Test uplink transmission

1. PUCCH sub test:

   1.1 The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.3.5B.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. Send the appropriate TPC commands for PUCCH to the UE to ensure that the UE transmits PUCCH at 0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

   1.2. Every 5 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the PDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 4 subframes. The downlink transmission is scheduled in the appropriate sub-frames to make the UE transmit PUCCH as described in figure 6.3.5B.3.4.2-1.

   1.3. Measure the mean sum power at each antenna connector for UE of 5 consecutive PUCCH transmissions to verify the UE transmitted PUCCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

2. PUSCH sub test:

   2.1. The SS sends uplink scheduling information via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.3.5B.3.4.1-2. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency f ≤ 3.0GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

   2.2. Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5B.3.4.2-1.

   2.3. Measure the mean sum power at each antenna connector for UE of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

6.3.5B.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.3.5B.3.4.3-1: PUCCH-ConfigDedicated-v1020-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-9A: PUCCH-ConfigDedicated-v1020-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {			
twoAntennaPortActivatedPUCCH-Format1a1b-r10	true		
}			

6.3.5B.3.5 Test requirement

The requirement for the power measurements made in step (1.3) and (2.3) of the test procedure shall not exceed the values specified in Table 6.3.5B.3.5-1. The power measurement period shall be 1 sub-frame excluding transient periods.

Table 6.3.5B.3.5-1: Power control tolerance

TPC command	UL channel	Test requirement measured power
0 dB	PUCCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 3.2 dB of the 1st measurement.
0 dB	PUSCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 4.2 dB of the 1st measurement.
Note 1: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

6.3.5C Power Control for DC

6.3.5C.1

6.3.5C.2 Power Control Relative power tolerance for Dual Connectivity

6.3.5C.2.1 Test purpose

To verify the ability of the UE transmitter to change the output power in both assigned component carrier in the uplink with a defined power step sizes between sub-frames on the two respective component carrier in a synchronous Dual Connectivity scenario with maximum (33us) time offset between carriers.

6.3.5C.2.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward that support Dual Connectivity.

6.3.5C.2.3 Minimum conformance requirement

The minimum conformance requirements are defined in clause 6.3.5A.2.0.

6.3.5C.2.4 Test description

6.3.5C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA DC configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each DC Configuration, and are shown in table 6.3.5C.2.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5C.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different DC bandwidth classes.		Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the DC Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for DC Configurations								
DC Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
MCG CC N_{RB}	**SCG CCs N_{RB}**	**MCG & SCG RB allocation**		**N_{RB_alloc}**	**MCG & SCG RB allocations(Note 3) (L_{CRB} @ RB_{start})**			
6	25	N/A for this test	QPSK	31	See table 6.3.5C.2.2.5-1 6.3.5C.2.2.5-2	See table 6.3.5C.2.2.5-5 6.3.5C.2.2.5-6	-	-
6	50		QPSK	56	See table 6.3.5C.2.2.5-1 6.3.5C.2.2.5-2	See table 6.3.5C.2.2.5-7 6.3.5C.2.2.5-8	-	-
25	15		QPSK	40	See table 6.3.5C.2.2.5-5 6.3.5C.2.2.5-6	See table 6.3.5C.2.2.5-3 6.3.5C.2.2.5-4	-	-
25	25		QPSK	50	See table 6.3.5C.2.2.5-5 6.3.5C.2.2.5-6	See table 6.3.5C.2.2.5-5 6.3.5C.2.2.5-6	-	-
25	50		QPSK	75	See table 6.3.5C.2.2.5-5 6.3.5C.2.2.5-6	See table 6.3.5C.2.2.5-5 6.3.5C.2.2.5-6	-	-
50	50		QPSK	100	See table 6.3.5C.2.2.5-7 6.3.5C.2.2.5-8	See table 6.3.5C.2.2.5-7 6.3.5C.2.2.5-8	-	-
50	100		QPSK	150	See table 6.3.5C.2.2.5-7 6.3.5C.2.2.5-8	See table 6.3.5C.2.2.5-11 6.3.5C.2.2.5-12	-	-
75	75		QPSK	150	See table 6.3.5C.2.2.5-9 6.3.5C.2.2.5-10	See table 6.3.5C.2.2.5-9 6.3.5C.2.2.5-10	-	-
100	75		QPSK	175	See table 6.3.5C.2.2.5-11 6.3.5C.2.2.5-12	See table 6.3.5C.2.2.5-9 6.3.5C.2.2.5-10	-	-
100	100		QPSK	200	See table 6.3.5C.2.2.5-11 6.3.5C.2.2.5-12	See table 6.3.5C.2.2.5-11 6.3.5C.2.2.5-12	-	-

Note 1: DC Configuration Test CC Combination settings are checked separately for each DC Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the DC Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, only the first of those is tested, according to the order in the Test Configuration Table list.

Note 3: The UL allocation is changed as part of the test procedure. The Test Configuration Table entries list the combinations used, with the sequence of usage as determined by the test procedure for each sub-test.

Note 4: The starting resource block shall be RB# 0.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals for MCG CC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.3.5A.1.2.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-DC1 according to TS 36.508 [7] clause 5.2A.2A. Message contents are defined in clause 6.3.5C.2.2.4.3.

6.3.5C.2.4.2 Test procedure

1. Configure SCG CC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels with a time offset of +33 us compared to PCC.

3. SS activates SCG CC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clause 8.3.3.2).

4. The procedure is separated in various subtests to verify different aspects of relative power control on both MCG CC and SCG CC individually. The power patterns of the subtests are shown in figure 6.3.5C.2.4.2-1 to 6.3.5C.2.4.2-4. In this test case, the term $P_{CMAX_L} - MAX\{T_L, T_{LOW}(P_{CMAX_L})\}$ defined in TS 36.101 [2] clause 6.2.5A is used, to ensure the UE is not tested outside its power capability.

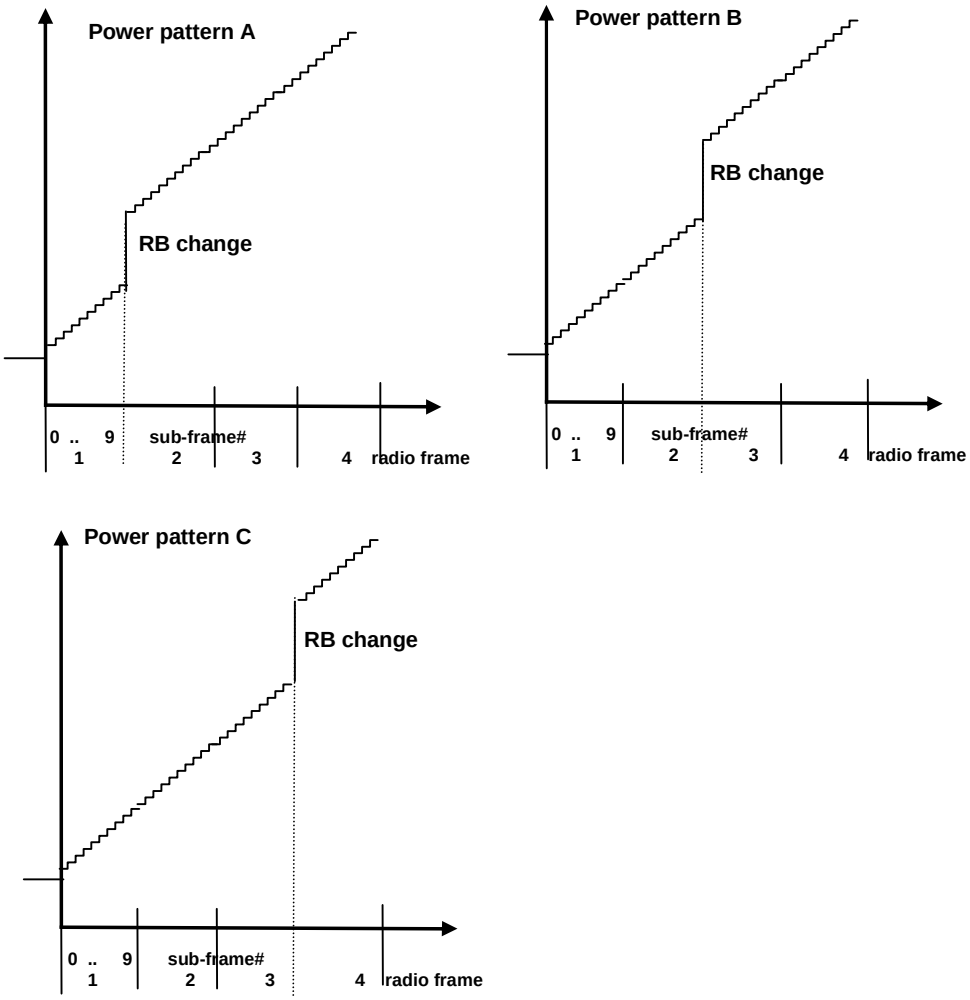


Figure 6.3.5C.2.4.2-1: FDD ramping up test power patterns

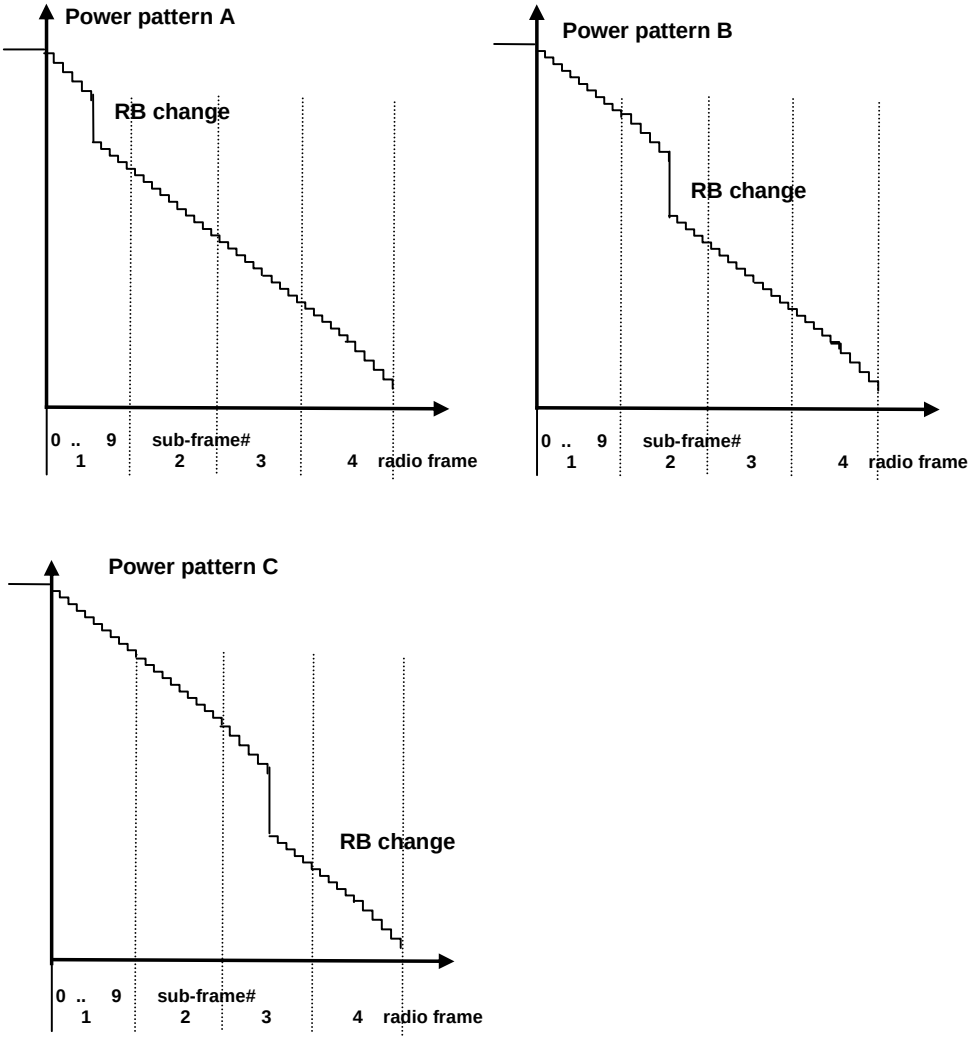


Figure 6.3.5C.2.4.2-2: FDD ramping down test power patterns

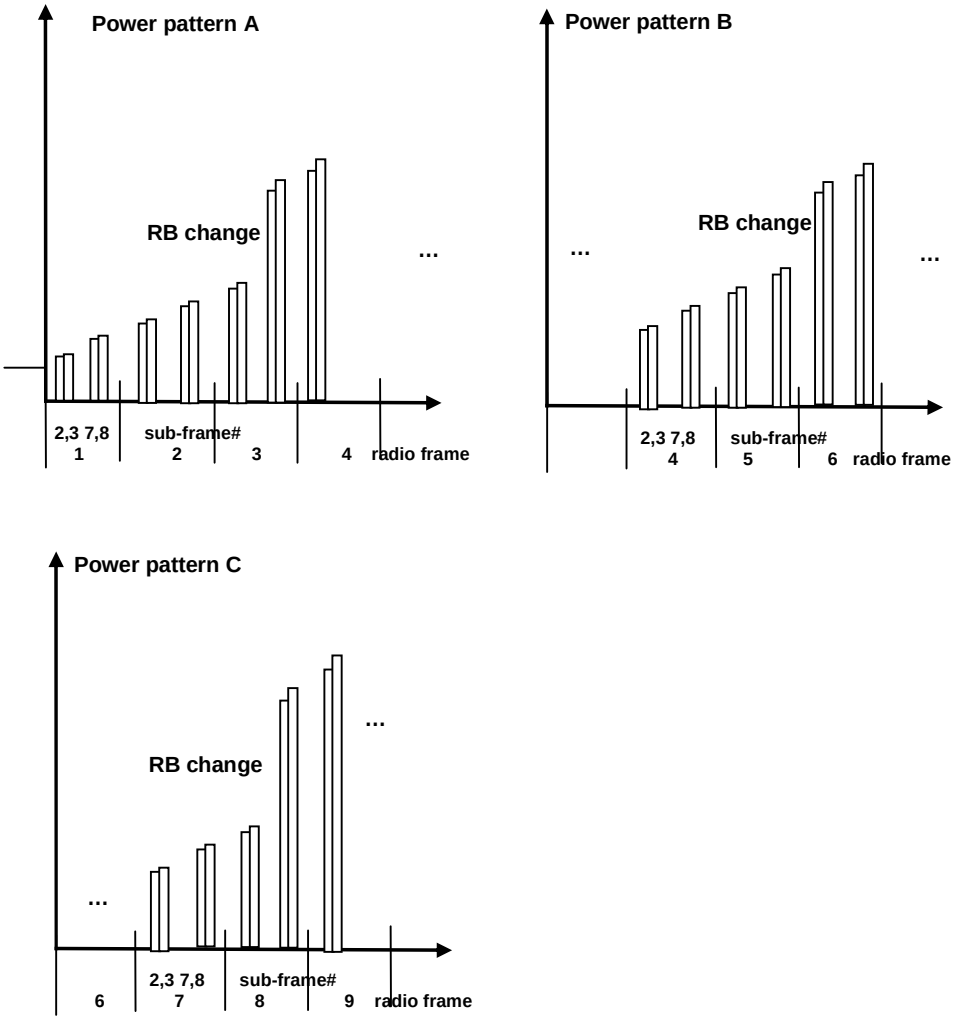


Figure 6.3.5C.2.4.2-3: TDD ramping up test power patterns

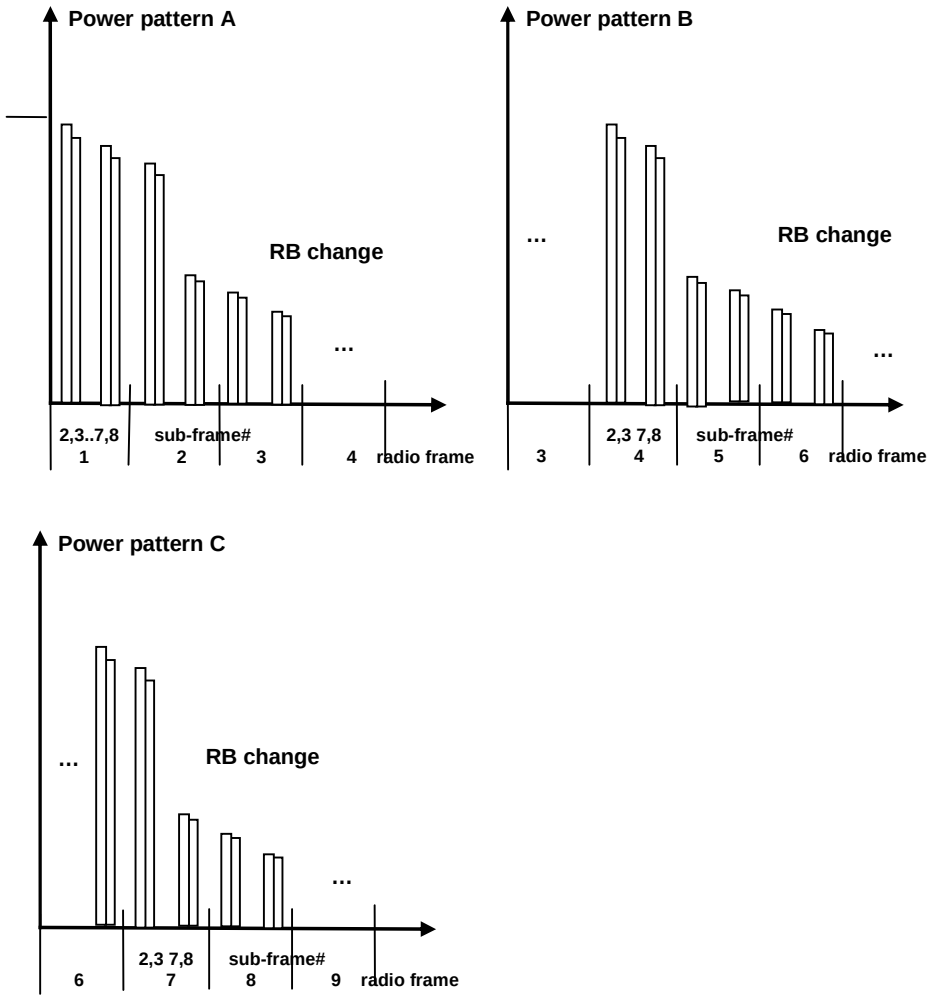


Figure 6.3.5C.2.4.2-4: TDD ramping down test power patterns

5. Sub test: ramping up pattern

5.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both CC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the MCG CC and on the SCG CC at -36.8dBm +/- 3.2 dB for carrier frequency $f \leq 3.0$GHz or at -36.5dBm +/- 3.5 dB for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

5.2. Schedule the UE's PUSCH data transmission on each component carrier as described in Figure 6.3.5C.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5C.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5C.2.5-1 thru 6.3.5C.2.5-12 depending on CC combinations. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a +1dB TPC command on both CCs separately. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

5.3. Measure the power of PUSCH transmissions on both CCs separately to verify the UE relative power control meet test requirements 6.3.5C.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded. Calculate the Total uplink power across both CCs. If (P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } - Total uplink power) < 0.7dB, stop ramping, exclude the last measurement and go to step 5.4.5.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5C.2.5-1 thru Table 6.3.5C.2.5-12 to force bigger UE power steps at various points in the power range.

6. Sub test: ramping down pattern

6.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both CCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the MCG CC and on the SCG CC at +15.0dBm +/- 3.2 dB for carrier frequency $f \leq 3.0$GHz or at +14.7dBm +/- 3.5 dB for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

6.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5C.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5C.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5C.2.2.5-1 thru 6.3.5C.2.5-12 depending on CC combinations. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a -1dB TPC command on both CCs separately. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

6.3. Measure the power of PUSCH transmissions on both CCs separately to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5C.2.5-1 thru Table 6.3.5C.2.5-12 to force bigger UE power steps at various points in the power range.

6.3.5C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.5C.2.4.3-1: SCG-Configuration-r12-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-19F: SCG-Configuration-r12-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
setup SEQUENCE {			PSCell_Mod, PSCell_Add_Split_DRB, PSCell_Add_SCG_DRB
scg-ConfigPartMCG-r12 SEQUENCE {			
scg-Counter-r12	0	INTEGER (0..65535)	
powerCoordinationInfo-r12 SEQUENCE {			
p-MeNB-r12	9 (50%)	INTEGER (1..16) mapped to 0..15 in Table 5.1.4.2-1 in TS 36.213 for power allocation for DC (0% - 100%)	
p-SeNB-r12	9 (50%)	INTEGER (1..16) mapped to 0..15 in Table 5.1.4.2-1 in TS 36.213 for power allocation for DC (0% - 100%)	
powerControlMode-r12	1	DC power control mode 1	
}			
}			

6.3.5C.2.5 Test requirement

Each UE power step measured in the test procedure 6.3.5C.2.4.2 should satisfy the test requirements specified in Table 6.3.5C.2.5-1, thru 6.3.5C.2.5-12 for normal conditions.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns on both PCC and SCC separately. For these exceptions the power tolerance limit is a maximum of ±6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5C.2.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 6 RBs	TPC=+1dB	8.78	4 ≤ ΔP < 10	8.78 ± (4.7) Note 2 8.78 +6.2/-4.7 Note 3
Subframes after RB change	Fixed = 6	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 5	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 5 to 1 RBs	TPC=-1dB	7.99	4 ≤ ΔP < 10	7.99 ± (4.7) Note 2 7.99 +4.7/-6.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 4 RBs	TPC=+1dB	7.02	4 ≤ ΔP < 10	7.02 ± (4.7) Note 2 7.02 +6.2/-4.7 Note 3
Subframes after RB change	Fixed =4	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 15	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 15 to 1 RBs	TPC=-1dB	12.76	10 ≤ ΔP < 15	12.76 ± (5.7) Note 2 12.76 +5.7/-7.2 Note 4
Subframes after RB change	Fixed =1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern **A** the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 20	TPC=+1dB	14.01	10 ≤ ΔP < 15	14.01 ± (5.7) Note 2 14.01 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 20	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 25	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 25 to 1	TPC=-1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +5.7/-7.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 25	TPC=+1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 25	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 50 (UE-Categories ≥2) Fixed = 48 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 50 to 1 (UE-Categories ≥2) Change from 48 to 1 (UE cat 1)	TPC=-1dB	17.99 17.81	15 ≤ Δ	17.99 ± (6.7) Note 2 17.99 +6.7/-8.2 Note 4 17.81 ± (6.7) Note 2 17.81 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 50	TPC=+1dB	17.99	15 ≤ ΔP	17.99±(6.7) Note 2 17.99 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 50	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 75 (UE-Categories ≥2) Fixed = 50 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 75 to 1 (UE-Categories ≥2) Change from 50 to 1 (UE Cat 1)	TPC=-1dB	19.75 17.99	15 ≤ ΔP	19.75 ± (6.7) Note 2 19.75 +6.7/-8.2 Note 4 17.99 ± (6.7) Note 2 17.99 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 75	TPC=+1dB	19.75	15 ≤ ΔP	19.75 ± (6.7) Note 2 19.75 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 75	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 100 (UE-Categories ≥2) Fixed = 75 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 100 to 1 (UE-Categories ≥2) Change from 75 to 1 (UE Cat 1)	TPC=-1dB	21.0 19.75	15 ≤ ΔP	21.0 ± (6.7) Note 2 21.0 +6.7/-8.2 Note 4 19.75 ± (6.7) Note 2 19.75 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

6.3.5C.2_1 Power Control Relative power tolerance for asynchronous Dual Connectivity

6.3.5C.2_1.1 Test purpose

To verify the ability of the UE transmitter to change the output power in both assigned component carrier in the uplink with a defined power step sizes between sub-frames on the two respective component carrier in a asynchronous Dual Connectivity scenario with maximum (500 us) time offset between carriers.

6.3.5C.2_1.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward that support asynchronous Dual Connectivity.

6.3.5C.2_1.3 Minimum conformance requirement

The minimum conformance requirements are defined in clause 6.3.5A.2.0.

6.3.5C.2_1.4 Test description

6.3.5C.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA DC configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each DC Configuration, and are shown in table 6.3.5C.2_1.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.3.5C.2_1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508 [7] subclause 4.1		NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different DC bandwidth classes.		Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the DC Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for DC Configurations								
DC Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
MCG CC N_{RB}	**SCG CCs N_{RB}**	**MCG & SCG RB allocation**		**N_{RB_alloc}**	**MCG & SCG RB allocations(Note 3) (L_{CRB} @ RB_{start})**			
6	25	N/A for this test	QPSK	31	See table 6.3.5C.2_1.2.5-1 6.3.5C.2_1.2.5-2	See table 6.3.5C.2_1.2.5-5 6.3.5C.2_1.2.5-6	-	-
6	50		QPSK	56	See table 6.3.5C.2_1.2.5-1 6.3.5C.2_1.2.5-2	See table 6.3.5C.2_1.2.5-7 6.3.5C.2_1.2.5-8	-	-
25	15		QPSK	40	See table 6.3.5C.2_1.2.5-5 6.3.5C.2_1.2.5-6	See table 6.3.5C.2_1.2.5-3 6.3.5C.2_1.2.5-4	-	-
25	25		QPSK	50	See table 6.3.5C.2_1.2.5-5 6.3.5C.2_1.2.5-6	See table 6.3.5C.2_1.2.5-5 6.3.5C.2_1.2.5-6	-	-
25	50		QPSK	75	See table 6.3.5C.2_1.2.5-5 6.3.5C.2_1.2.5-6	See table 6.3.5C.2_1.2.5-5 6.3.5C.2_1.2.5-6	-	-
50	50		QPSK	100	See table 6.3.5C.2_1.2.5-7 6.3.5C.2_1.2.5-8	See table 6.3.5C.2_1.2.5-7 6.3.5C.2_1.2.5-8	-	-
50	100		QPSK	150	See table 6.3.5C.2_1.2.5-7 6.3.5C.2_1.2.5-8	See table 6.3.5C.2_1.2.5-11 6.3.5C.2_1.2.5-12	-	-
75	75		QPSK	150	See table 6.3.5C.2_1.2.5-9 6.3.5C.2_1.2.5-10	See table 6.3.5C.2_1.2.5-9 6.3.5C.2_1.2.5-10	-	-
100	75		QPSK	175	See table 6.3.5C.2_1.2.5-11 6.3.5C.2_1.2.5-12	See table 6.3.5C.2_1.2.5-9 6.3.5C.2_1.2.5-10	-	-

100	100		QPSK	200	See table 6.3.5C.2_1.2.5-11 6.3.5C.2_1.2.5-12	See table 6.3.5C.2_1.2.5-11 6.3.5C.2_1.2.5-12	-	-
Note 1: DC Configuration Test CC Combination settings are checked separately for each DC Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.								
Note 2: If in the DC Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, only the first of those is tested, according to the order in the Test Configuration Table list.								
Note 3: The UL allocation is changed as part of the test procedure. The Test Configuration Table entries list the combinations used, with the sequence of usage as determined by the test procedure for each sub-test.								
Note 4: The starting resource block shall be RB# 0.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals for MCG CC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.3.5C.2_1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-DC1 according to TS 36.508 [7] clause 5.2A.2A. Message contents are defined in clause 6.3.5C.2_1.4.3.

6.3.5C.2_1.4.2 Test procedure

1. Configure SCG CC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels with a time offset of +500 us compared to PCC.

3. SS activates SCG CC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clause 8.3.3.2).

4. The procedure is separated in various subtests to verify different aspects of relative power control on both MCG CC and SCG CC individually. The power patterns of the subtests are shown in figure 6.3.5C.2_1.4.2-1 to 6.3.5C.2_1.4.2-4. In this test case, the term P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } defined in TS 36.101 [2] clause 6.2.5A is used, to ensure the UE is not tested outside its power capability.

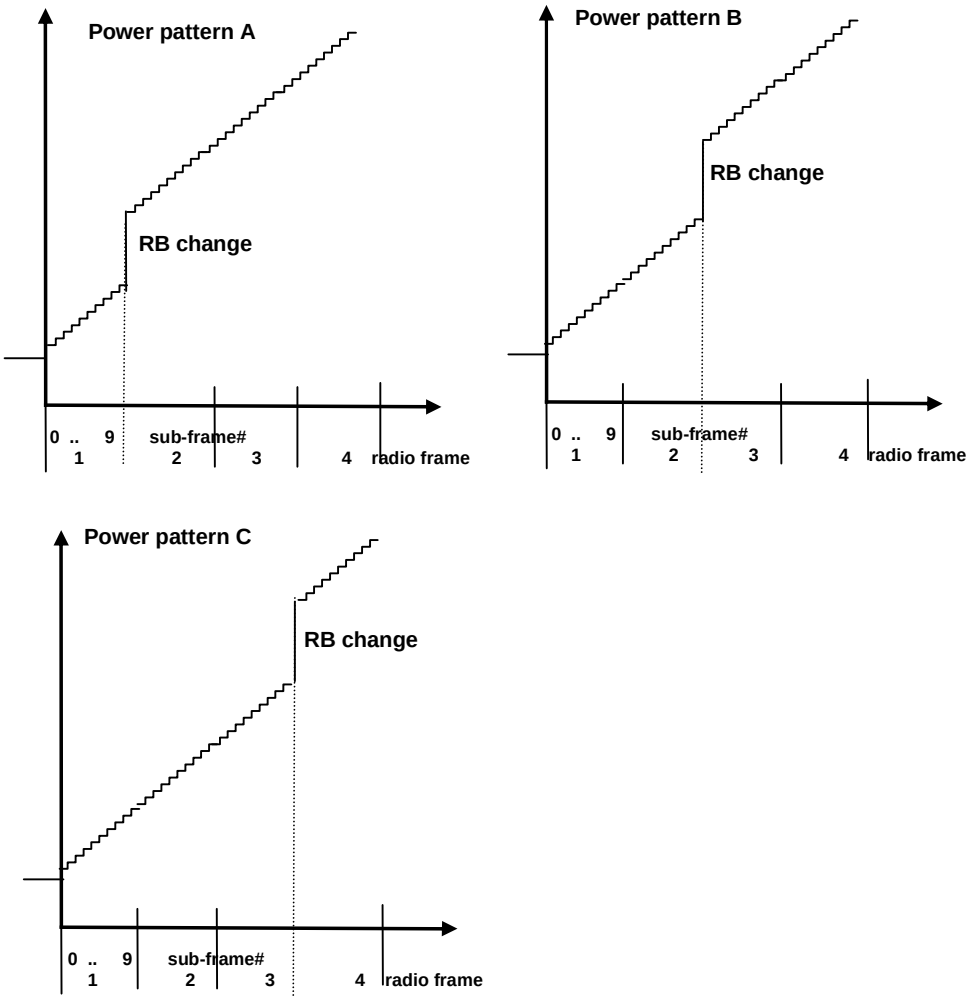


Figure 6.3.5C.2_1.4.2-1: FDD ramping up test power patterns

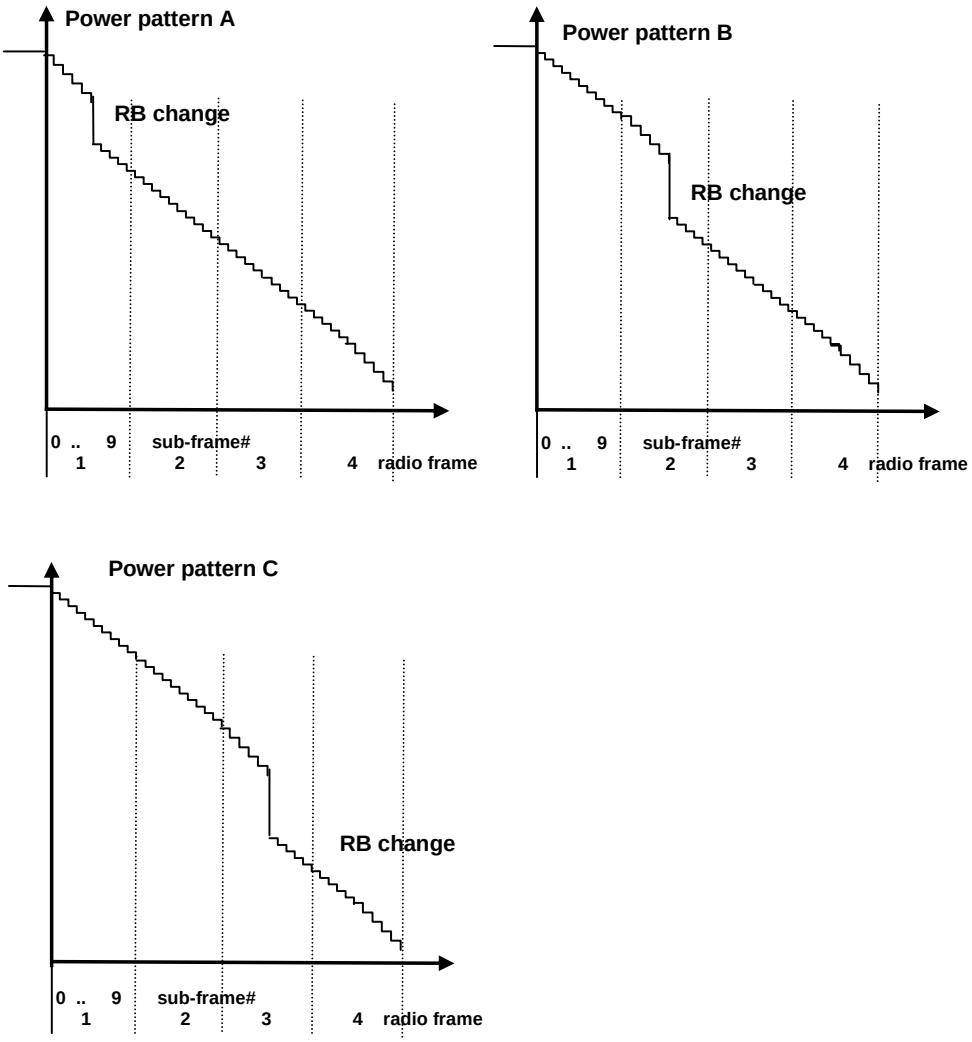


Figure 6.3.5C.2_1.4.2-2: FDD ramping down test power patterns

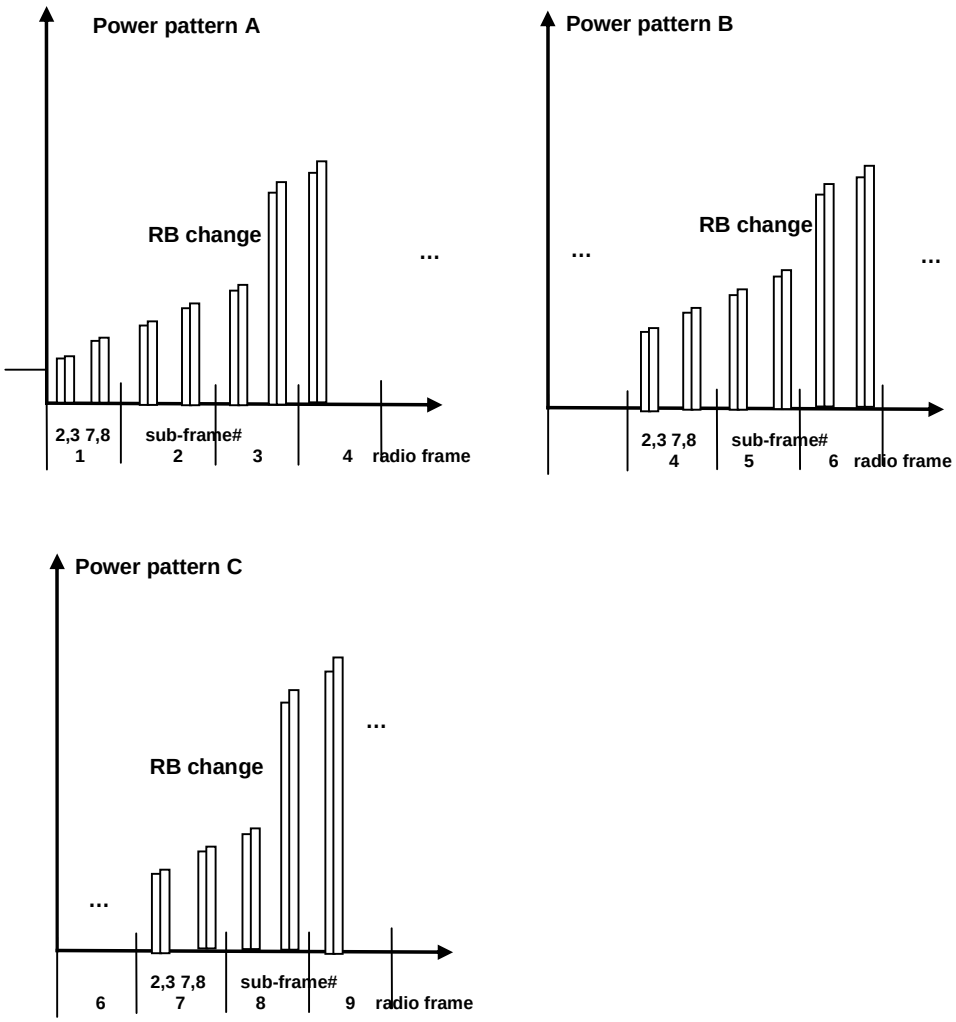


Figure 6.3.5C.2_1.4.2-3: TDD ramping up test power patterns

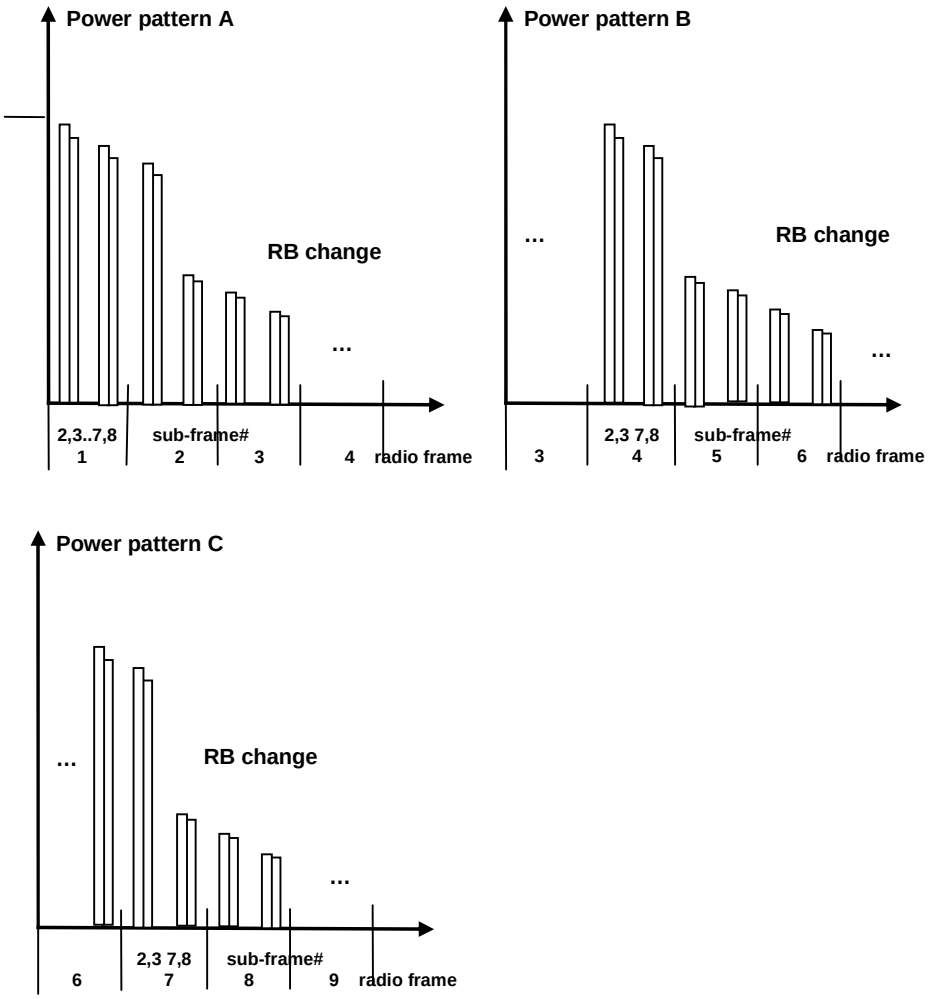


Figure 6.3.5C.2_1.4.2-4: TDD ramping down test power patterns

5. Sub test: ramping up pattern

5.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both CC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the MCG CC and on the SCG CC at -36.8dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at -36.5dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

5.2. Schedule the UE's PUSCH data transmission on each component carrier as described in Figure 6.3.5C.2_1.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5C.2_1.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5C.2_1.5-1 thru 6.3.5C.2_1.5-12 depending on CC combinations. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a +1dB TPC command on both CCs separately. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

5.3. Measure the power of PUSCH transmissions on both CCs separately to verify the UE relative power control meet test requirements 6.3.5C.2_1.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded. Calculate the Total uplink power across both CCs. If (P_{CMAX_L} – MAX{T_L, $T_{LOW}(P_{CMAX_L})$ } - Total uplink power) < 0.7dB, stop ramping, exclude the last measurement and go to step 5.4.5.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5C.2_1.5-1 thru Table 6.3.5C.2_1.5-12 to force bigger UE power steps at various points in the power range.

6. Sub test: ramping down pattern

6.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table A.2.2.2.1-1 (FDD) or Table A.2.3.2.1-1 (TDD) on both CCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH on each component carrier to the UE to ensure that the UE transmits PUSCH on the MCG CC and on the SCG CC at +15.0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at +14.7dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

6.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5C.2_1.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5C.2_1.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5C.2_1.5-1 thru 6.3.5C.2_1.5-12 depending on CC combinations. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a -1dB TPC command on both CCs separately. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

6.3. Measure the power of PUSCH transmissions on both CCs separately to verify the UE relative power control meet test requirements 6.3.5.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5C.2_1.5-1 thru Table 6.3.5C.2_1.5-12 to force bigger UE power steps at various points in the power range.

6.3.5C.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.5C.2_1.4.3-1: SCG-Configuration-r12-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-19F: SCG-Configuration-r12-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
setup SEQUENCE {			PSCell_Mod, PSCell_Add_Split_DRB, PSCell_Add_SCG_DRB
scg-ConfigPartMCG-r12 SEQUENCE {			
scg-Counter-r12	0	INTEGER (0..65535)	
powerCoordinationInfo-r12 SEQUENCE {			
p-MeNB-r12	9 (50%)	INTEGER (1..16) mapped to 0..15 in Table 5.1.4.2-1 in TS 36.213 for power allocation for DC (0% - 100%)	
p-SeNB-r12	9 (50%)	INTEGER (1..16) mapped to 0..15 in Table 5.1.4.2-1 in TS 36.213 for power allocation for DC (0% - 100%)	
powerControlMode-r12	2	DC power control mode 2	
}			
}			

6.3.5C.2_1.5 Test requirement

Each UE power step measured in the test procedure 6.3.5C.2_1.4.2 should satisfy the test requirements specified in Table 6.3.5C.2_1.5-1, thru 6.3.5C.2_1.5-12 for normal conditions.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns on both PCC and SCC separately. For these exceptions the power tolerance limit is a maximum of ±6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5C.2_1.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 6 RBs	TPC=+1dB	8.78	4 ≤ ΔP < 10	8.78 ± (4.7) Note 2 8.78 +6.2/-4.7 Note 3
Subframes after RB change	Fixed = 6	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 5	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 5 to 1 RBs	TPC=-1dB	7.99	4 ≤ ΔP < 10	7.99 ± (4.7) Note 2 7.99 +4.7/-6.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 4 RBs	TPC=+1dB	7.02	4 ≤ ΔP < 10	7.02 ± (4.7) Note 2 7.02 +6.2/-4.7 Note 3
Subframes after RB change	Fixed =4	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 15	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 15 to 1 RBs	TPC=-1dB	12.76	10 ≤ ΔP < 15	12.76 ± (5.7) Note 2 12.76 +5.7/-7.2 Note 4
Subframes after RB change	Fixed =1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern **A** the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 20	TPC=+1dB	14.01	10 ≤ ΔP < 15	14.01 ± (5.7) Note 2 14.01 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 20	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 25	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 25 to 1	TPC=-1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +5.7/-7.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 25	TPC=+1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 25	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 50 (UE-Categories ≥2) Fixed = 48 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 50 to 1 (UE-Categories ≥2) Change from 48 to 1 (UE cat 1)	TPC=-1dB	17.99 17.81	15 ≤ Δ	17.99 ± (6.7) Note 2 17.99 +6.7/-8.2 Note 4 17.81 ± (6.7) Note 2 17.81 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 50	TPC=+1dB	17.99	15 ≤ ΔP	17.99±(6.7) Note 2 17.99 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 50	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 75 (UE-Categories ≥2) Fixed = 50 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 75 to 1 (UE-Categories ≥2) Change from 50 to 1 (UE Cat 1)	TPC=-1dB	19.75 17.99	15 ≤ ΔP	19.75 ± (6.7) Note 2 19.75 +6.7/-8.2 Note 4 17.99 ± (6.7) Note 2 17.99 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 75	TPC=+1dB	19.75	15 ≤ ΔP	19.75 ± (6.7) Note 2 19.75 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 75	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5C.2_1.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 100 (UE-Categories ≥2) Fixed = 75 (UE Cat 1)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 100 to 1 (UE-Categories ≥2) Change from 75 to 1 (UE Cat 1)	TPC=-1dB	21.0 19.75	15 ≤ ΔP	21.0 ± (6.7) Note 2 21.0 +6.7/-8.2 Note 4 19.75 ± (6.7) Note 2 19.75 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

6.3.5D

6.3.5E Power Control for UE category 0

6.3.5E.1 Power Control Absolute power tolerance for UE category 0

6.3.5E.1.1 Test purpose

Same test purpose as in clause 6.3.5.1.1.

6.3.5E.1.2 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.5.1.2

6.3.5E.1.3 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.3.5E.1.4 Test description

6.3.5E.1.4.1 Initial conditions

Same initial conditions as in clause 6.3.5.1.4.1 with the following exceptions:

- Instead of Table 6.3.5.1.4.1-1 → use Table 6.3.5E.1.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.3.5E.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in **TS 36.508 [7] subclause 4.3.1**	Mid range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Power Control Absolute power tolerance test case	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	36	36
15MHz		QPSK	36	36
20MHz		QPSK	36	36
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

6.3.5E.1.4.2 Test procedure

Same test procedure as in clause 6.3.5.1.4.2.

6.3.5E.1.4.3 Message contents

Same message contents as in clause 6.3.5.1.4.3.

6.3.5E.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5E.1.5-1 and 6.3.5E.1.5-2.

Table 6.3.5E.1.5-1: Absolute power tolerance: test point 1

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Expected Measured power Normal conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-14.8 dBm	-10.8 dBm	-8.6 dBm	-5.6 dBm	-3.9 dBm	-2.6 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2.E3						

Table 6.3.5E.1.5-2: Absolute power tolerance: test point 2

	Channel bandwidth / expected output power (dBm)					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Expected Measured power Normal conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB	± 10.0dB ± 10.4dB
Expected Measured power Extreme conditions	-2.8 dBm	1.2 dBm	3.4 dBm	6.4 dBm	8.2 dBm	9.4 dBm
Power tolerance f ≤ 3.0GHz 3.0GHz < f ≤ 4.2GHz	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB	± 13.0dB ± 13.4dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2E.3						

6.3.5E.2 Power Control Relative power tolerance for UE category 0

6.3.5E.2.1 Test purpose

Same test purpose as in clause 6.3.5.1.1.

6.3.5E.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.3.5E.2.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.5.2.3

6.3.5E.2.4 Test description

6.3.5E.2.4.1 Initial conditions

Same initial conditions as in clause 6.3.5.2.4.1 with the following exceptions:

- Instead of Table 6.3.5.2.4.1-1 → use Table 6.3.5E.2.4.1-1.

- Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.3.5E.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Power Control Relative power tolerance test case	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	See table 6.3.5E.2.5-1 6.3.5E.2.5-2 6.3.5E.2.5-13	See table 6.3.5E.2.5-1 6.3.5E.2.5-2 6.3.5E.2.5-13
3MHz		QPSK	See table 6.3.5E.2.5-3 6.3.5E.2.5-4 6.3.5E.2.5-13	See table 6.3.5E.2.5-3 6.3.5E.2.5-4 6.3.5E.2.5-13
5MHz		QPSK	See table 6.3.5E.2.5-5 6.3.5E.2.5-6 6.3.5E.2.5-13	See table 6.3.5E.2.5-5 6.3.5E.2.5-6 6.3.5E.2.5-13
10MHz		QPSK	See table 6.3.5E.2.5-7 6.3.5E.2.5-8 6.3.5E.2.5-13	See table 6.3.5E.2.5-7 6.3.5E.2.5-8 6.3.5E.2.5-13
15MHz		QPSK	See table 6.3.5E.2.5-9 6.3.5E.2.5-10 6.3.5E.2.5-13	See table 6.3.5E.2.5-9 6.3.5E.2.5-10 6.3.5E.2.5-13
20MHz		QPSK	See table 6.3.5E.2.5-11 6.3.5E.2.5-12 6.3.5E.2.5-13	See table 6.3.5E.2.5-11 6.3.5E.2.5-12 6.3.5E.2.5-13
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: The starting resource block shall be RB# 0.				

6.3.5E.2.4.2 Test procedure

The procedure is separated in various subtests to verify different aspects of relative power control. The power patterns of the subtests are described in figure 6.3.5E.2.4.2-1.

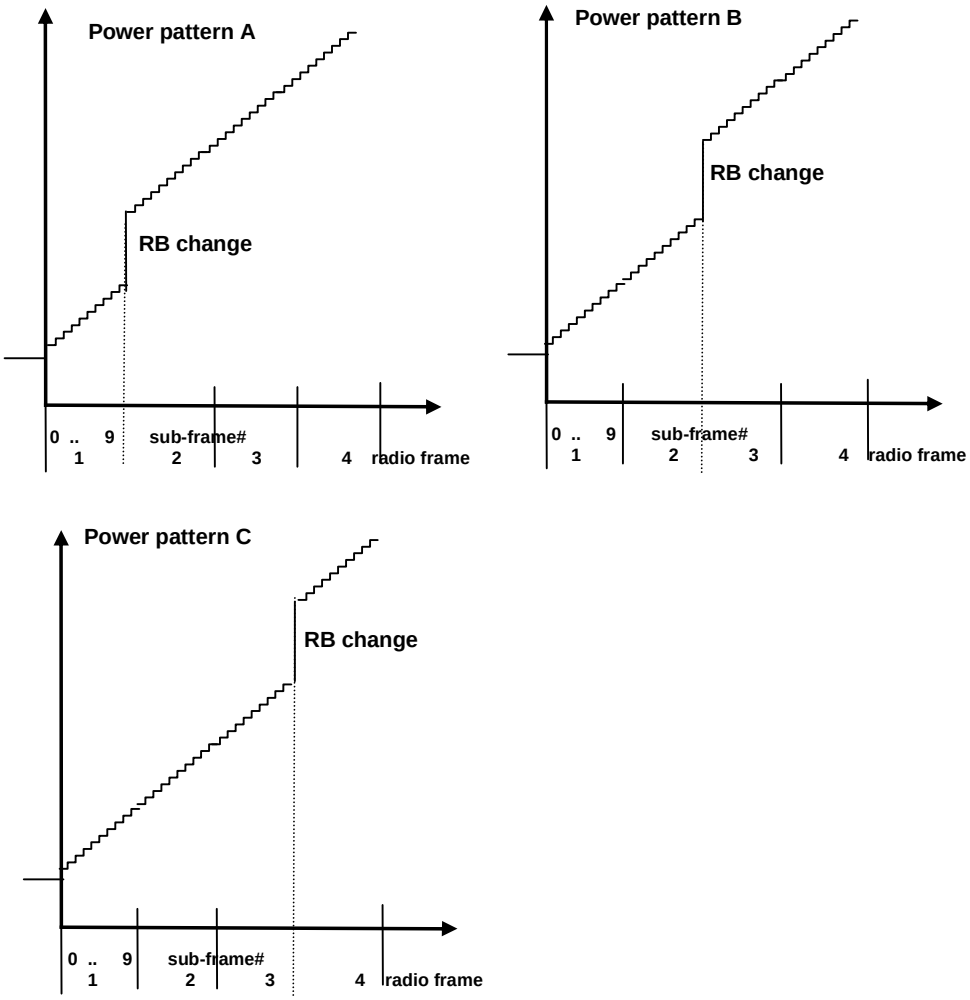


Figure 6.3.5E.2.4.2-1: FDD ramping up test power patterns

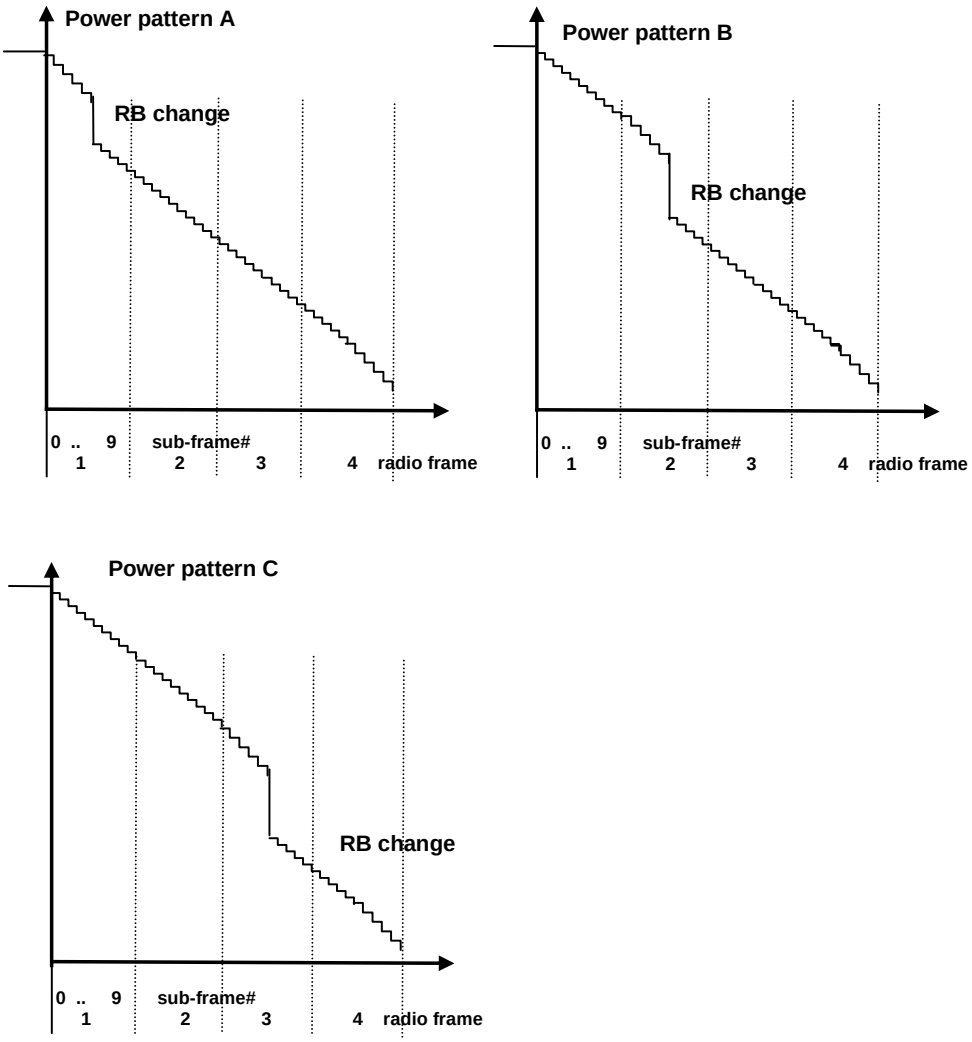


Figure 6.3.5E.2.4.2-2: FDD ramping down test power patterns

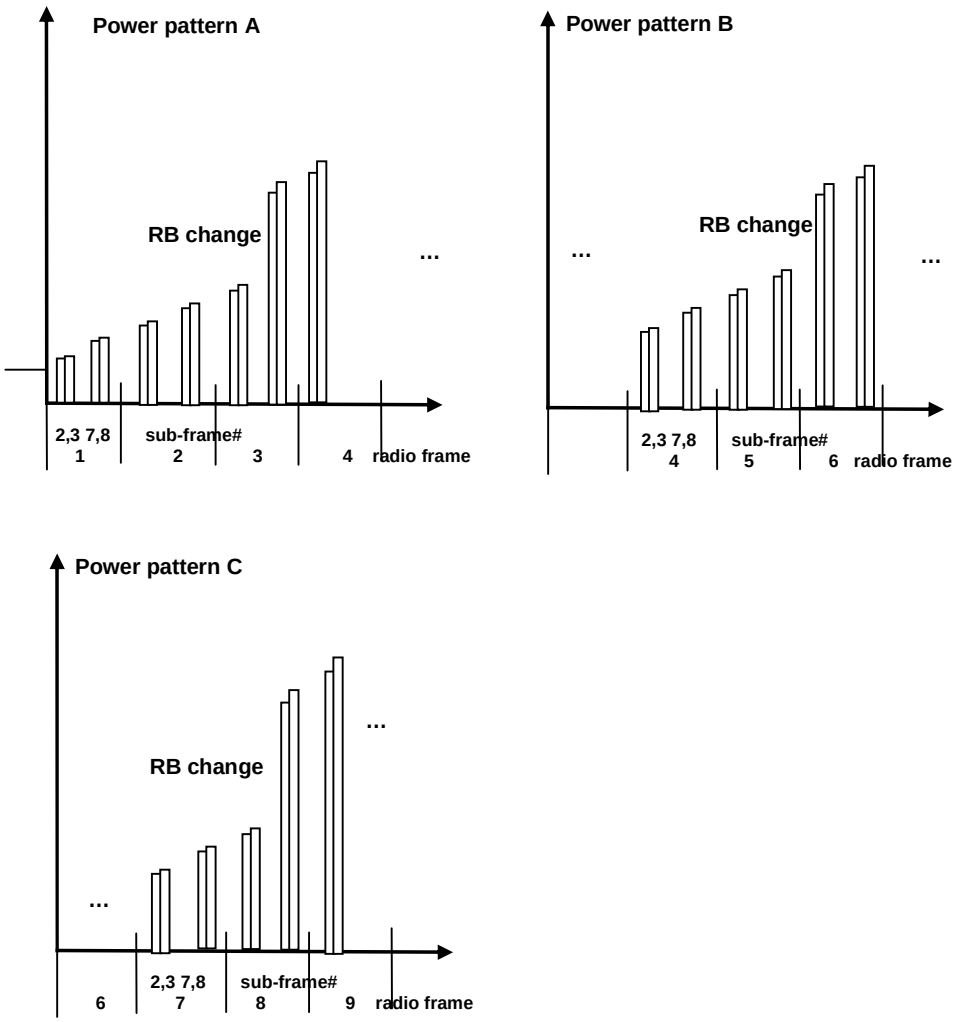


Figure 6.3.5E.2.4.2-3: TDD ramping up test power patterns

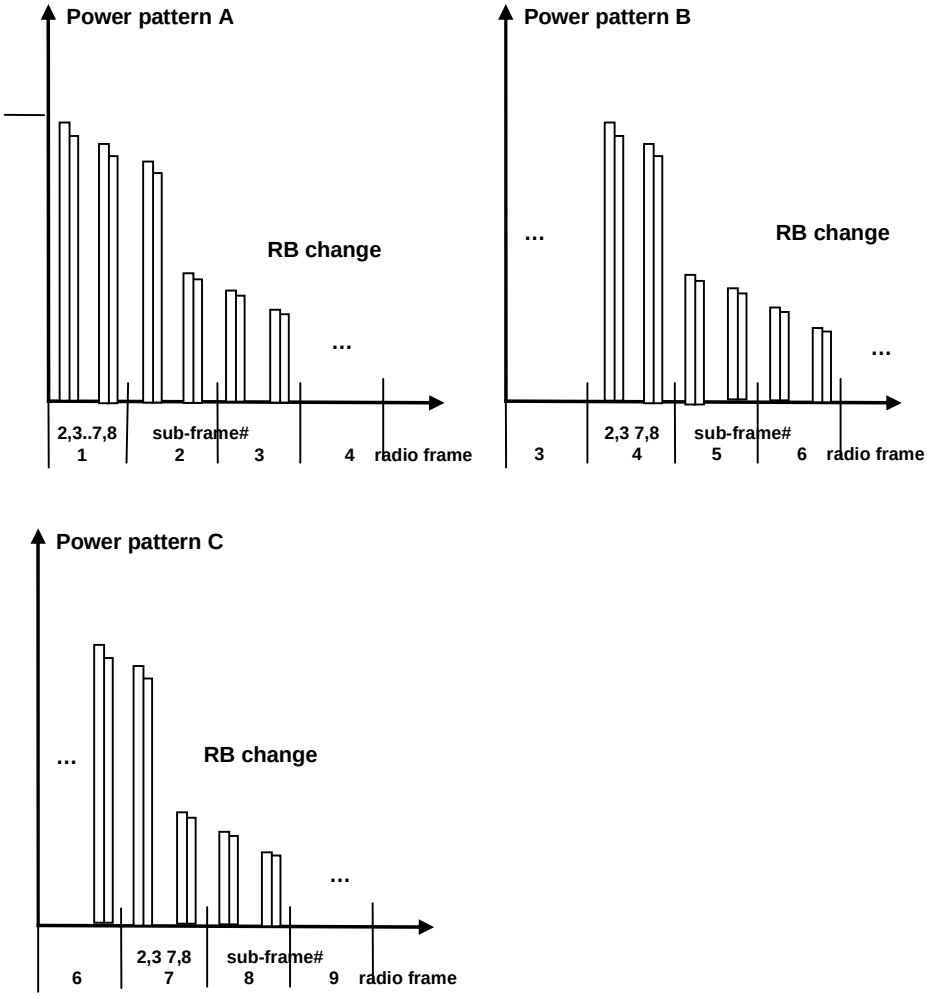


Figure 6.3.5E.2.4.2-4: TDD ramping down test power patterns

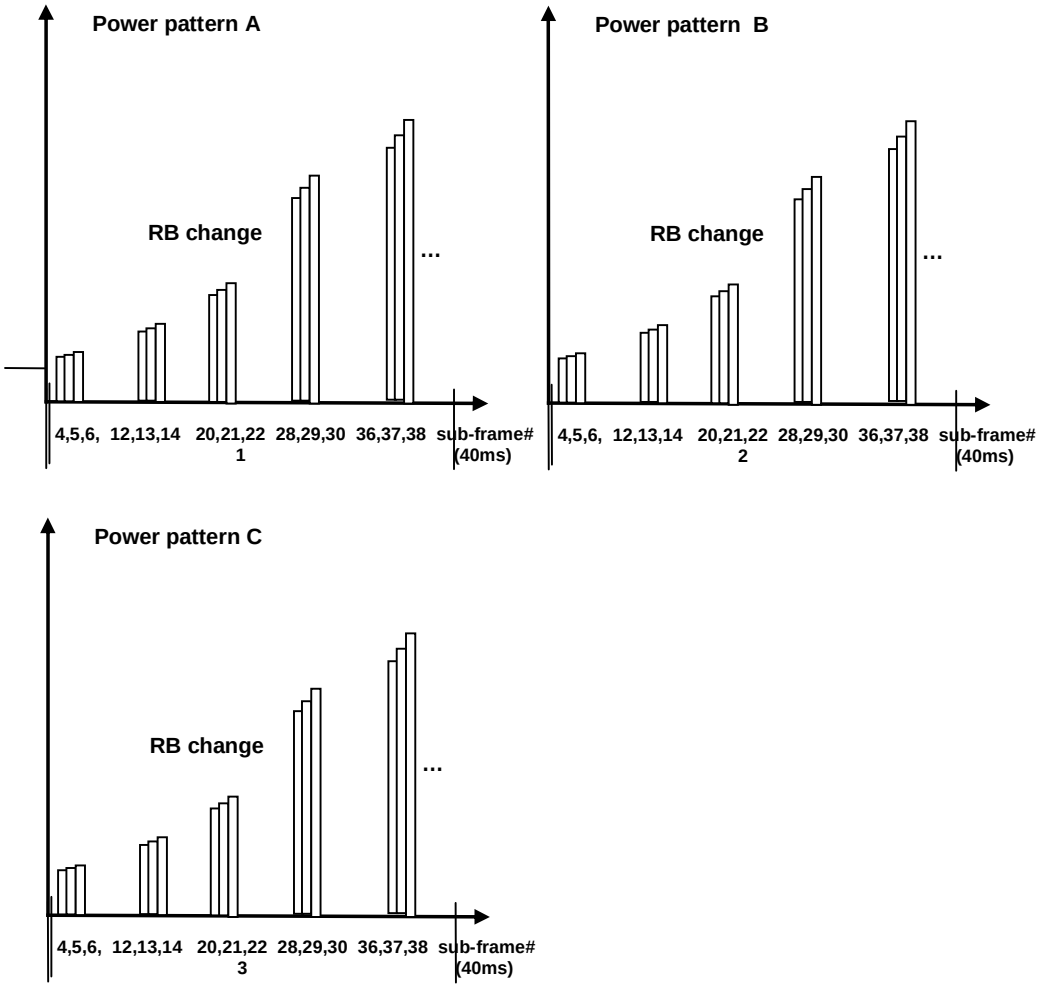


Figure 6.3.5E.2.4.2-5: HD-FDD ramping up test power patterns

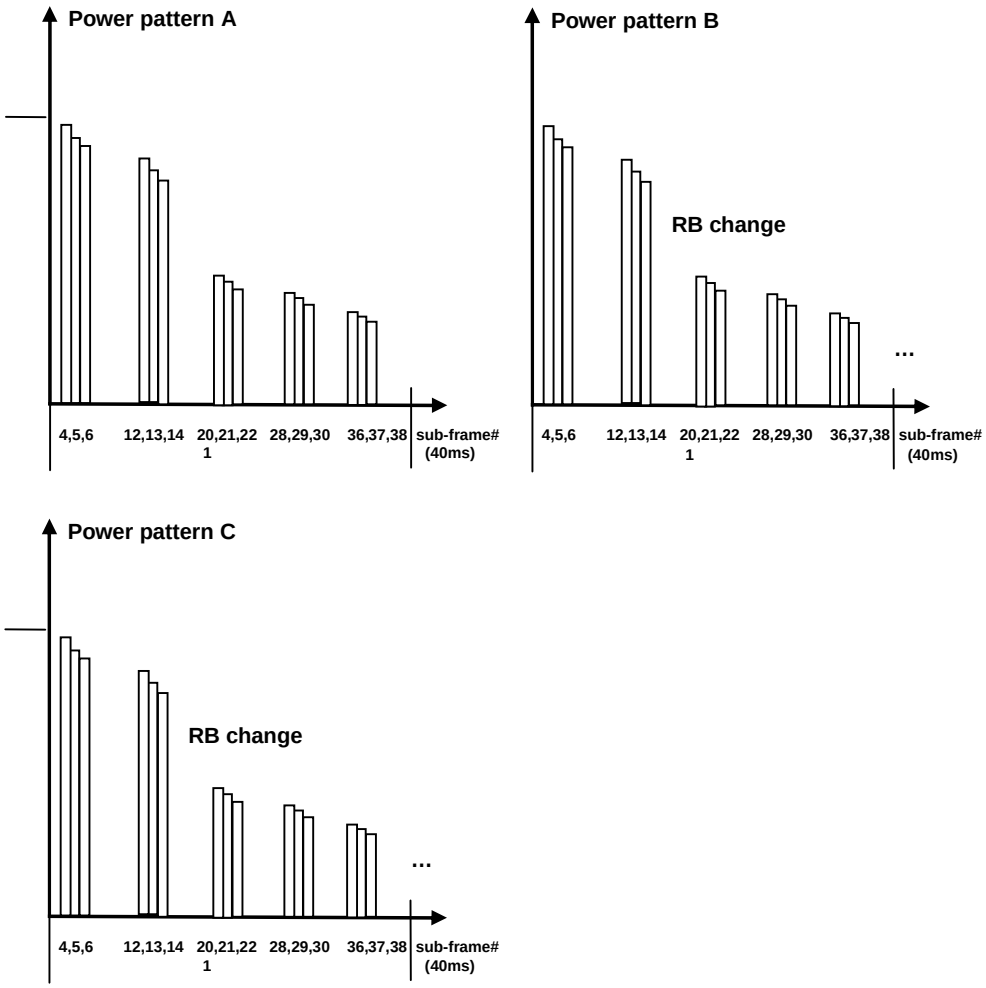


Figure 6.3.5E.2.4.2-6: HD-FDD ramping down test power patterns

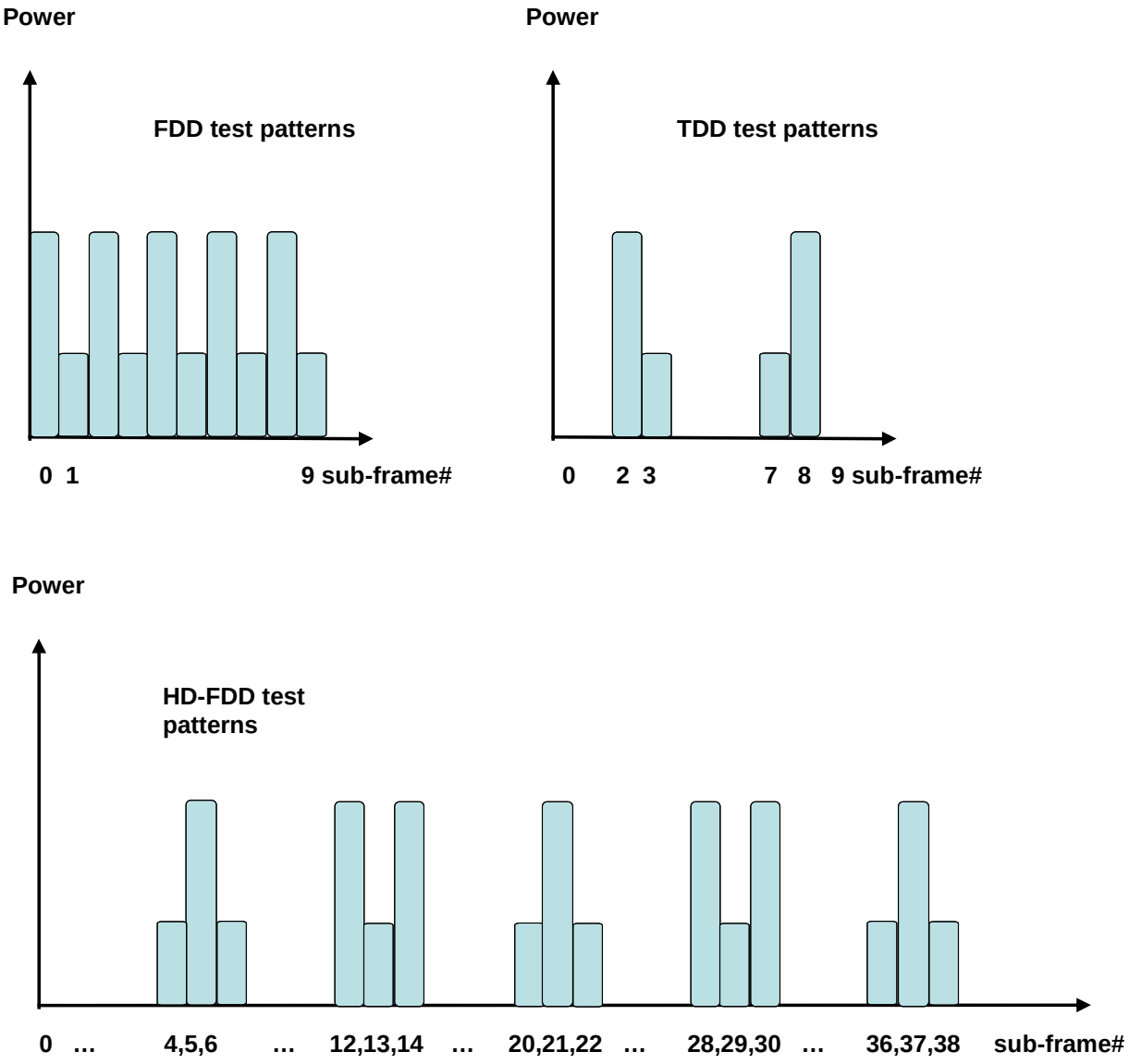


Figure 6.3.5E.2.4.2-7: Alternating Test Power patterns

1. Sub test: ramping up pattern

   1.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -36.8dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at -36.5dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

   1.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5E.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5E.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5E.2.5-1 thru 6.3.5E.2.5-12 depending on channel bandwidth. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a +1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

1.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5E.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

1.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5E.2.5-1 thru Table 6.3.5E.2.5-12 to force bigger UE power steps at various points in the power range.

2. Sub test: ramping down pattern

2.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at +18.0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at +17.7dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5E.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) and Figure 6.3.5E.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5E.2.5-1 thru 6.3.5E.2.5-12 depending on channel bandwidth. On the PDCCH format 0 for the scheduling of the PUSCH the SS will transmit a -1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

2.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5E.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

2.4. Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5E.2.5-1 thru Table 6.3.5E.2.5-12 to force bigger UE power steps at various points in the power range.

3. Sub test: alternating pattern

3.1 SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -10dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at -10dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz. The initial uplink RB allocation is defined as the smaller uplink RB allocation value specified in tables 6.3.5E.2.5-13. The power level and RB allocation are reset for each sub-test.

3.2. Schedule the UE's PUSCH data transmission as described in Figure 6.3.5E.2.4.2-5for 10 sub-frames with an uplink RB allocation alternating pattern as defined in table 6.3.5E.2.5-13 while transmitting 0dB TPC command for PUSCH via the PDCCH.

3.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements specified in clause 6.3.5E.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.3.5E.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5E.2.5 Test requirement

TBD

6.3.5E.3 Aggregate power control tolerance for UE category 0

6.3.5E.3.1 Test purpose

Same test purpose as in clause 6.3.5.3.1.

6.3.5E.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.3.5E.3.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.3.5.1.2

6.3.5E.3.4 Test description

6.3.5E.3.4.1 Initial conditions

Same initial conditions as in clause 6.3.5.3.4.1 with the following exception:

- Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

6.3.5E.3.4.2 Test procedure

Each UE power step measured in the test procedure 6.3.5E.2.4.2 should satisfy the test requirements specified in Table 6.3.5E.2.5-1, thru 6.3.5E.2.5-13 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns. For these exceptions the power tolerance limit is a maximum of ±6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5E.2.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 6 RBs	TPC=+1dB	8.78	4 ≤ ΔP < 10	8.78 ± (4.7) Note 2 8.78 +6.2/-4.7 Note 3
Subframes after RB change	Fixed = 6	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 1.4MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 5	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 5 to 1 RBs	TPC=-1dB	7.99	4 ≤ ΔP < 10	7.99 ± (4.7) Note 2 7.99 +4.7/-6.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 4 RBs	TPC=+1dB	7.02	4 ≤ ΔP < 10	7.02 ± (4.7) Note 2 7.02 +6.2/-4.7 Note 3
Subframes after RB change	Fixed =4	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-4: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 3MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 15	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 15 to 1 RBs	TPC=-1dB	12.76	10 ≤ ΔP < 15	12.76 ± (5.7) Note 2 12.76 +5.7/-7.2 Note 4
Subframes after RB change	Fixed =1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-5: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 20	TPC=+1dB	14.01	10 ≤ ΔP < 15	14.01 ± (5.7) Note 2 14.01 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 20	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-6: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 25	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 25 to 1	TPC=-1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +5.7/-7.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-7: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 25	TPC=+1dB	14.98	10 ≤ ΔP < 15	14.98 ± (5.7) Note 2 14.98 +7.2/-5.7 Note 3
Subframes after RB change	Fixed = 25	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-8: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 10MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 36 (UE Cat 0)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 36 to 1 (UE cat 0)	TPC=-1dB	16.56	15 ≤ Δ	16.56 ± (6.7) Note 2 16.56+6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-9: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 36 to 1 (UE Cat 0)	TPC=+1dB	16.56	15 ≤ ΔP	16.56±(6.7) Note 2 16.56 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 36 (UE cat 0)	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-10: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 15MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 36 (UE Cat 0)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 36 to 1 (UE Cat 0)	TPC=-1dB	16.56	15 ≤ ΔP	16.56 ± (6.7) Note 2 16.56 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-11: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 36 to 1 (UE Cat 0)	TPC=+1dB	16.56	15 ≤ ΔP	16.56 ± (6.7) Note 2 16.56 +8.2/-6.7 Note 3
Subframes after RB change	Fixed = 36 (UE cat 0)	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-12: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 20MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 36 (UE Cat 0)	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 36 to 1 (UE Cat 0)	TPC=-1dB	16.56	15 ≤ ΔP	16.56 ± (6.7) Note 2 16.56 +6.7/-8.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5E.2.5-13: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) (Alternating pattern)

Sub-test	Uplink RB allocation	TPC command	Expected power step size (Up or down) ΔP [dB]	Power step size range (Up or down) ΔP [dB]	PUSCH [dB]
1.4 MHz	Alternating 1 and 6	TPC=0dB	7.78	4 ≤ ΔP < 10	7.78 ± (6.7) Note 1,2 7.78 +8.2/-6.7 Note 3 7.78 +6.7/-8.2 Note 4
3 MHz	Alternating 1 and 15	TPC=0dB	11.76	10 ≤ ΔP < 15	11.76 ± (6.7) Note 1,2 11.76 +8.2/-6.7 Note 3 11.76 +6.7/-8.2 Note 4
5 MHZ	Alternating 1 and 25	TPC=0dB	13.98	10 ≤ ΔP < 15	13.98 ± (6.7) Note 1,2 13.98 +8.2/-6.7 Note 3 13.98 +6.7/-8.2 Note 4
10 MHZ	Alternating 1 and 36 (UE Cat 0)	TPC=0dB	15.56	15 ≤ ΔP	15.56 ± (6.7) Note 1,2 15.56 +8.2/-6.7 Note 3 15.56 +6.7/-8.2 Note 4
15 MHZ	Alternating 1 and 36 (UE Cat 0)	TPC=0dB	15.56	15 ≤ ΔP	15.56 ± (6.7) Note 1,2 15.56 +8.2/-6.7 Note 3 15.56 +6.7/-8.2 Note 4
20 MHZ	Alternating 1 and 36 (UE Cat 0)	TPC=0dB	15.56	15 ≤ ΔP	15.56 ± (6.7) Note 1,2 15.56 +8.2/-6.7 Note 3 15.56 +6.7/-8.2 Note 4

Note 1: Test tolerance +/- 6.7 dB was selected to allow PA switch possible exceptions to occur.
Note 2: When neither Note 3 nor Note 4 applies.
Note 3: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: For operating bands under Note 2 in Table 6.2.2.3-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

The procedure is separated in two subtests to verify PUCCH and PUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5E.3.4.2-1.

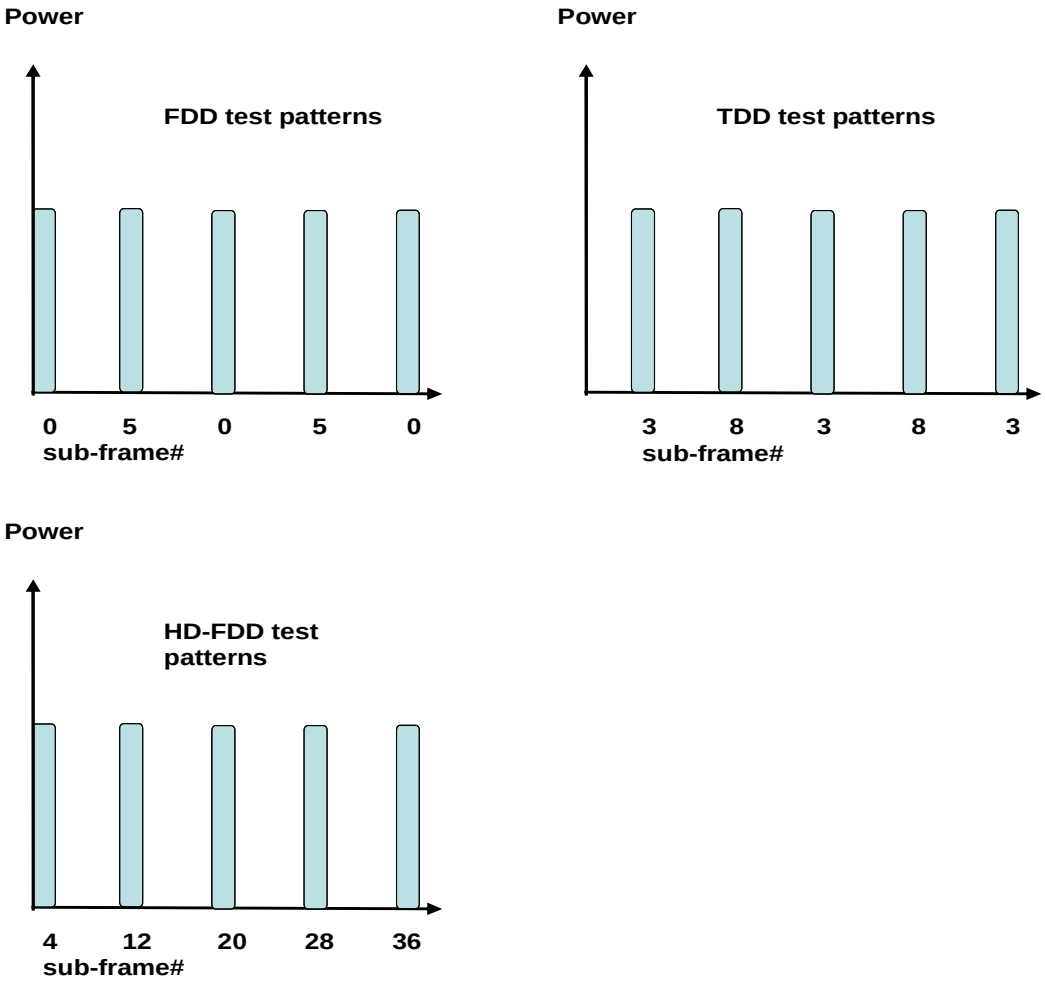


Figure 6.3.5: E.3.4.2-1 Test uplink transmission

1. PUCCH sub test:

1.1 The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.3.5E.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. Send the appropriate TPC commands for PUCCH to the UE to ensure that the UE transmits PUCCH at 0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.2. Every 5 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the PDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 4 subframes. The downlink transmission is scheduled in the appropriate sub-frames to make the UE transmit PUCCH as described in figure 6.3.5E.3.4.2-1.

1.3. Measure the power of 5 consecutive PUCCH transmissions to verify the UE transmitted PUCCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

2. PUSCH sub test:

2.1. The SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency f ≤ 3.0GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.2. Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the PDCCH to make the UE transmit PUSCH with 4 subframes gap. The uplink transmission patterns are described in figure 6.3.5E.3.4.2-1.

2.3. Measure the power of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms. The transient periods of 20us are excluded from the power measurement.

6.3.5E.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5E.3.5 Test requirement

The requirement for the power measurements made in step (1.3) and (2.3) of the test procedure shall not exceed the values specified in Table 6.3.5E.3.5-1. The power measurement period shall be 1 sub-frame excluding transient periods.

Table 6.3.5: E.3.5-1: Power control tolerance

TPC command	UL channel	Test requirement measured power
0 dB	PUCCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 3.2 dB of the 1st measurement.
0 dB	PUSCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 4.2 dB of the 1st measurement.
Note 1: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

6.3.5EA Power control for UE category M1

6.3.5EA.1 Power Control Absolute power tolerance for UE category M1

6.3.5EA.1.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value at the start of a contiguous transmission or non-contiguous transmission with a long transmission gap, i.e. transmission gap is larger than 20 ms.

6.3.5EA.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.3.5EA.1.3 Minimum conformance requirement

Absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap larger than 20ms.

The minimum requirement on absolute power tolerance is given in Table 6.3.5EA.1.3-1 over the power range bounded by the Maximum output power as defined in sub-clause 6.2.2EA and the Minimum output power as defined in sub clause 6.3.2.

For operating bands under Note 2 in Table 6.2.2EA-1, the absolute power tolerance as specified in Table 6.5EA.1.3-1 is relaxed by reducing the lower limit by 1.5 dB when the transmission bandwidth is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}.

Table 6.3.5EA.1.3-1: Absolute power tolerance

Conditions	Tolerance
Normal conditions	± 9.0 dB
Extreme conditions	± 12.0 dB

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5.1 and 6.3.5E.

6.3.5EA.1.4 Test description

6.3.5EA.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands defined for category M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5EA.1.4.1-1. The details of the uplink reference measurement channel (RMCs) are specified in Annexes A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.3.5EA.1.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
5MHz		QPSK	6	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.3.5EA.1.4.1-1.

5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2 AA. Message contents are defined in clause 6.3.5EA.1.4.3. Note that MPDCCH DCI format 6-0A sent after resetting uplink power with RRC Connection Reconfiguration, should have TPC command 0dB.

6.3.5EA.1.4.2 Test procedure

1. SS sends uplink scheduling information via MPDCCH DCI format 6-0A with TPC command 0dB for C_RNTI to schedule the UL RMC according to Table 6.3.5EA.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Measure the initial output power of the first subframe of UE PUSCH first transmission. The transient periods of 20us are excluded.

3. Repeat for the two test points as indicated in section 6.3.5EA.1.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5EA.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.5EA.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-105	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5EA.1.4.3-2: UplinkPowerControlCommon: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-25 UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE { p0-NominalPUSCH	-93	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5EA.1.4.3-3: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2.1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
uplinkPowerControlDedicated	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	SRB1
	UplinkPowerControlDedicated-DEFAULT	See subclause 4.6.3	RBC

Table 6.3.5EA.1.4.3-4: UplinkPowerControlDedicated

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-26 UplinkPowerControlDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	1		SRB1
	0		RBC
}			

6.3.5EA.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5EA.1.5-1 and 6.3.5EA.1.5-2.

Table 6.3.5EA.1.5-1: Absolute power tolerance: test point 1

`	UE Power Class / Expected output power (dBm)	
	Class 3	Class 5
Expected Measured power Normal conditions	-14.8 dBm	-14.8 dBm
Power tolerance f ≤ 3.0GHz	± 10.0dB	± 10.0dB
Expected Measured power Extreme conditions	-14.8 dBm	-14.8 dBm
Power tolerance f ≤ 3.0GHz	± 13.0dB	± 13.0dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2EA.3		

Table 6.3.5EA.1.5-2: Absolute power tolerance: test point 2

	Expected output power (dBm)	
	Class 3	Class 5
Expected Measured power Normal conditions	-2.8 dBm	-2.8 dBm
Power tolerance f ≤ 3.0GHz	± 10.0dB	± 10.0dBm
Expected Measured power Extreme conditions	-2.8 dBm	-2.8 dBm
Power tolerance f ≤ 3.0GHz	± 13.0dB	± 13.0dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2EA.3		

6.3.5EA.2 Power Control Relative power tolerance for UE category M1

6.3.5EA.2.1 Test purpose

To verify the ability of the UE transmitter to set its output power relatively to the power in a target sub-frame relatively to the power of the most recently transmitted reference sub-frame if the transmission gap between these sub-frames is ≤ 20 ms.

6.3.5EA.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.3.5EA.2.3 Minimum conformance requirement

The UE shall meet the requirements specified in Table 6.3.5EA.2.3-1.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of two test patterns. The test patterns are a monotonically increasing power sweep and a monotonically decreasing power sweep over a range bounded by the requirements of minimum power and maximum power specified in clauses 6.3.2.3 and 6.2.2EA.3. For these exceptions the power tolerance limit is a maximum of ±6.0 dB in Table 6.3.5EA.2.3-1.

Table 6.3.5EA.2.3-1: Relative Power Tolerance for Transmission (normal conditions)

Power step ΔP (Up or down) [dB]	All combinations of PUSCH and PUCCH transitions [dB]	All combinations of PUSCH/PUCCH and SRS transitions between sub-frames [dB]	PRACH [dB]
ΔP < 2	±2.5 (Note 3)	±3.0	±2.5
2 ≤ ΔP < 3	±3.0	±4.0	±3.0
3 ≤ ΔP < 4	±3.5	±5.0	±3.5
4 ≤ ΔP ≤ 10	±4.0	±6.0	±4.0
10 ≤ ΔP < 15	±5.0	±8.0	±5.0
15 ≤ ΔP	±6.0	±9.0	±6.0

Note 1: For extreme conditions an additional ± 2.0 dB relaxation is allowed

Note 2: For operating bands under Note 2 in Table 6.2.2.EA-1, the relative power tolerance is relaxed by increasing the upper limit by 1.5 dB if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges; if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges, then the tolerance is relaxed by reducing the lower limit by 1.5 dB.

Note 3: For PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods for TDD: for a power step ΔP ≤ 1 dB, the relative power tolerance for transmission is ±1.0 dB.

The power step (ΔP) is defined as the difference in the calculated setting of the UE Transmit power between the target and reference sub-frames with the power setting according to Clause 5.1 of TS 36.213. The error is the difference between ΔP and the power change measured at the UE antenna port with the power of the cell-specific reference signals kept constant. The error shall be less than the relative power tolerance specified in Table 6.5EA.2.3-1.

The normative reference for this requirement is TS 36.101 clause 6.3.5.2 and 6.3.5E.

6.3.5EA.2.4 Test description

6.3.5EA.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands defined for category M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5EA.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.3.5EA.2.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
5MHz		QPSK	See table 6.3.5EA.2.5-1 6.3.5EA.2.5-2 6.3.5EA.2.5-3	See table 6.3.5EA.2.5-1 6.3.5EA.2.5-2 6.3.5EA.2.5-3	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4.					
Note 2: The RB_{start} of partial RB allocation shall be RB#0.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to table 6.3.5EA.2.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.3EA.5.2.4.3.

6.3.5EA.2.4.2 Test procedure

The procedure is separated in various subtests to verify different aspects of relative power control. The power patterns of the subtests are described in figure 6.3.5EA.2.4.2-1.

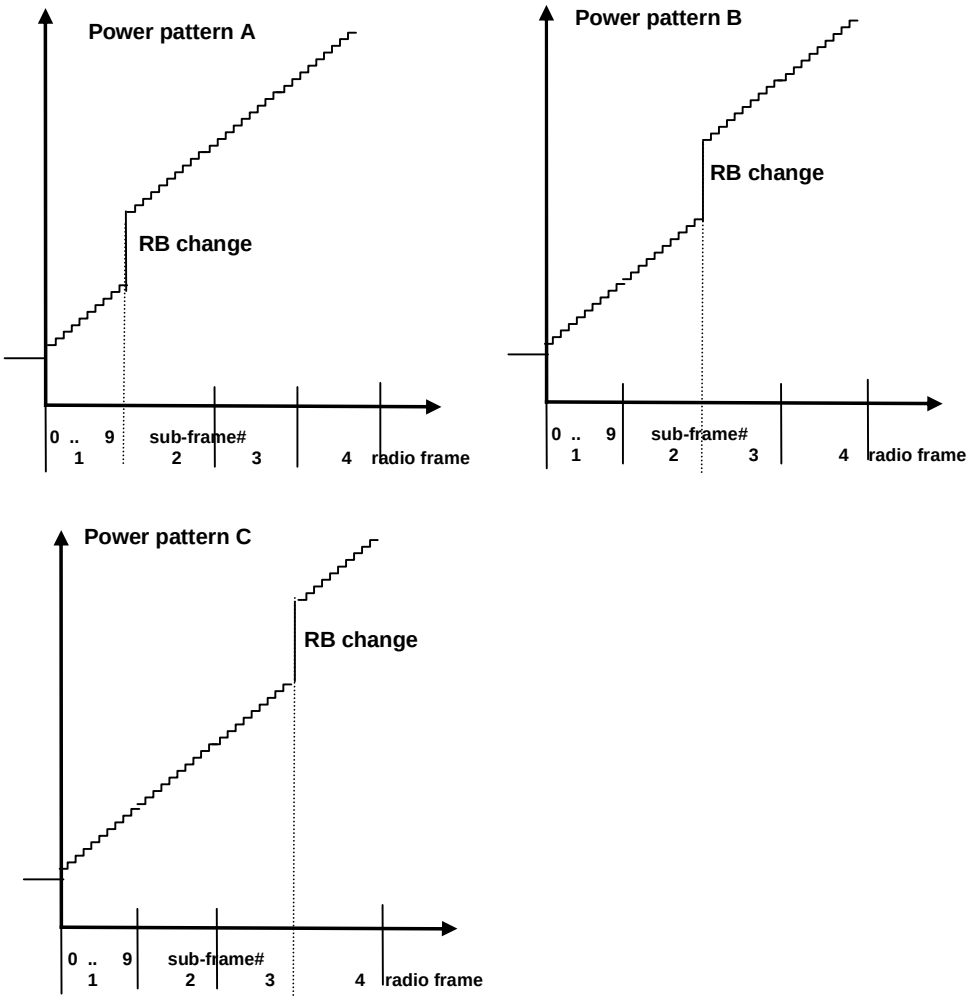


Figure 6.3.5EA.2.4.2-1: FDD ramping up test power patterns

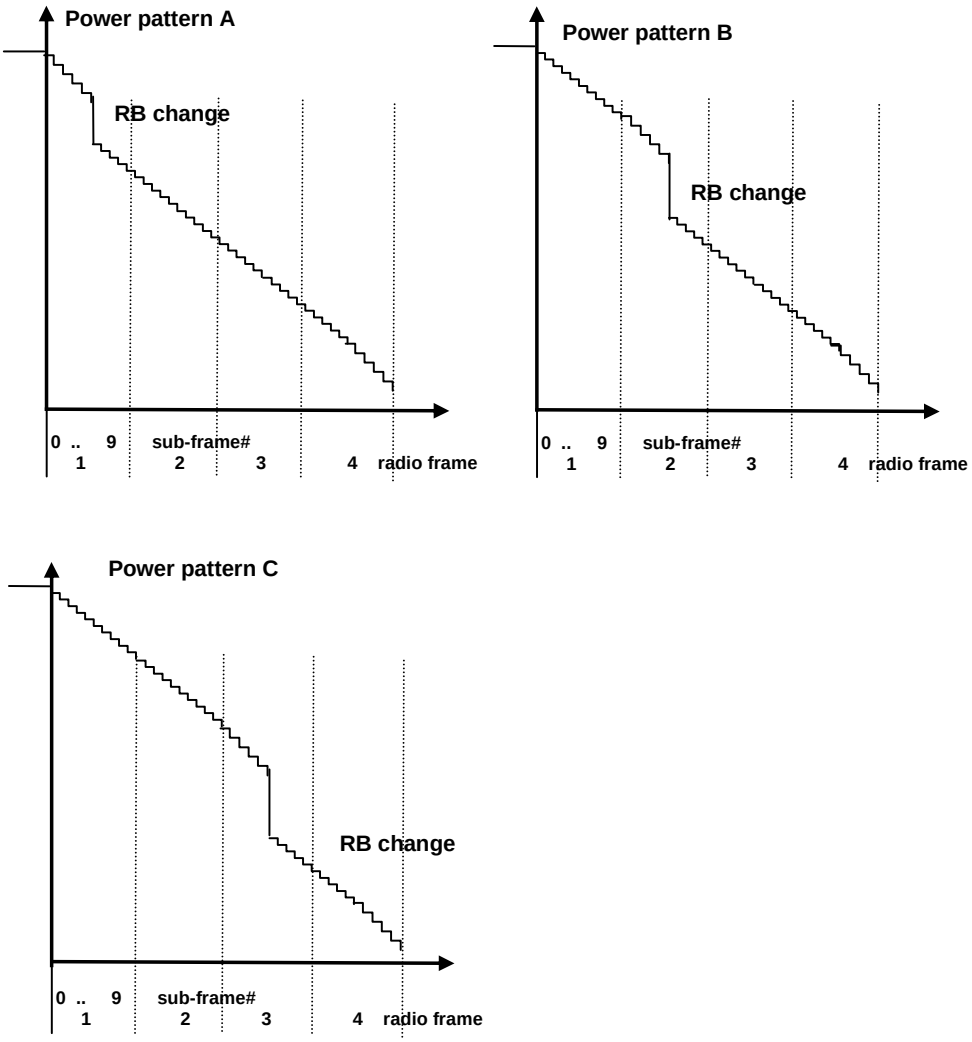


Figure 6.3.5EA.2.4.2-2: FDD ramping down test power patterns

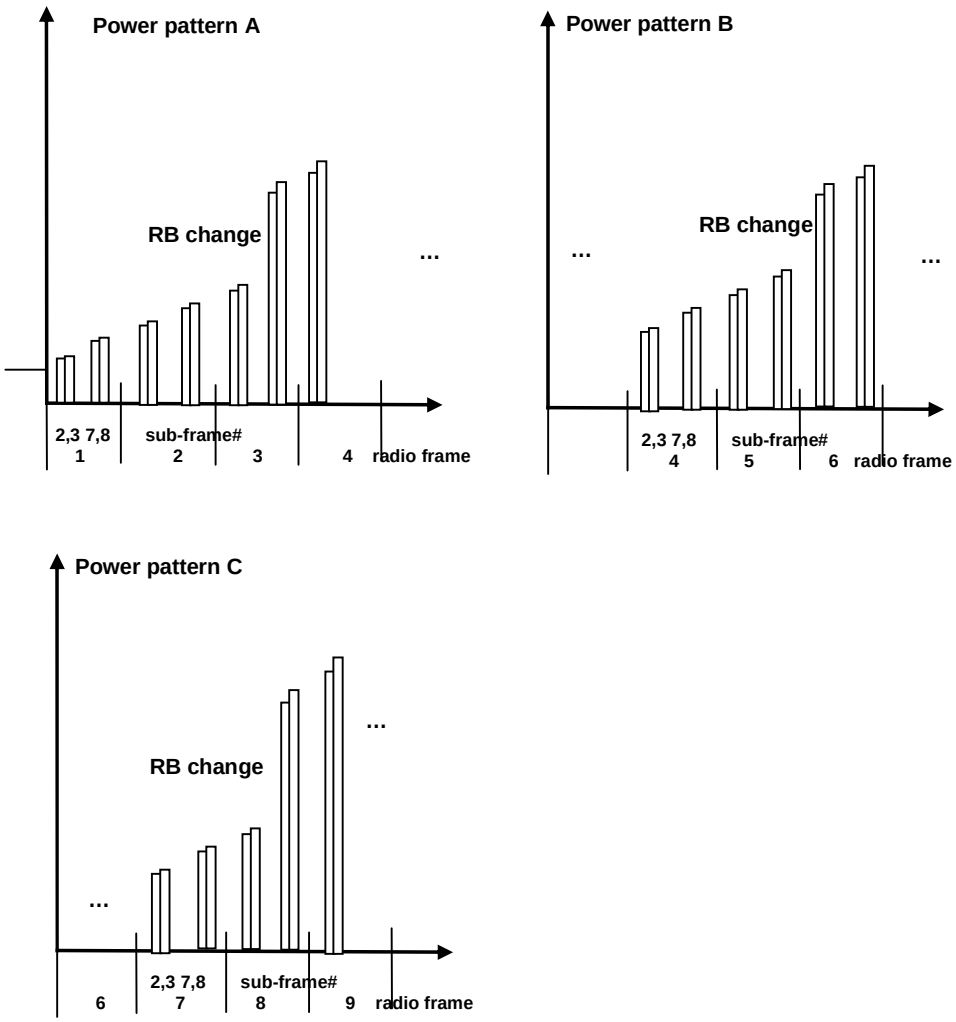


Figure 6.3.5EA.2.4.2-3: TDD ramping up test power patterns

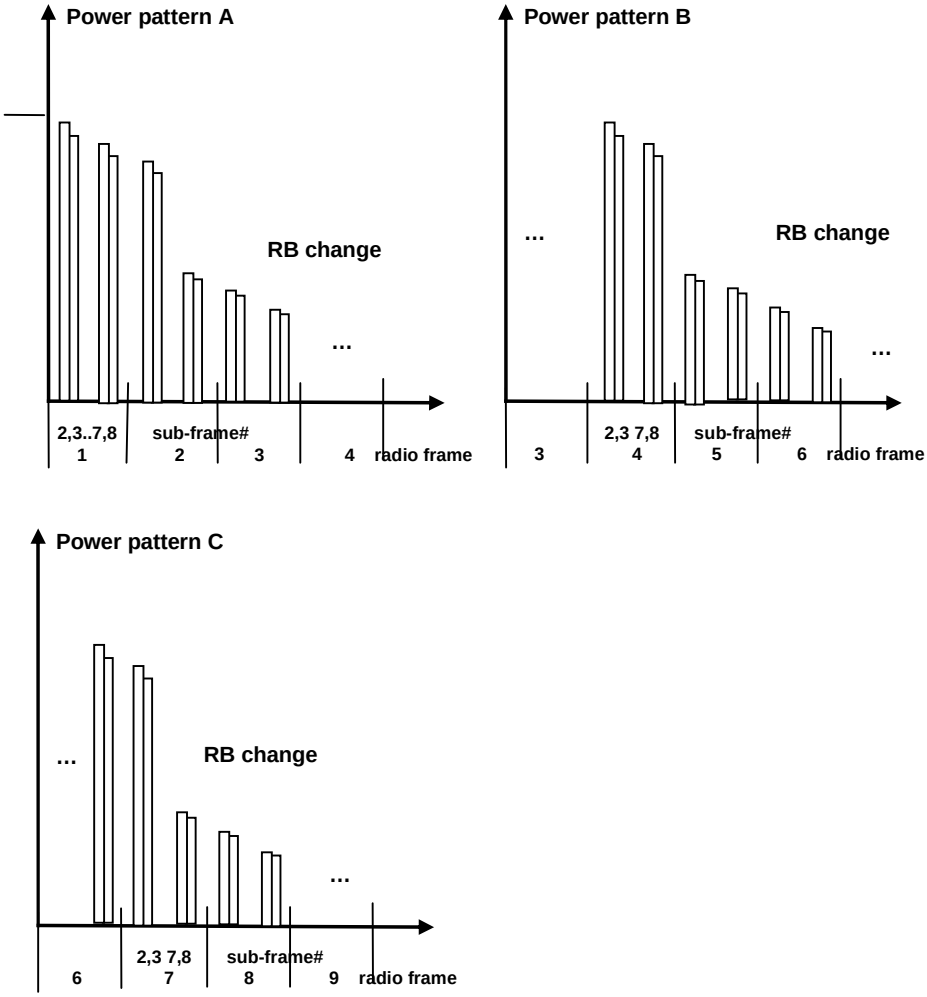


Figure 6.3.5EA.2.4.2-4: TDD ramping down test power patterns

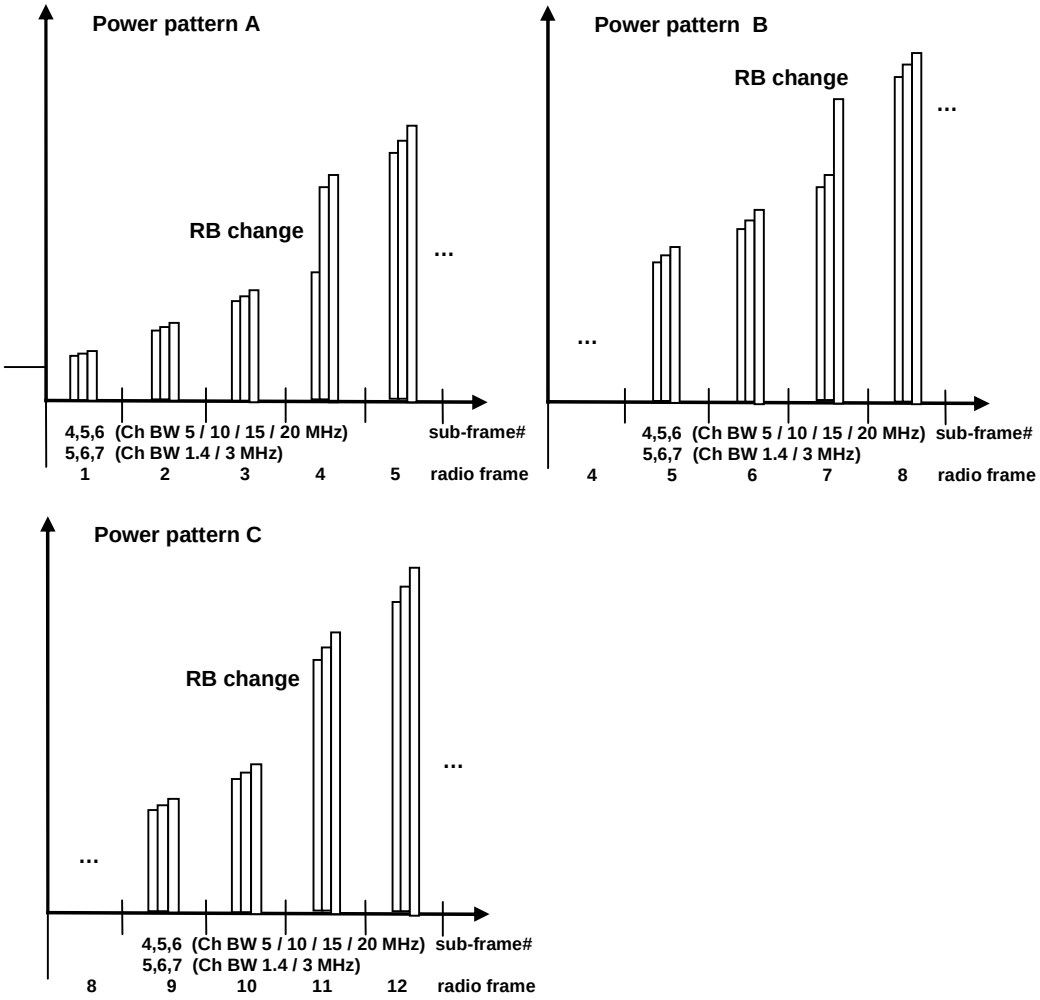


Figure 6.3.5EA.2.4.2-5: HD-FDD ramping up test power patterns

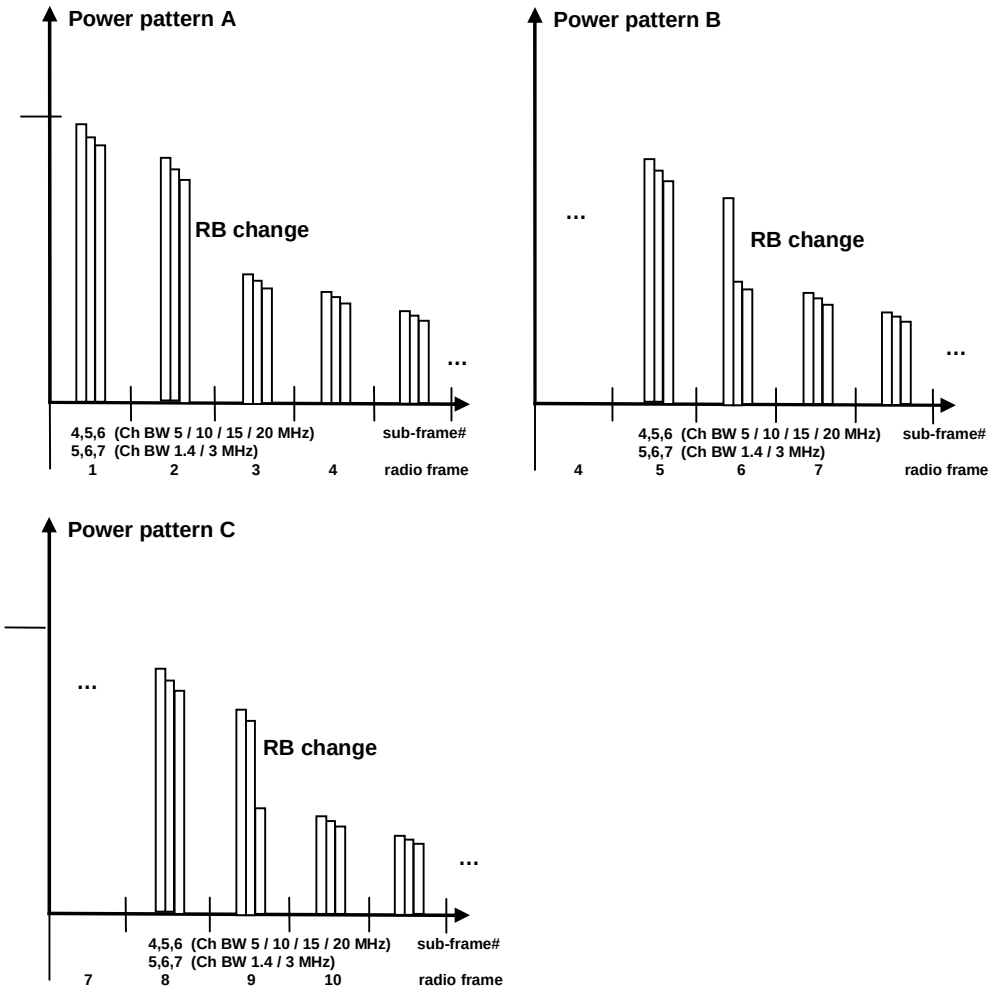


Figure 6.3.5EA.2.4.2-6: HD-FDD ramping down test power patterns

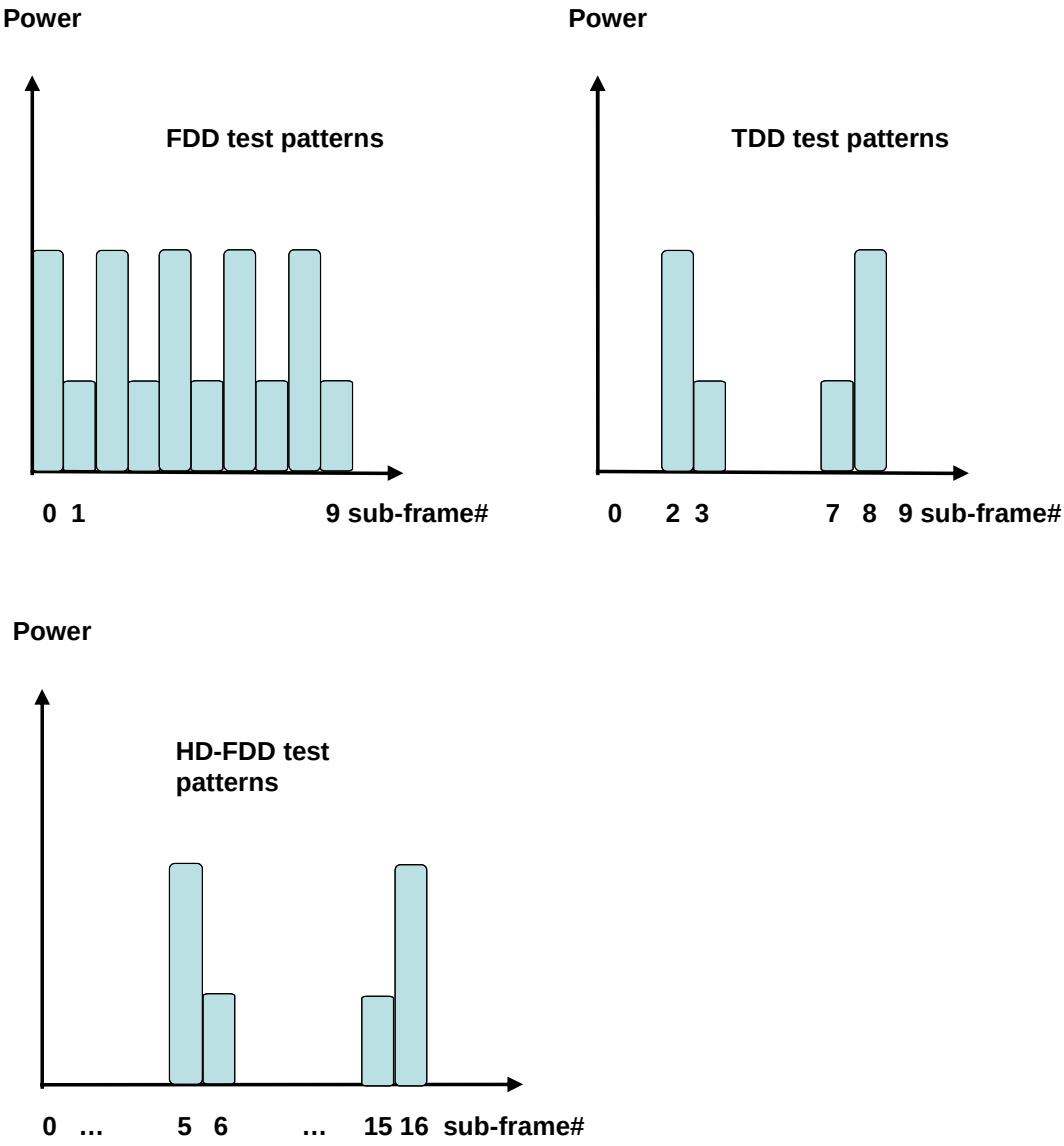


Figure 6.3.5EA.2.4.2-7: Alternating Test Power patterns

1. Sub test: ramping up pattern

   1.1 SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -36.8dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz.

   1.2 Schedule the UE's PUSCH data transmission as described in Figure 6.3.5EA.2.4.2-1 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame) Figure 6.3.5EA.2.4.2-3 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) and Figure 6.3.5EA.2.4.2-5 (HD-FDD pattern A: sub-test is divided in 14 arbitrary radio frames with 3 active uplink sub-frames per radio frame) with an uplink RB allocation as defined in tables 6.3.5EA.2.5-1. On the MPDCCH DCI format 6-0A for the scheduling of the PUSCH the SS will transmit a +1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

1.3 Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5EA.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

1.4 Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5EA.2.5-1 to force bigger UE power steps at various points in the power range.

2. Sub test: ramping down pattern

2.1 SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at +18.0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz with UE power class 3 or +15.0dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz with UE power class 5.

2.2 Schedule the UE's PUSCH data transmission as described in Figure 6.3.5EA.2.4.2-2 (FDD pattern A: sub-test is divided in 4 arbitrary radio frames with 10 active uplink sub-frames per radio frame), Figure 6.3.5EA.2.4.2-4 (TDD pattern A: sub-test is divided in 10 arbitrary radio frames with 4 active uplink sub-frames per radio frame) and Figure 6.3.5EA.2.4.2-6 (HD-FDD pattern A: sub-test is divided in 14 arbitrary radio frames with 3 active uplink sub-frames per radio frame)with an uplink RB allocation as defined in table 6.3.5EA.2.5-2. On the MPDCCH DCI format 6-0A for the scheduling of the PUSCH the SS will transmit a -1dB TPC command. Note that the measurement need not be done continuously, provided that interruptions are whole numbers of frames, and TPC commands of 0dB are sent during the interruption.

2.3 Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements 6.3.5EA.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

2.4 Repeat the subtest different pattern B, C to move the RB allocation change at different points in the pattern as described in Table 6.3.5EA.2.5-2 to force bigger UE power steps at various points in the power range.

3. Sub test: alternating pattern

3.1 SS sends uplink scheduling information for each UL HARQ process via P MPDCCH DCI format 6-0A for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at -10dBm +/- 3.2 dB for carrier frequency f ≤ 3.0GHz or at -10dBm +/- 3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz. The initial uplink RB allocation is defined as the smaller uplink RB allocation value specified in table 6.3.5EA.2.5-3. The power level and RB allocation are reset for each sub-test.

3.2 Schedule the UE's PUSCH data transmission as described in Figure 6.3.5EA.2.4.2-7 for 10 sub-frames (FDD and TDD) and 20 sub-frames (HD-FDD) with an uplink RB allocation alternating pattern as defined in table 6.3.5EA.2.5-3 while transmitting 0dB TPC command for PUSCH via the MPDCCH.

3.3. Measure the power of PUSCH transmissions to verify the UE relative power control meet test requirements specified in clause 6.3.5EA.2.5. For power transients between subframes, transient periods of 40us between subframes are excluded. For ON/OFF or OFF/ON transients, transient periods of 20 us at the beginning of the subframe are excluded.

6.3.5EA.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5EA.2.5 Test requirement

Each UE power step measured in the test procedure 6.3.5EA.2.4.2 should satisfy the test requirements specified in Table 6.3.5EA.2.5-1, thru 6.3.5EA.2.5-3 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of ramping up and ramping down test patterns. For these exceptions the power tolerance limit is a maximum of ±6.7 dB. If there is an exception in the power step caused by the RB change for all test patterns (A, B, C) then fail the UE.

Table 6.3.5EA.2.5-1: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping up)

Sub-test (ramp up)	Uplink RB allocation	TPC command	Expected power step size (Up) ΔP [dB]	Power step size range (Up) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 1	TPC=+1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 1 to 6 RBs	TPC=+1dB	8.78	4 ≤ ΔP < 10	8.78 ± (4.7) Note 2 8.78 +6.2/-4.7 Note 3
Subframes after RB change	Fixed = 6	TPC=+1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 10 active uplink subframes
Pattern B the position of RB uplink allocation change is after 20 active uplink subframes
Pattern C the position of RB uplink allocation change is after 30 active uplink subframes
Note 2: When Note 3 does not apply.
Note 3: For operating bands under Note 2 in Table 6.2.2EA-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: N/A
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5EA.2.5-2: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) channel bandwidth 5MHz (ramping down)

Sub-test (ramp down)	Uplink RB allocation	TPC command	Expected power step size (down) ΔP [dB]	Power step size range (down) ΔP [dB]	PUSCH [dB]
Subframes before RB change	Fixed = 5	TPC=-1dB	1	ΔP < 2	1 ± (1.7)
RB change	Change from 5 to 1 RBs	TPC=-1dB	7.99	4 ≤ ΔP < 10	7.99 ± (4.7) Note 2 7.99 +4.7/-6.2 Note 4
Subframes after RB change	Fixed = 1	TPC=-1dB	1	ΔP < 2	1 ± (1.7)

Note 1: Position of RB change:
Pattern A the position of RB uplink allocation change is after 6 active uplink subframes
Pattern B the position of RB uplink allocation change is after 16 active uplink subframes
Pattern C the position of RB uplink allocation change is after 26 active uplink subframes
Note 2: When Note 4 does not apply.
Note 3: N/A
Note 4: For operating bands under Note 2 in Table 6.2.2EA-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

Table 6.3.5EA.2.5-3: Test Requirements Relative Power Tolerance for Transmission (normal conditions – Note 5) (Alternating pattern)

Sub-test	Uplink RB allocation	TPC command	Expected power step size (Up or down) ΔP [dB]	Power step size range (Up or down) ΔP [dB]	PUSCH [dB]
5 MHz	Alternating 1 and 6	TPC=0dB	7.78	4 ≤ ΔP < 10	7.78 ± (6.7) Note 1,2 7.78 +8.2/-6.7 Note 3 7.78 +6.7/-8.2 Note 4

Note 1: Test tolerance +/- 6.7 dB was selected to allow PA switch possible exceptions to occur.
Note 2: When neither Note 3 nor Note 4 applies.
Note 3: For operating bands under Note 2 in Table 6.2.2EA.-1, if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges.
Note 4: For operating bands under Note 2 in Table 6.2.2EA.-1, if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges.
Note 5: For extreme conditions an additional ± 2.0 dB relaxation is allowed.
Note 6: The starting resource block shall be RB# 0.

6.3.5EA.3 Aggregate power control tolerance for UE category M1

6.3.5EA.3.1 Test purpose

To verify the ability of category M1 UE to maintain its power level in non-contiguous transmission in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in TS 36.213 are constant.

6.3.5EA.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.3.5EA.3.3 Minimum conformance requirement

The category M1 TDD and FD-FDD UEs shall meet the requirements specified in Table 6.3.5EA.3.3-1 for aggregate power control over the power range bounded by the minimum output power as defined in subclause 6.3.2EA, the maximum output power as defined in subclause 6.2.2EA, and the requirements for configured transmitted power are specified in subclause 6.2.5EA.

The category M1 HD-FDD UEs and for continuous uplink transmissions of duration $\leq$ 64 ms, shall meet the requirements specified in Table 6.3.5EA.3.3-1 for aggregate power control over the power range bounded by the minimum output power as defined in subclause 6.3.2EA, the maximum output power as defined in subclause 6.2.2EA, and the requirements for configured transmitted power are specified in subclause 6.2.5EA.

Table 6.3.5EA.3.3-1: Aggregate power control tolerance

TPC command	UL channel	Aggregate power tolerance within 21 ms [2]
0 dB	PUCCH	±2.5 dB
0 dB	PUSCH	±3.5 dB

NOTE 1: The UE transmission gap is 4 ms for full-duplex FDD and TDD.
For UE of half-duplex FDD with the channel bandwidth 5 MHz / 10 MHz / 15 MHz / 20 MHz, the transmission gap is 1 ms after subframe #4 and 7 ms after subframe #6.
For UE of half-duplex FDD with the CBW 1.4 / 3 MHz, the transmission gap is 9 ms.
TPC command is transmitted via MPDCCH 4 subframes preceding each PUCCH/PUSCH transmission.
NOTE 2: For UE of half-duplex FDD with the CBW 1.4 / 3 MHz, the test interval is 41 ms.

The normative reference for this requirement is TS 36.101 [2] clauses 6.3.5E.3.1.

6.3.5EA.3.4 Test description

6.3.5EA.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for CAT M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5EA.3.4.1-1 and table 6.3.5EA.3.4.1-2. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.3.5EA.3.4.1-1: Test Configuration Table Tx test cases UE Cat-M1: PUCCH sub-test

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 4.1				Normal
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1				Mid range
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1				5MHz
Test Parameters for Channel Bandwidths and Narrowband positions				
	Downlink Configuration			**Uplink Configuration**
Ch BW	Mod'n	RB allocation		FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a/1b
		FDD	TDD	
5MHz	QPSK	4	4	
Note 1: Downlink RB position shall be RB_{start} = 0 within the narrowband Note 2: The Narrowband index (TS36.211, 5.2.4) shall be set to 0 for all testpoints.				

Table 6.3.5EA.3.4.1-2: Test Configuration Table Tx test cases UE Cat-M1: PUSCH sub-test

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		5MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for PUSCH sub-test	Mod'n		RB allocation	
			FDD and HD-FDD	TDD	Narrowband index[1]
Low range					
5MHz		QPSK	5	5	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband. Note 4: Mid range test point shall use Narrowband index = 0.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 6.3.5EA.3.4.1-1 (PUCCH sub-test) and Table 6.3.5EA.3.4.1-2 (PUSCH sub-test).

5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.3.5EA.3.4.3.

6.3.5EA.3.4.2 Test procedure

The procedure is separated in two subtests to verify PUCCH and PUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5 EA.3.4.2-1.

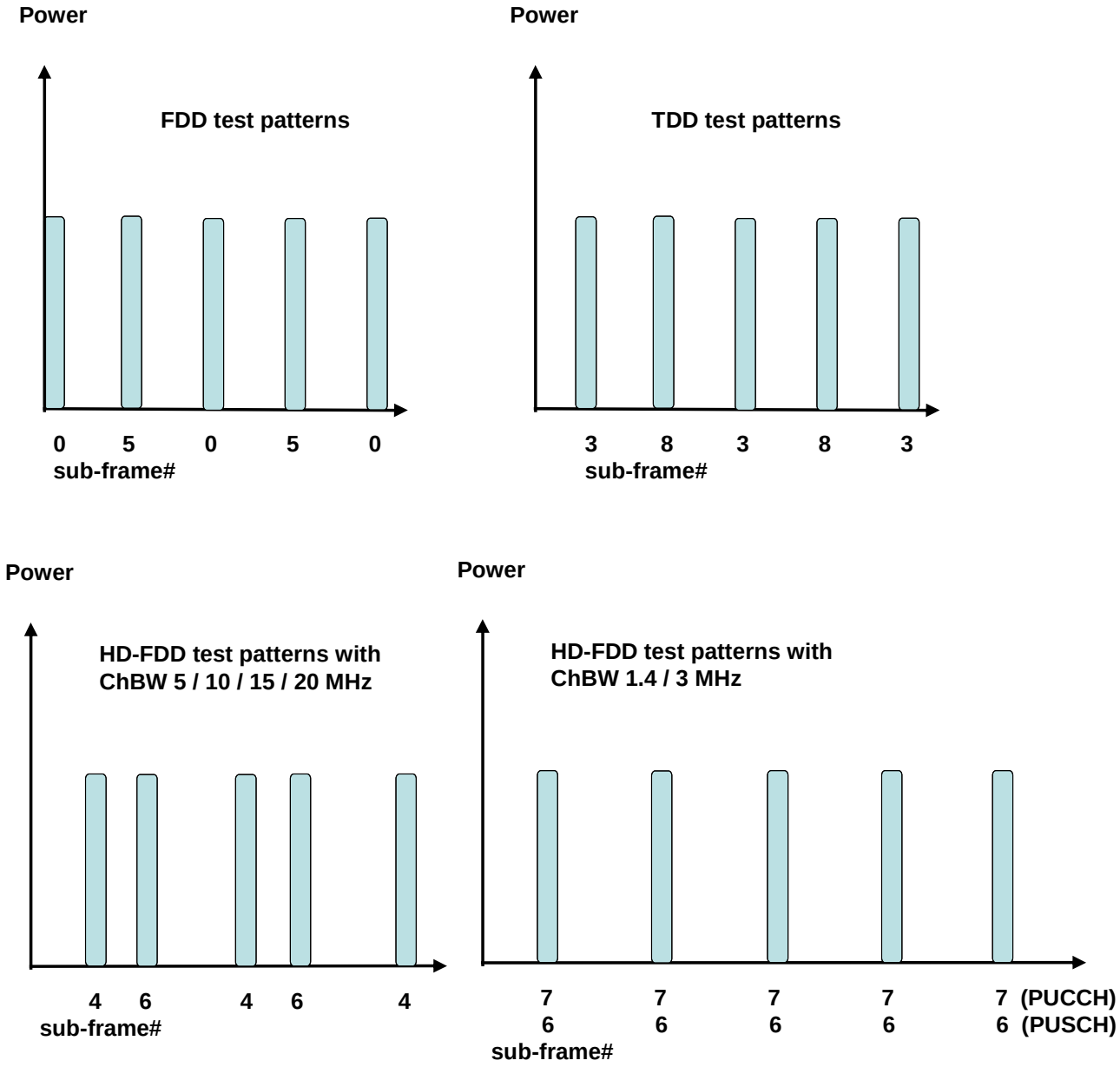


Figure 6.3.5EA.3.4.2-1: Test uplink transmission

1. PUCCH sub test:

1.1 The SS transmits PDSCH via M-PDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 6.3.5EA.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. Send the appropriate TPC commands for PUCCH to the UE to ensure that the UE transmits PUCCH at 0dBm +/- 3.2 dB for carrier frequency $f \leq 3.0$GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz $< f \leq 4.2$GHz.

1.2. For FDD and TDD: Every 5 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the MPDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 4 subframes. For HD-FDD with the channel bandwidth 5, 10, 15 and 20 MHz: Subframes #0 and #2 every 10 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the MPDCCH to make the UE transmit ACK/NACK on the PUCCH with transmission gap of 1 ms after subframe #4 and 7 ms after subframe #6. For HD-FDD with the channel bandwidth 1.4 and 3 MHz: Subframe #3 every 10 subframes transmit to the UE downlink PDSCH MAC padding bits as well as 0 dB TPC command for PUCCH via the MPDCCH to make the UE transmit ACK/NACK on the

PUCCH with transmission gap of 9 ms after subframe #7. The downlink transmission is scheduled in the appropriate sub-frames to make the UE transmit PUCCH as described in figure 6.3.5EA.3.4.2-1.

1.3. Measure the power of 5 consecutive PUCCH transmissions to verify the UE transmitted PUCCH power is maintained within 21 ms for FDD and TDD with any channel bandwidth and HD-FDD with the channel bandwidth 5, 10, 15 and 20 MHz, within 41 ms for HD-FDD with the channel bandwidth 1.4 and 3 MHz. The transient periods of 20us are excluded from the power measurement.

2. PUSCH sub test:

2.1. The SS sends uplink scheduling information via M-PDCCH DCI format 6-0A for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. Send the appropriate TPC commands for PUSCH to the UE to ensure that the UE transmits PUSCH at 0dBm +/- 3.2.dB for carrier frequency $f \leq 3.0$GHz or at 0dBm +/- 3.5 dB for carrier frequency 3.0GHz $< f \leq$ 4.2GHz.

2.2. For FDD and TDD: Every 5 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the MPDCCH to make the UE transmit PUSCH with 4 subframes gap. For HD-FDD with the channel bandwidth 5, 10, 15 and 20 MHz: Subframes #4 and #6 every 10 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the MPDCCH to make the UE transmit PUSCH with transmission gap of 1 ms after subframe #4 and 7 ms after subframe #6. For HD-FDD with the channel bandwidth 1.4 and 3 MHz: Subframe #6 every 10 subframes schedule the UE's PUSCH data transmission and transmit 0 dB TPC command for PUSCH via the MPDCCH to make the UE transmit PUSCH with transmission gap of 9 ms after subframe #6. The uplink transmission patterns are described in figure 6.3.5EA.3.4.2-1.

2.3. Measure the power of 5 consecutive PUSCH transmissions to verify the UE transmitted PUSCH power is maintained within 21 ms for FDD and TDD with any channel bandwidth and HD-FDD with the channel bandwidth 5, 10, 15 and 20 MHz, within 41 ms for HD-FDD with the channel bandwidth 1.4 and 3 MHz. The transient periods of 20us are excluded from the power measurement.

6.3.5EA.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5EA.3.5 Test requirement

The requirement for the power measurements made in step (1.3) and (2.3) of the test procedure shall not exceed the values specified in Table 6.3.5EA.3.5-1. The power measurement period shall be 1 sub-frame excluding transient periods.

Table 6.3.5EA.3.5-1: Power control tolerance

TPC command	UL channel	Test requirement measured power within 21m [2]
0 dB	PUCCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 3.2 dB of the 1st measurement.
0 dB	PUSCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 4.2 dB of the 1st measurement.
Note 1: The UE transmission gap is 4 ms for full-duplex FDD and TDD. For UE of half-duplex FDD with the channel bandwidth 5 MHz / 10 MHz / 15 MHz / 20 MHz, the transmission gap is 1 ms after subframe #4 and 7 ms after subframe #6. For UE of half-duplex FDD with the CBW 1.4 / 3 MHz, the transmission gap is 9 ms TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission. Note 2: For UE of half-duplex FDD with the CBW 1.4 / 3 MHz, the test interval is 41 ms.		

6.3.5EA.3_1 Aggregate power control tolerance for UE category M1 (CE Mode B)

6.3.5EA.3_1.1 Test purpose

To verify the ability of category M1 UE to maintain its power level in non-contiguous transmission with respect to the first UE transmission, when the power control parameters specified in TS 36.213 are constant.

6.3.5EA.3_1.2 Test applicability

This test case applies to HD-FDD E-UTRA UE release 13 and forward of UE category M1 that support operating in CEModeB.

6.3.5EA.3_1.3 Minimum conformance requirement

The category M1 TDD and FD-FDD UEs shall meet the requirements specified in Table 6.3.5EA.3_1.3-1 for aggregate power control over the power range bounded by the minimum output power as defined in subclause 6.3.2EA, the maximum output power as defined in subclause 6.2.2EA, and the requirements for configured transmitted power are specified in subclause 6.2.5EA.

The category M1 HD-FDD UEs and for continuous uplink transmissions of duration ≤ 64 ms, shall meet the requirements specified in Table 6.3.5EA.3_1.3-1 for aggregate power control over the power range bounded by the minimum output power as defined in subclause 6.3.2EA, the maximum output power as defined in subclause 6.2.2EA, and the requirements for configured transmitted power are specified in subclause 6.2.5EA.

Table 6.3.5EA.3_1.3-1: Aggregate power control tolerance

TPC command	UL channel	Aggregate power tolerance within 21 ms [2]
0 dB	PUCCH	±2.5 dB
0 dB	PUSCH	±3.5 dB
NOTE 1: The UE transmission gap is 4 ms for full-duplex FDD and TDD. For UE of half-duplex FDD with the channel bandwidth 5 MHz / 10 MHz / 15 MHz / 20 MHz, the transmission gap is 1 ms after subframe #4 and 7 ms after subframe #6. For UE of half-duplex FDD with the CBW 1.4 / 3 MHz, the transmission gap is 9 ms. TPC command is transmitted via MPDCCH 4 subframes preceding each PUCCH/PUSCH transmission. NOTE 2: For UE of half-duplex FDD with the CBW 1.4 / 3 MHz, the test interval is 41 ms.		

The category M1 and M2 HD-FDD UE and for continuous uplink transmissions of duration > 64 ms shall meet the requirements specified in Table 6.3.5E.3.1-2 for aggregate power control over the power range bounded by the minimum output power as defined in subclause 6.3.2EA and the maximum output power as defined in subclause 6.2.5EA.

Table 6.3.5EA.3_1.3-2: Aggregate power control tolerance

TPC command	UL channel	Aggregate power tolerance within 129 ms
0 dB	PUCCH	±2.5 dB
0 dB	PUSCH	±3.5 dB
NOTE: The UE transmission gap is 5 ms. TPC command is transmitted via MPDCCH 4 subframes preceding each PUCCH/ PUSCH transmission.		

The normative reference for this requirement is TS 36.101 [2] clauses 6.3.5E.3.1.

6.3.5EA.3_1.4 Test description

6.3.5EA.3_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for CAT M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5EA.3_1.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.3.5EA.3_1.4.1-1: Test Configuration Table Tx test cases UE Cat-M1

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		5MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for PUSCH sub-test	Mod'n		RB allocation	
			FDD and HD-FDD	TDD	Narrowband index[1]
Low range					
5MHz		QPSK	5	5	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband. Note 4: Mid range test point shall use Narrowband index = 0.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 6.3.5EA.3_1.4.1-1.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.3.5EA.3_1.4.3.

6.3.5EA.3_1.4.2 Test procedure

1. The SS sends uplink scheduling information via MPDCCH DCI format 6-0B for C_RNTI to schedule the PUSCH. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Every 133 subframes schedule the UE's PUSCH data transmission via the MPDCCH to make the UE transmit PUSCH over 128 subframes with 5 subframes gap.
3. Measure the power of the first subframe and the last subframe in one PUSCH transmission to verify the UE transmitted PUSCH power is maintained within 129 ms with any channel bandwidth. The transient periods of 20us are excluded from the power measurement.

6.3.5EA.3_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.3.5EA.3_1.5 Test requirement

The requirement for the power measurements made in step 3 and of the test procedure shall not exceed the values specified in Table 6.3.5EA.3_1.5-1. The power measurement period shall be 1 sub-frame excluding transient periods.

Table 6.3.5EA.3_1.5-1: Power control tolerance

TPC command	UL channel	Test requirement measured power within 129 ms
0 dB	PUSCH	Given 2 power measurements in the pattern, 2nd measurements shall be within ± 4.2 dB of the 1st measurement.
NOTE1: The UE transmission gap is 5 ms. NOTE2: TPC command is not applicable for CEModeB. NOTE3: PUCCH is not applicable due to maximum configurable PUCCH duration of 32 ms.		

6.3.5F Power Control for category NB1

6.3.5F.1 Power Control Absolute power tolerance for category NB1

6.3.5F.1.1 Test purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value at the start of a contiguous transmission or non-contiguous transmission with a long transmission gap, i.e. transmission gap is larger than 20 ms.

6.3.5F.1.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.3.5F.1.3 Minimum conformance requirements

Absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap larger than 20ms.

The minimum requirement for absolute power tolerance is given in Table 6.3.5F.1.3-1 over the power range bounded by the Maximum output power as defined in subclause 6.2.2 and the Minimum output power as defined in subclause 6.3.2.

For operating bands under NOTE 2 in Table 6.2.2-1, the absolute power tolerance as specified in Table 6.3.5F.1.3-1 is relaxed by reducing the lower limit by 1.5 dB when the transmission bandwidth is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}.

Table 6.3.5F.1.3-1: Absolute power tolerance

Conditions	Tolerance
Normal	± 9.0 dB
Extreme	± 12.0 dB

The normative reference for this requirement is TS 36.101 clause 6.3.5F.1

6.3.5F.1.4 Test description

6.3.5F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 6.3.5F.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.3.5F.1.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] clause 8.1.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defined in Annex K.1.1		
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Modulation	Subcarriers	Modulation	N_{tones}	Subcarrier spacing
1	N/A		QPSK	1@0	3.75 kHz
2			QPSK	1@0	15 kHz
3 (NOTE 1)			QPSK	12@0	15 kHz
Note 1: Applicable to UE supporting UL multi-tone transmissions					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.2, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.3.5F.1.4.1-1.
5. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.3.5F.1.4.3.

6.3.5F.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.3.5F.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. The SS shall configure the UE to transmit according to Table 6.3.5F.1.4.3-1 and Table 6.3.5F.1.4.3-2.
3. Measure the initial output power of the first resource unit of UE NPUSCH first transmission. The transient periods of 20us are excluded. The period of measurement shall be at least the continuous duration of one sub-frame (1ms) for 15 kHz sub-carrier spacing or one slot (2ms) excluding the 2304Ts gap when UE is not transmitting for 3.75 kHz sub-carrier spacing. Half-Duplex guard subframes are not under test.
4. Release the connection through State 3A-NB.
5. Modify system information elements according to Table 6.3.5F.1.4.3-3 and Table 6.3.5F.1.4.3-4 and notify the UE via paging message with SystemInformationModification included.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the new UL power control setting.

7. SS sends uplink scheduling information for each UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.3.5F.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

8. Measure the initial output power of the first resource unit of UE NPUSCH first transmission. The transient periods of 20us are excluded. The period of measurement shall be at least the continuous duration of one sub-frame (1ms) for 15 kHz sub-carrier spacing or one slot (2ms) excluding the 2304Ts gap when UE is not transmitting for 3.75 kHz sub-carrier spacing. Half-Duplex guard subframes are not under test.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.3.5F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions:

Table 6.3.5F.1.4.3-1: UplinkPowerControlCommon: Test point 1

Derivation Path: TS 36.508 [7] clause 8.1.6.3, Table 8.1.6.3-14 UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	-124 (-124 dBm)	Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5F.1.4.3-2: NPDSCH-ConfigCommon-NB-DEFAULT: Test Point 1

Derivation Path: 36.331 clause 6.7.3			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	20 (dBm)		
}			

Table 6.3.5F.1.4.3-3: UplinkPowerControlCommon: Test point 2

Derivation Path: TS 36.508 [7] clause 8.1.6.3, Table 8.1.6.3-14 UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	-94 (-94 dBm)	Test point 2 to verify a UE relative high initial power transmission	

Table 6.3.5F.1.4.3-4: NPDSCH-ConfigCommon-NB-DEFAULT: Test Point 2

Derivation Path: 36.331 clause 6.7.3			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	3 (dBm)		
}			

Table 6.3.5F.1.4.3-5: PhysicalConfigDedicated

Derivation Path: TS 36.508 [7] clause 8.1.8.2, Table 8.1.8.2.1.6-1 PhysicalConfigDedicated-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-NB-DEFAULT ::= SEQUENCE {			
uplinkPowerControlDedicated-r13	UplinkPowerControlDedicated-NB-DEFAULT	See subclause 8.1.6.3	

Table 6.3.5F.1.4.3-6: UplinkPowerControlDedicated-NB-DEFAULT

Derivation Path: TS 36.508 [7] clause 8.1.6.3, Table 8.1.6.3-15 UplinkPowerControlDedicated-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-NB-DEFAULT ::= SEQUENCE {			
p0-UE-NPUSCH-r13	0	Default	
}			

6.3.5F.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5F.1.5-1 and 6.3.5F.1.5-2.

Table 6.3.5F.1.5-1: Absolute power tolerance: test point 1

	Channel bandwidth / expected output power (dBm)		
	Configuration ID 1 3.75 kHz (1 tone)	**Configuration ID 2 15 kHz (1 tone)**	**Configuration ID 3 15 kHz (12 tones)**
Expected Measured power Normal conditions	-25 dBm	-19 dBm	-8.2 dBm
Power tolerance f ≤ 3.0GHz	± 10.0dB	± 10.0dB	± 10.0dB
Expected Measured power Extreme conditions	-25 dBm	-19 dBm	-8.2 dBm
Power tolerance f ≤ 3.0GHz	± 13.0dB	± 13.0dB	± 13.0dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2F.3			

Table 6.3.5F.1.5-2: Absolute power tolerance: test point 2

	Channel bandwidth / expected output power (dBm)		
	Configuration ID 1 3.75 kHz (1 tone)	**Configuration ID 2 15 kHz (1 tone)**	**Configuration ID 3 15 kHz (12 tones)**
Expected Measured power Normal conditions	-12 dBm	-6 dBm	4.8 dBm
Power tolerance f ≤ 3.0GHz	± 10.0dB	± 10.0dB	± 10.0dB
Expected Measured power Extreme conditions	-12 dBm	-6 dBm	4.8 dBm
Power tolerance f ≤ 3.0GHz	± 13.0dB	± 13.0dB	± 13.0dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2F.3			

6.3.5F.2 Power Control Relative power tolerance for category NB1

6.3.5F.2.1 Test purpose

To verify the ability of the UE transmitter to set its output power relatively to the power in a target sub-frame relatively to the power of the most recently transmitted reference sub-frame if the transmission gap between these sub-frames is ≤ 20 ms.

6.3.5F.2.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.3.5F.2.3 Minimum conformance requirements

Category NB1 UE relative power control requirement is defined for NPRACH power step values of 0, 2, 4 and 6 dB. For NPRACH transmission, the relative tolerance is the ability of the UE transmitter to set its output power relatively to the power of the most recently transmitted preamble. The measurement period for the NPRACH preamble is specified in Table 6.3.4F.2.3-1.

The requirements specified in Table 6.3.5F.2.3-1 apply when the power of the target and reference sub-frames are within the power range bounded by the Minimum output power as defined in subclause 6.3.2F and the maximum output power as defined in subclause 6.2.2F.

Table 6.3.5F.2.3-1: Relative power tolerance for category NB1 NPRACH transmission (normal conditions)

Power step ΔP [dB]	NPRACH [dB]
ΔP = 0	±1.5
ΔP = 2	±2.0
ΔP = 4	±3.5
ΔP = 6	±4.0
NOTE: For extreme conditions an additional ± 2.0 dB relaxation is allowed.	

The power step (ΔP) is defined as the difference in the calculated setting of the UE Transmit power between the target and reference sub-frames. The error is the difference between ΔP and the power change measured at the UE antenna port with the power of the cell-specific reference signals kept constant. The error shall be less than the relative power tolerance specified in Table 6.3.5F.2.3-1.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5F.2

6.3.5F.2.4 Test description

6.3.5F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 6.3.5F.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.3.5F.2.4.1-1: Test Configuration Table for NPRACH

Initial Conditions	
Test Environment as specified in TS 36.508 [7] clause 8.1.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1	Frequency ranges defined in Annex K.1.1
NPRACH preamble format	0

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.2, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.3.5F.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.3.5F.2.4.3 with NPRACH Format 0.

6.3.5F.2.4.2 Test procedure

1. The SS send the paging and UE shall send a preamble to the SS.
2. NPRACH is set according to Table 6.3.5F.2.4.1-1.
3. UE shall send a preamble to the SS.
4. In response to the preamble, the SS shall transmit a random access response not corresponding to the transmitted random access preamble, or send no response.
5. The UE shall consider the random access response reception not successful then re-transmit the preamble with the calculated NPRACH transmission power.
6. Measure the output power of the transmitted NPRACH preamble according to Figure 6.3.4F.2.3-1. Note that the measurement does not need to be done for overall measurement range at one time. The measurement range can be divided into few ranges. Each range needs to overlap neighbouring one.
7. Switches off and on the UE and ensure the UE is in State 3A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.3.5F.2.4.3.
8. Repeat test with step 1-6 as indicated in section 6.3.5F.2.4.3.

6.3.5F.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions.

Table 6.3.5F.2.4.3-1: NPDSCH-ConfigCommon-NB-DEFAULT: NPRACH measurement

Derivation Path: TS 36.508 [7] clause 8.1.6, Table 8.1.6.3-4 NPDSCH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	-22 (dBm)		
}			

Table 6.3.5F.2.4.3-2: RACH-ConfigCommon-NB-DEFAULT: NPRACH measurement (Subtest 1: power step size ΔP = 2 dB)

Derivation Path: TS 36.508 [7] clause 8.1.6, Table 8.1.6.3-8 RACH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RACH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
preambleTransMax-CE-r13	n50		
}			

Table 6.3.5F.2.4.3-3: RACH-ConfigCommon-NB-DEFAULT: NPRACH measurement (Subtest 2: power step size ΔP = 6 dB)

Derivation Path: TS 36.508 [7] clause 8.1.6, Table 8.1.6.3-8 RACH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RACH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
preambleTransMax-CE-r13	n10		
powerRampingParameters-r13 SEQUENCE {			
powerRampingStep	dB6		
}			
}			

6.3.5F.2.5 Test requirement

Each UE power step measured in the test procedure 6.3.5F.2.4.2 should satisfy the test requirements specified in Table 6.3.5F.2.5-1 for normal conditions; for extreme conditions an additional ± 2.0 dB relaxation is allowed.

Table 6.3.5F.2.5-1: Relative power tolerance for category NB1 NPRACH transmission (normal conditions – Note 1)

Expected power step size (up) ΔP [dB]	**NPRACH [dB]**
ΔP = 2	2 ± (2.7)
ΔP = 6	6 ± (4.7)
Note 1: For extreme conditions an additional ± 2.0 dB relaxation is allowed. Note 2: Only UE output power measurements within the range -39.3 to 20.3 dBm for Power Class 3, or -39.3 to 16.8 dBm for Power Class 5 shall be considered in the pass/fail criteria.	

6.3.5F.3 Aggregate power control tolerance for category NB1

6.3.5F.3.1 Test purpose

To verify the ability of a category NB1 UE to maintain its output power in non-contiguous transmission with respect to the first UE transmission, when the uplink power control parameters as defined in TS 36.213 are constant and α is set to 0.

6.3.5F.3.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.3.5F.3.3 Minimum conformance requirement

The UE shall meet the requirements specified in Table 6.3.5F.3.3-1 for aggregate power control over the power range bounded by the minimum output power as defined in subclause 6.3.2F and the maximum output power as defined in subclause 6.2.2F.

Table 6.3.5F.3.3-1: Aggregate power control tolerance

UL channel	Aggregate power tolerance	
	15 kHz / 12 tones within 53 ms	15 kHz / 1 tone within 104 ms
NPUSCH	±3.5 dB	
NOTE: For five consecutive UE transmissions the transmission gaps are 12 ms for 12 tone and 16 ms for single tone transmissions. Uplink scheduling grant is transmitted via NPDCCH eight subframes before NPUSCH transmission.		

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5F.3.

6.3.5F.3.4 Test description

6.3.5F.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5F.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

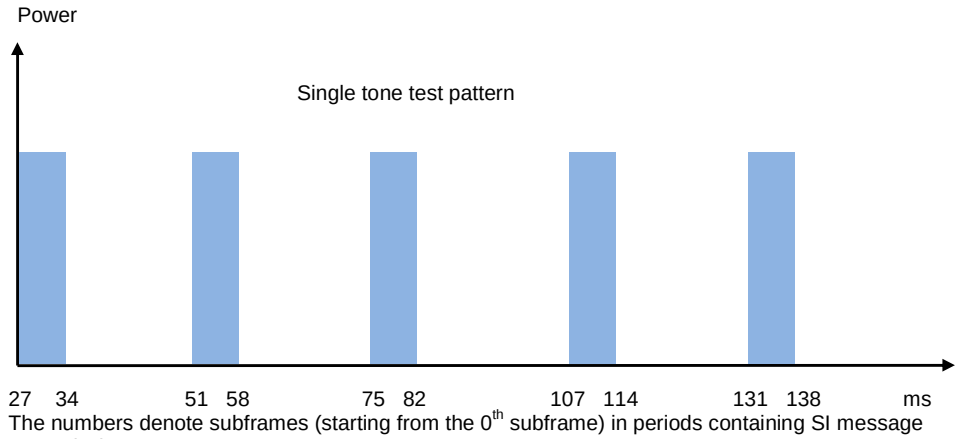
Table 6.3.5F.3.4.1-1: Test Configuration

Initial Conditions				
Test Environment as specified in TS 36.508 [7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}, start position	Sub-carrier spacing (kHz)
1		QPSK	1@0	15
2		QPSK	1@11	15
3 (Note 1)		QPSK	12@0	15
Note 1: Applicable to UE supporting UL multi-tone transmissions				

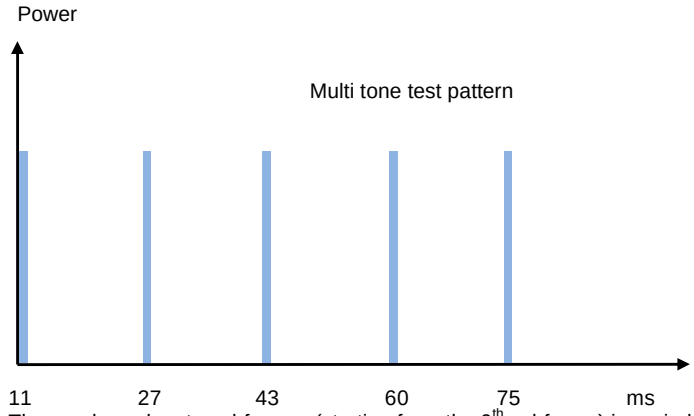
1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C, and uplink signals according to Annex H.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.1F.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.5.2.1F.1.4.3.

6.3.5F.3.4.2 Test procedure

The procedure is separated in two subtests to verify single tone and multi tone NPUSCH aggregate power control tolerance respectively. The uplink transmission patterns are described in figure 6.3.5F.3.4.2-1.



The numbers denote subframes (starting from the 0th subframe) in periods containing SI message transmission.



The numbers denote subframes (starting from the 0th subframe) in periods where there is no transmission of SI messages.

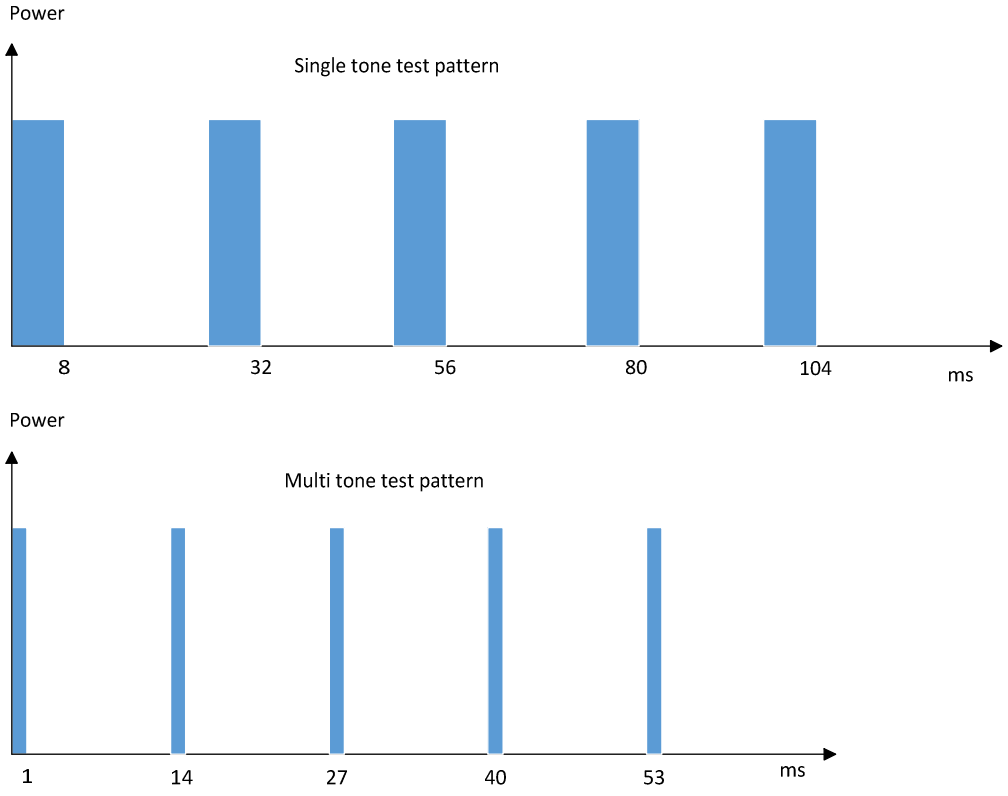


Figure 6.3.5F.3.4.2-1 Test uplink transmission

For single tone NPUSCH transmission scenario:

1. SS sends uplink scheduling information for each UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.3.5F.3.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Schedule the UE's NPUSCH data transmission for period containing SI message transmission according to Annex A.2.4 and make the UE transmit NPUSCH with 32 or 48 slots (16 or 24 ms) gap. Uplink scheduling grant is transmitted via NPDCCH 9 subframes before NPUSCH transmission.

3. Measure the power of 5 consecutive NPUSCH transmissions to verify the UE transmitted NPUSCH power is maintained within 112 ms. The transient periods of 20us are excluded from the power measurement.

4. Repeat step 2 and 3 for configuration ID 2 in Table 6.3.5F.3.4.1-1.

For 12 tones NPUSCH transmission scenario:

0. SS release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 and configure the UE to the new UL power level with messages in Table 6.3.5F.3.4.3-2.

1. SS sends uplink scheduling information for each UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.3.5F.3.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Schedule the UE's NPUSCH data transmission for period where there is no transmission of SI messages according to Annex A.2.4 and make the UE transmit NPUSCH with 28, 30 or 32 slots (14, 15 or 16 ms) gap. Uplink scheduling grant is transmitted via NPDCCH 9 subframes before NPUSCH transmission.

3. Measure the power of 5 consecutive NPUSCH transmissions to verify the UE transmitted NPUSCH power is maintained within 65 ms. The transient periods of 20us are excluded from the power measurement.

6.3.5F.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions:

Table 6.3.5F.3.4.3-1: P0-NominalNPUSCH-r13 configuration for single tone 15 kHz scenario

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-14: UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	0 (0 dBm)		
alpha-r13	al0 (0)		
deltaPreambleMsg3-r13	4		
}			

Table 6.3.5F.3.4.3-2: P0-NominalNPUSCH-r13 configuration for 12 tones 15 kHz scenario

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-14: UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	-11 (-0.2 dBm)		
alpha-r13	al0 (0)		
deltaPreambleMsg3-r13	4		
}			

6.3.5F.3.5 Test requirement

The requirement for the power measurements made in step 4 of the test procedure shall not exceed the values specified in Table 6.3.5F.3.5-1. The power measurement period shall be 1 resource unit excluding transient periods.

Table 6.3.5F.3.5-1: Power control tolerance

UL channel	Test requirement measured power
NPUSCH	Given 5 power measurements in the pattern, the 2nd, 3rd, 4th, and 5th measurements shall be within ± 4.2 dB of the 1st measurement.

6.3.5G Power Control Absolute power tolerance for V2X Communication

6.3.5G.1 Power Control Absolute power tolerance for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Value for *dataTxParameters-r14* in 6.3.5G.1.4.3 is left FFS.

- Expected Measured power and the test tolerance in 6.3.5G.1.5 is left FFS.

- Annexes A, F.1.2, and F.3.2 is left FFS.

6.3.5G.1.1 Test Purpose

To verify the ability of the UE transmitter to set its initial output power to a specific value at the start of a contiguous transmission or non-contiguous transmission with a long transmission gap, i.e. transmission gap is larger than 20 ms when performing V2X sidelink Communication non-concurrent with E-UTRA uplink transmissions.

6.3.5G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that supports V2X communication and is capable of V2X sidelink communication.

6.3.5G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.2G-1, the absolute power tolerance requirements specified in subclause 6.3.5.1 shall apply for each V2X transmission.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5G .

6.3.5G.1.4 Test description

6.3.5G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3. GNSS simulator is configured as Table C.2-8 in Annex C.2.

Table 6.3.5G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.92.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 4.10.1. Message content exceptions are defined in clause 6.3.5G.1.4.3.
3. The V2X reference measurement channel is set according to Table 6.3.5G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State5A -V2X according to TS 36.508 [7] clause 4.5.9.

6.3.5G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Measure the mean power of the UE in the channel bandwidth for each test point in section 6.3.5G.1.4.3 according to the test configuration from Table 6.3.5G.1.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).
3. Repeat for the two test points as indicated in section 6.3.5G.1.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.5G.1.4.3-1: SL-V2X-PreconfigCommPool-r14: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-20J: SL-V2X-PreconfigCommPool-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-PreconfigCommPool-r14-DEFAULT ::= SEQUENCE { dataTxParameters-r14	FFS	p0-r12; Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5G.1.4.3-2: SL-V2X-PreconfigCommPool-r14: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-20J: SL-V2X-PreconfigCommPool-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-PreconfigCommPool-r14-DEFAULT ::= SEQUENCE { dataTxParameters-r14	FFS	p0-r12; Test point 1 to verify a UE relative low initial power transmission	

6.3.5G.1.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5G.1.5-1 and 6.3.5G.1.5-2.

Table 6.3.5G.1.5-1: Absolute power tolerance: test point 1

	Channel bandwidth / expected output power (dBm)	
	10 MHz	**20 MHz**
Expected Measured power Normal conditions	FFS dBm	FFS dBm
Power tolerance	± (9+TT)dB	± (9+TT)dB
Expected Measured power Extreme conditions	FFS dBm	FFS dBm
Power tolerance	± (12+TT)dB	± (12+TT)dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2G.1.3		

Table 6.3.5G.1.5-2: Absolute power tolerance: test point 2

	Channel bandwidth / expected output power (dBm)	
	10 MHz	**20 MHz**
Expected Measured power Normal conditions	FFS dBm	FFS dBm
Power tolerance	± (9+TT)dB	± (9+TT)dB
Expected Measured power Extreme conditions	FFS dBm	FFS dBm
Power tolerance	± (12+TT)dB	± (12+TT)dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2G.1.3		

6.3.5G.2 Power Control Absolute power tolerance for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Value for *dataTxParameters-r14* in 6.3.5G.2.4.3 is left FFS.

- Expected Measured power and the test tolerance in 6.3.5G.2.5 is left FFS.

- Annexes A, F.1.2, and F.3.2 is left FFS.

6.3.5G.2.1 Test Purpose

To verify the ability of the UE transmitter to set its initial output power for each component carrier to a specific value at the start of a contiguous transmission or non-contiguous transmission with a long transmission gap, i.e. transmission gap is larger than 20 ms when performing V2X sidelink Communication with Intra-band contiguous multi-carrier operation.

6.3.5G.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support Intra-band contiguous multi-carrier operation V2X Communication.

6.3.5G.2.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions with Intra-band contiguous multi-carrier operation for V2X multi-carrier Band configuration specified in Table 5.2G-3, the absolute power tolerance requirements specified in subclause 6.3.5.1 shall apply for each component carrier.

The normative reference for this requirement is TS 36.101 [2] clause 6.3.5G .

6.3.5G.2.4 Test description

6.3.5G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on V2X intra-band multi-carrier configurations specified in Table 5.4.2G.1-4. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.3.5G.2.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3. GNSS simulator is configured as Table C.2-8 in Annex C.2.

Table 6.3.5G.2.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Mid range	
Test Channel Bandwidths as specified in subclause 5.4.2G		Lowest N_{RB_agg}, Highest N_{RB_agg}	
Test Parameters for Channel Bandwidths			
V2X multi-carrier Configuration		**V2X PSSCH Allocation**	
CC1 N_{RB}	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**CC1 and CC2 RB Allocation**
10MHz	10MHz	QPSK	[48+48]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.89a.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] Table 6.8.2.1-1A. Message content exceptions are defined in clause 6.3.5G.2.4.3.
3. The V2X reference measurement channel is set according to Table 6.3.5G.2.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State5A -V2X according to TS 36.508 [7] clause 4.5.9.

6.3.5G.2.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.

2. Measure the mean power of the UE in the channel bandwidth for each component carrier and each test point in section 6.3.5G.2.4.3 according to the test configuration from Table 6.3.5G.2.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

3. Repeat for the two test points as indicated in section 6.3.5G.2.4.3. The timing of the execution between the two test points shall be larger than 20ms.

6.3.5G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.3.5G.2.4.3-1: SL-V2X-PreconfigCommPool-r14: Test point 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-20J: SL-V2X-PreconfigCommPool-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-PreconfigCommPool-r14-DEFAULT ::= SEQUENCE { dataTxParameters-r14	FFS	p0-r12; Test point 1 to verify a UE relative low initial power transmission	

Table 6.3.5G.2.4.3-2: SL-V2X-PreconfigCommPool-r14: Test point 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-20J: SL-V2X-PreconfigCommPool-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-PreconfigCommPool-r14-DEFAULT ::= SEQUENCE { dataTxParameters-r14	FFS	p0-r12; Test point 1 to verify a UE relative low initial power transmission	

6.3.5G.2.5 Test requirement

The requirement for the power measured in step (2) of the test procedure is not to exceed the values specified in Table 6.3.5G.2.5-1 and 6.3.5G.2.5-2.

Table 6.3.5G.2.5-1: Absolute power tolerance: test point 1

	expected output power (dBm)
Expected Measured power Normal conditions	FFS dBm
Power tolerance	± (9+TT)dB
Expected Measured power Extreme conditions	FFS dBm
Power tolerance	± (12+TT)dB
Note 1: The lower power limit shall not exceed the minimum output power requirements defined in sub-clause 6.3.2G.3.3	

Table 6.3.5G.2.5-2: Absolute power tolerance: test point 2

	expected output power (dBm)
Expected Measured power Normal conditions	FFS dBm
Power tolerance	± (9+TT)dB
Expected Measured power Extreme conditions	FFS dBm
Power tolerance	± (12+TT)dB
Note 1: The upper power limit shall not exceed the maximum output power requirements defined in sub-clause 6.2.2G.3.3	

6.4 Void

6.5 Transmit signal quality

Editor's note: The test cases for transmit signal quality: frequency error, EVM, carrier leakage, IBE, EVM equalizer spectrum flatness are complete, except the following aspect is not determined:

- Reference signal EVM and PRACH EVM minimum requirements from the core specification are still in brackets.

In this clause a multitude of results are derived, all using one common algorithm returning these results: Global In-Channels TX-Test (Annex E). Each sub clause of this clause contains a procedure and test requirements described for a specific measurement. If all relevant test parameters in different sub clauses are the same, then the results, returned by the Global In-Channel TX-Test, may be used across the applicable sub clauses.

For UE category M1, carrier centre frequency can be either at the centre of channel bandwidth or the 6RB narrowband assigned for transmission. TE shall measure frequency error, EVM, carrier leakage, In-band emissions and EVM equalizer spectrum flatness using Global In-Channels TX-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

6.5.1 Frequency Error

6.5.1.1 Test purpose

This test verifies the ability of both, the receiver and the transmitter, to process frequency correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency from the results, gained by the receiver.

6.5.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.5.1.3 Minimum conformance requirements

The UE modulated carrier frequency shall be accurate to within ±0.1 PPM observed over a period of one time slot (0.5ms) compared to the carrier frequency received from the E-UTRA Node B.

The normative reference for this requirement is TS 36.101 clause 6.5.1

6.5.1.4 Test description

6.5.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[3]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth.						
Note 3: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.5.1.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.1.4.3.

6.5.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.5.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.1.4.1-1, since the UE has no payload data to send, the UE transmit uplink MAC padding bits on the UL RMC
3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3.5-1. Send continuously uplink power control "up" commands to the UE in every uplink scheduling information to the UE so that the UE transmits at P_{UMAX} level for the duration of the test.

4. Measure the Frequency Error using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the exceptions in subclause 7.3.4.3 and Table 7.3.3-3.

6.5.1.5 Test requirement

The 20 frequency error Δf results must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz})$$

6.5.1A Frequency error for CA

6.5.1A.0 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the frequency error requirements defined in subclause 6.5.1 shall apply on each component carrier with both component carriers active.

For intra-band contiguous carrier aggregation the UE modulated carrier frequencies per band shall be accurate to within ±0.1 PPM observed over a period of one timeslot compared to the carrier frequency of primary component carrier received from the E-UTRA in the corresponding band.

For intra-band non-contiguous carrier aggregation the requirements in Section 6.5.1 applies per component carrier.

The normative reference for this requirement is TS 36.101[2] clause 6.5.1A.

6.5.1A.1 Frequency error for CA (intra-band contiguous DL CA and UL CA)

6.5.1A.1.1 Test purpose

This test verifies the ability of both, receiver and the transmitter, to process frequency for intra-band CA correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency from the results, gained by the receiver.

6.5.1A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.5.1A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.1A.0.

6.5.1A.1.4 Test description

6.5.1A.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.1A.1.4.1-1. The details of the uplink reference

measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.1A.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.		Low range, High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 3)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**UL Allocation**					
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50	N/A	QPSK	25	P_25@0	S_0@0	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	50	P_50@0	S_0@0	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
75	75		QPSK	129	P_75@0	S_54@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
75	75		QPSK	75	P_75@0	S_0@0	-	-
100	25		QPSK	125	P_100@0	S_25@0	-	-
100	25		QPSK	50	P_50@0	S_0@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
100	100		QPSK	130	P_100@0	S_30@0	-	-
100	100		QPSK	75	P_75@0	S_0@0	-	-
100	100		QPSK	100	P_100@0	S_0@0	-	-
100	100		QPSK	50	P_50@0	S_0@0	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.0-1 for UE supporting two uplink carriers is tested per Test CA configuration.
Note 3: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.
Note 4: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The ULReference Measurement channel is set according to Table 6.5.1A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.1A.1.4.3.

6.5.1A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.1A.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.1A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Set the Downlink signal level for PCC and SCC to the appropriate REFSENS value defined in 7.3A.2.5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the test.
6. Measure the Frequency Error on PCC and SCC using Global In-Channel Tx-Test (Annex E) respectively. For TDD slots with transient periods are not under test.

6.5.1A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.1A.1.5 Test Requirements

The 20 frequency error Δf results per test point must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz}) \text{ for each test point}$$

where PPM refers to PCC UL frequency.

6.5.1A.2 Frequency error for CA (inter-band DL CA and UL CA)

6.5.1A.2.1 Test purpose

This test verifies the ability of both, receiver and the transmitter, to process frequency for inter-band CA correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency from the results, gained by the receiver.

6.5.1A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.5.1A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.1A.0.

6.5.1A.2.4 Test description

6.5.1A.2.4.1 Initial condition

Same as in clause 6.5.1A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.5.1A.1.4.1-1 → use Table 6.5.1A.2.4.1-1.
- Instead of clause 6.5.1A.1.4.3 use clause 6.5.1A.2.4.3.

Table 6.5.1A.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.			Mid range for PCC and SCC			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC			
Network signalling value			NS_01 Unless given by Table 7.3.3-3 for the band with active uplink carrier			
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**		
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
6	25	NA	QPSK	31	P_6@0	S_25@0
6	50		QPSK	56	P_6@0	S_50@0
15	25		QPSK	40	P_15@0	S_25@0
25	25		QPSK	50	P_25@0	S_25@0
25	50		QPSK	75	P_25@0	S_50@0
50	50		QPSK	100	P_50@0	S_50@0
50	100		QPSK	150	P_50@0	S_100@0
75	75		QPSK	150	P_75@0	S_75@0
75	100		QPSK	175	P_75@0	S_100@0
100	50		QPSK	100	P_100@0	S_50@0
100	100		QPSK	200	P_100@0	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						

6.5.1A.2.4.2 Test procedure

Same test procedure as in clause 6.5.1A.1.4.2.

- Instead of Table 6.5.1A.1.4.1-1 → use Table 6.5.1A.2.4.1-1.
- Instead of Table 7.3A.2.5-1 use Table 7.3A.6.5-1.
- Instead of clause 6.5.1A.1.4.3 use clause6.5.1A.2.4.3.

6.5.1A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.1A.2.5 Test requirement

The 20 frequency error Δf results per test point must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz}) \text{ for each test point}$$

where PPM refers to each CC UL frequency.

6.5.1A.3 Frequency error for CA (intra-band non-contiguous DL CA and UL CA)

6.5.1A.3.1 Test purpose

This test verifies the ability of both, receiver and the transmitter, to process frequency for intra-band non-contiguous CA correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency from the results, gained by the receiver.

6.5.1A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.5.1A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.1A.0.

6.5.1A.3.4 Test description

6.5.1A.3.4.1 Initial condition

Same as in clause 6.5.1A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-3 for CA configurations.
- Instead of Table 6.5.1A.1.4.1-1 → use Table 6.5.1A.3.4.1-1.
- Instead of clause 6.5.1A.1.4.3 → use clause 6.5.1A.3.4.3.

Table 6.5.1A.3.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH							
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: N/A (Range is not relevant), Maximum Wgap							
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC							
Test Parameters for CA Configurations								
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**	**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations								
1	25	25	35	NA	QPSK	P_25@0	QPSK	S_25@0
2	50	50	25		QPSK	P_50@0	QPSK	S_50@0
3	100	100	5		QPSK	P_100@0	QPSK	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.0-4 for UE supporting two uplink carriers is tested per Test CA configuration. Note 3: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list. Note 4: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.								

6.5.1A.3.4.2 Test procedure

Same test procedure as in clause 6.5.1A.1.4.2 with the following exceptions:

- Instead of Table 6.5.1A.1.4.1-1 → use Table 6.5.1A.3.4.1-1.
- Instead of Table 7.3A.2.5-1 → 7.3A.7.5-1.
- Instead of clause 6.5.1A.1.4.3 → use clause 6.5.1A.3.4.3.

6.5.1A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.1A.3.5 Test Requirements

The 20 frequency error Δf results per test point must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz}) \text{ for each test point}$$

where PPM refers to each CC UL frequency.

6.5.1A.4 Frequency error for CA (3UL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

-Test Configuration Table is incomplete

-The test applicability is incomplete

-The test applicability needs to be added to TS36.521-2

6.5.1A.4.1 Test purpose

This test verifies the ability of both receiver and the transmitter to processes frequency for 3UL CA correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency from the results, gained by the receiver.

6.5.1A.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support intra-band contiguous or inter-band and 3UL CA.

6.5.1A.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.1A.0.

6.5.1A.4.4 Test description

6.5.1A.4.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested inset up and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.1A.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.1A.4.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.		Low range, High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 3)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**UL Allocation**					
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
TBD	TBD	N/A	TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.55 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.5.1A.4.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.1A.4.4.3.

6.5.1A.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.1A.4.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.1A.4.4.1-1 on both PCC and SCCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Set the Downlink signal level for PCC and SCCs to the appropriate REFSENS value defined in 7.3A.2.5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the test.
6. Measure the Frequency Error on PCC and SCCs using Global In-Channel Tx-Test (Annex E) respectively. For TDD slots with transient periods are not under test.

6.5.1A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

6.5.1A.5 Test Requirements

The 20 frequency error Δf results per test point must fulfill the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz}) \text{ for each test point}$$

where PPM refers to PCC UL frequency.

6.5.1B Frequency Error for UL-MIMO

6.5.1B.1 Test purpose

This test verifies the ability of both, the receiver and the transmitter for UL-MIMO, to process frequency correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency for each transmitter connector from the results, gained by the receiver.

6.5.1B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.5.1B.3 Minimum conformance requirements

The UE modulated carrier frequency for each transmit antenna shall be accurate to within ±0.1 PPM observed over a period of one time slot (0.5ms) compared to the carrier frequency received from the E-UTRA Node B.

The normative reference for this requirement is TS 36.101 clause 6.5.1B

6.5.1B.4 Test description

6.5.1B.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.1B.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.1B.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[3]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth.						
Note 3: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.5.1B.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.1B.4.3.

6.5.1B.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.5.1B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.5.1B.4.1-1, since the UE has no payload data to send, the UE transmit uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3B.5-1. Send continuously uplink power control "up" commands to the UE in every uplink scheduling information to the UE so that the UE transmits at PUMAX level for the duration of the test.

4. Measure the Frequency Error using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE. For TDD slots with transient periods are not under test.

6.5.1B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the exceptions in clause 7.3.4.3 and Table 7.3.3-3.

6.5.1B.5 Test requirement

The requirements apply to each transmit antenna connector.

The 20 frequency error Δf results must fulfil the test requirement:

$$|\Delta f| \leq (0.1PPM+15\ Hz)$$

6.5.1C

6.5.1D Frequency Error for ProSe

6.5.1D.0 Minimum conformance requirements

The UE modulated carrier frequency for ProSe sidelink transmissions shall be accurate to within ±0.1 PPM observed over a period of one time slot (0.5 ms) compared to the carrier frequency received from the synchronization source. The synchronization source can be E-UTRA Node B or a ProSe UE transmitting sidelink synchronization signals.

When UE is configured for simultaneous E-UTRA ProSe sidelink and E-UTRA uplink transmissions for inter-band E-UTRA ProSe / E-UTRA bands specified in Table 5.2D-2, the requirements in subclause 6.5.1D.0 apply for ProSe transmission and the requirements in subclause 6.5.1 apply for uplink transmission.

The normative reference for this requirement is TS 36.101 clause 6.5.1D.

6.5.1D.1 Frequency error for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Message exceptions content needs further investigation (some values still TBD).
- Test procedure is not defined (concurrent operation with E-UTRA uplink transmissions and the communication between SS and UE are undefined).

6.5.1D.1.1 Test purpose

This test verifies the ability of both, the receiver and the transmitter for ProSe Discovery physical channels, to process frequency correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency for each transmitter connector from the results, gained by the receiver.

6.5.1D.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

6.5.1D.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.1D.0.

6.5.1D.1.4 Test description

6.5.1D.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA ProSe bands specified in table 5.4.2D.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.1D.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.6.

Table 6.5.1D.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1			Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz, Highest			
	Downlink Configuration		**Uplink Configuration**		**Sidelink Configuration (PSDCH)**	
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Mod'n	RB allocation
5MHz	QPSK	8	QPSK	8	QPSK	2
10MHz	QPSK	16	QPSK	16	QPSK	2
15MHz	QPSK	25	QPSK	25	QPSK	2
20MHz	QPSK	30	QPSK	30	QPSK	2

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.67.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 6.5.1D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 6.5.1D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is closed and UE is set to announce discovery.

6.5.1D.1.4.2 Test procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 6.5.1D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.5.1D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.1D.1.4.1-1, since the UE has no payload data to send, the UE transmit uplink MAC padding bits on the UL RMC.
5. SS transmits PDSCH to transmit the SL RMC according to Table 6.5.1D.1.4.1-1. Set the Sidelink signal level to the appropriate REFSENS value defined in Table 7.3D.1.5-1.

6. Measure the Frequency Error using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE. For TDD slots with transient periods are not under test.

6.5.1D.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 6.5.1D.1.4.3-1: ACTIVATE TEST MODE: Frequency Error for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 6.5.1D.1.4.3-2: CLOSE UE TEST LOOP: Frequency Error for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 6.5.1D.1.4.3-3: MAC-MainConfig-RBC: Frequency Error for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

6.5.1D.1.5 Test requirement

The 20 frequency error Δf results must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz})$$

6.5.1D.2 Frequency error for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Many clauses are TBD.

6.5.1D.2.1 Test purpose

This test verifies the ability of both, the receiver and the transmitter for ProSe Communication physical channels, to process frequency correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency for each transmitter connector from the results, gained by the receiver.

6.5.1D.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

6.5.1D.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.1D.0.

6.5.1D.2.4 Test description

TBD

6.5.1D.2.4.1 Initial condition

TBD

6.5.1D.2.4.2 Test procedure

TBD

6.5.1D.2.4.3 Message contents

TBD

6.5.1D.2.5 Test requirements

The 20 frequency error Δf results must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz})$$

6.5.1E Frequency Error for UE category 0

6.5.1E.1 Test purpose

Same test purpose as in clause 6.5.1.1.

6.5.1E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.5.1E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3.

6.5.1E.4 Test description

6.5.1E.4.1 Initial condition

Same initial conditions as in clause 6.5.1.4.1 with following exceptions:

- Instead of Table 6.5.1.4.1-1 → use Table 6.5.1E.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.5.1E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD and HD-FDD	TDD		FDD and HD-FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	14	14	QPSK	15	15
5MHz	QPSK	14	14	QPSK	25	25
5MHz	QPSK	14	N/A	QPSK	20	N/A
5MHz	QPSK	14	N/A	QPSK	15	N/A
10MHz	QPSK	14	14	QPSK	50	36
10MHz	QPSK	14	N/A	QPSK	25	N/A
10MHz	QPSK	14	N/A	QPSK	20	N/A
10MHz	QPSK	14	N/A	QPSK	15	N/A
15MHz	QPSK	14	14	QPSK	36	36
15MHz	QPSK	14	N/A	QPSK	36	N/A
15MHz	QPSK	14	N/A	QPSK	25	N/A
15MHz	QPSK	14	N/A	QPSK	20	N/A
20MHz	QPSK	14	14	QPSK	36	36
20MHz	QPSK	14	N/A	QPSK	36	N/A
20MHz	QPSK	14	N/A	QPSK	25	N/A
20MHz	QPSK	14	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth.						

6.5.1E.4.2 Test procedure

Same test procedure as in clause 6.5.1.4.2 with following exception for HD-FDD:

- In step 4, slots with transient periods are not under test. Half-duplex guard sub frame are not under test.

6.5.1E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the exceptions in subclause 7.3.4.3 and Table 7.3.3-3.

6.5.1E.5 Test requirement

The 20 frequency error Δf results must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz})$$

6.5.1EA Frequency Error for UE category M1

6.5.1EA.1 Test purpose

Same test purpose as in clause 6.5.1.1.

6.5.1EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.5.1EA.3 Minimum conformance requirements

For category M1 TDD UEs and FD-FDD UEs, the frequency error requirements in Clause 6.5.1.3 apply.

For category M1 HD-FDD UEs and for continuous uplink transmissions of duration ≤ 64 ms, the frequency error requirements in Clause 6.5.1.3 apply.

For category M1 HD-FDD UEs and for continuous uplink transmissions of duration > 64 ms, the UE modulated carrier frequency shall be accurate to within the limits in Table 6.5.1EA.3-1 observed over a period of one time slot (0.5 ms) compared to the carrier frequency received from the E-UTRA Node B.

Table 6.5.1EA.3-1: Frequency error requirement for HD-FDD UE category M1

Carrier frequency [GHz]	Frequency error [ppm]
≤1	±0.2
>1	±0.1

The normative reference for this requirement is TS 36.101 clause 6.5.1E

6.5.1EA.4 Test description

6.5.1EA.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.1EA.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.5.1EA.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz						
Test Parameters for Channel Bandwidths and Narrowband positions							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	Modulation	RB allocation		Modulation	RB allocation		
		FDD and HD-FDD	TDD		FDD and HD-FDD	TDD	Narrowband index[1]
5MHz	QPSK	4	4	QPSK	6	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4							

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.5.1EA.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.5.1EA.4.3.

6.5.1EA.4.2 Test procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 6.5.1EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.5.1EA.4.1-1, since the UE has no payload data to send, the UE transmit uplink MAC padding bits on the UL RMC
3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3EA-1. Send continuously uplink power control "up" commands to the UE in every uplink scheduling information to the UE so that the UE transmits at P_{UMAX} level for the duration of the test.
4. Measure the Frequency Error using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency. For TDD and HDD-FD slots with transient periods are not under test. Half-duplex guard sub frame are not under test

6.5.1EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA and the exceptions in subclause 7.3EA.4.3.

6.5.1EA.5 Test requirement

The 20 frequency error Δf results must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz})$$

6.5.1EA_1 Frequency Error for UE category M1 (CEmodeB)

6.5.1EA_1.1 Test purpose

Same test purpose as in clause 6.5.1.1.

6.5.1EA_1.2 Test applicability

This test case applies to all types of E-UTRA HD-FDD UE release 13 and forward of UE category M1 that support operating in CEmodeB.

6.5.1EA_1.3 Minimum conformance requirements

For category M1 TDD UEs and FD-FDD UEs, the frequency error requirements in Clause 6.5.1.3 apply.

For category M1 HD-FDD UEs and for continuous uplink transmissions of duration ≤ 64 ms, the frequency error requirements in Clause 6.5.1.3 apply.

For category M1 HD-FDD UEs and for continuous uplink transmissions of duration > 64 ms, the UE modulated carrier frequency shall be accurate to within the limits in Table 6.5.1EA_1.3-1 observed over a period of one time slot (0.5 ms) compared to the carrier frequency received from the E-UTRA Node B.

Table 6.5.1EA_1.3-1: Frequency error requirement for HD-FDD UE category M1

Carrier frequency [GHz]	Frequency error [ppm]
≤1	±0.2
>1	±0.1

The normative reference for this requirement is TS 36.101 clause 6.5.1E

6.5.1EA_1.4 Test description

6.5.1EA_1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.1EA_1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.5.1EA_1.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration		**Uplink Configuration**		
Ch BW	Modulation	RB allocation	Modulation	RB allocation	
		HD-FDD		HD-FDD	Narrowband index[1]
5MHz	QPSK	4	QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4					

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 6.5.1EA_1.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.5.1EA_1.4.3.

6.5.1EA_1.4.2 Test procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 6.5.1EA_1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.5.1EA_1.4.1-1, since the UE has no payload data to send, the UE transmit uplink MAC padding bits on the UL RMC

3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3EA-1. Send continuously uplink power control "up" commands to the UE in every uplink scheduling information to the UE so that the UE transmits at P_{UMAX} level for the duration of the test.

4. Measure the Frequency Error using Global In-Channel Tx-Test (Annex E). The acquired frame for Frequency Error measurement starts at 2020ms after the start of the first scheduled PUSCH subframe (Note 1).

Note 1: 2020ms is the start of the last UL frame before the last UL compensation gap within the PUSCH repetition period of 2048ms. The same frame for measuring of Frequency Error applies irrespective of the UL compensation gap existence. UL compensation gaps exist if the UE capability, ue-CE-NeedULGaps-r13, is true. See 36.211 [8], clause 5.3.4 for UL compensating gap timing for CEmodeB UEs.

6.5.1EA_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA and the exceptions in subclause 7.3EA.4.3, Table 7.3EA.3-3 and:

Table 6.5.1EA_1.4.3-1: PUSCH-ConfigCommon-v1310-DEFAULT

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-10A PUSCH-ConfigCommon-v1310-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigCommon-v1310-DEFAULT ::= SEQUENCE {			
pusch-maxNumRepetitionCEmodeB-r13	r2048	Set to maximum value for CE Mode B	CEmodeB
}			

6.5.1EA_1.5 Test requirement

The 20 frequency error Δf results must fulfil the test requirement:

Carrier frequency [GHz]	Frequency error |Δf| [Hz]
≤1	≤ (0.2ppm + 15 Hz)
>1	≤ (0.1ppm + 15 Hz)

6.5.1F Frequency Error for category NB1

6.5.1F.1 Test purpose

This test verifies the ability of both, the receiver and the transmitter, to process frequency correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency from the results, gained by the receiver.

6.5.1F.2 Test applicability

This test case applies to all types of E-UTRA release 13 and forward of category NB1.

6.5.1F.3 Minimum conformance requirements

For UE category NB1, the UE modulated carrier frequency shall be accurate to within the following limits

Table 6.5.1F.3-1: Frequency error requirement for UE category NB1

Carrier frequency [GHz]	Frequency error [ppm]
≤1	±0.2
>1	±0.1

Observed over a period of one time slot (0.5 ms for 15 kHz sub-carrier spacing and 2 ms excluding the 2304Ts gap for 3.75 kHz sub-carrier spacing) and averaged over $72/L_{Ctones}$ slots (where L_{Ctones} = {1, 3, 6, 12} is the number of sub-carriers used for the transmission), compared to the carrier frequency received from the E-UTRA Node B.

The normative reference for this requirement is TS 36.101 clause 6.5.1F.

6.5.1F.4 Test description

6.5.1F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA bands defined for NB-IOT in clause 5.2F. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.1F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.5.1F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
		Modulation	N_{tones}	Subcarrier spacing
1		QPSK	1@0	3.75
2		QPSK	1@0	15
3 (Note 1)		QPSK	3@0	15
4 (Note 1)		QPSK	6@0	15
5 (Note 1)		QPSK	12@0	15
Note 1: Applicable to UE supporting UL multi-tone transmissions				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex [H.1 and H.3.0].
4. The UL Reference Measurement channel is set according to Table 6.5.1F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.5.1F.4.3.

6.5.1F.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.5.1F.4.1-1, since the UE has no payload data to send, the UE transmit uplink MAC padding bits on the UL RMC. (UE should be already transmitting P_{UMAX} after Initial Conditions setting).

2. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3F.1.5-1. For the DL signal, Narrowband IoT OCNG pattern 1 in Annex A.5.3.1 is used.

3. Measure the Frequency Error using Global In-Channel Tx-Test (Annex E).

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.5.1F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.5.1F.5 Test requirement

The 20 frequency error Δf results must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz}) \text{ (Carrier frequency } > 1 \text{ GHz)}$$

$$|\Delta f| \leq (0.2 \text{ PPM} + 15 \text{ Hz}) \text{ (Carrier frequency } \leq 1 \text{ GHz)}$$

6.5.1G Frequency Error for V2X Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The test mode of Side link [5A-V2X] is FFS;

6.5.1G.1 Frequency Error for V2X Communication / Non-concurrent with E-UTRA uplink transmission

6.5.1G.1.1 Test purpose

This test verifies the ability of both, the receiver and the transmitter, to process frequency correctly.

Receiver: to extract the correct frequency from the stimulus signal, offered by the System simulator, under ideal propagation conditions and low level.

Transmitter: to derive the correct modulated carrier frequency from the results, gained by the receiver.

6.5.1G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X sidelink communication.

6.5.1G.1.3 Minimum Conformance Requirements

The UE modulated carrier frequency for V2X sidelink transmissions shall be accurate to within ±0.1 PPM observed over a period of one time slot (0.5 ms) compared to the absolute frequency in case of using GNSS synchronization source. The same requirements applied over a period of one time slot (0.5 ms) compared to the relative frequency in case of using the E-UTRA Node B or V2X UE sidelink synchronization signals.

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, the requirements in TS 36.101 subclause 6.5.1G apply for

V2X sidelink transmission and the requirements in TS 36.101 subclause 6.5.1 apply for the E-UTRA uplink transmission.

The normative reference for this requirement is TS 36.101 clause 6.5.1G

6.5.1G.1.4 Test description

6.5.1G.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.1G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3 and reference GNSS configuration as defined in Table C.2-8.

Table 6.5.1G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS and GNSS simulator to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [A.89].
2. The parameter settings for the V2X sidelink transmission over PC5 for both SS and UE are pre-configured according to TS 36.508 [7] subclause 4.10.1. Message content exceptions are defined in clause 6.5.1G.1.4.3.
3. The V2X reference measurement channel is set according to Table 6.5.1G.1.4.1-1.
4. The GNSS reference signal power level is set according to [Annex I.6.1].
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in [State 5A-V2X] according to TS 36.508 [7] clause [4.5.9].

6.5.1G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. The UE transmits at P_{UMAX} level according to pre-configured parameters for the duration of the test.
3. Measure the Frequency Error using Global In-Channel Tx-Test (Annex E).

6.5.1G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.7.A and 4.10 with following exceptions.

Table 6.5.1G.1.4.3-1: +CCUTLE (Initial condition)

Derivation Path: 36.508 Table 4.7A-16: +CCUTLE			
Field	**Value/remark**	**Comment**	**Condition**
+CATM=			
<status>	1		Close
<direction>	1		Transmit

6.5.1G.1.5 Test requirement

The 20 frequency error Δf results must fulfil the test requirement:

$$|\Delta f| \leq (0.1 \text{ PPM} + 15 \text{ Hz})$$

6.5.2 Transmit modulation

Transmit modulation defines the modulation quality for expected in-channel RF transmissions from the UE. This transmit modulation limit is specified in terms of:

- Error Vector Magnitude (EVM) for the allocated resources blocks (RB),
- EVM equalizer spectrum flatness derived from the equalizer coefficients generated by the EVM measurement process
- Carrier leakage

In-band emissions for the non-allocated RB

6.5.2.1 Error Vector Magnitude (EVM)

6.5.2.1.1 Test Purpose

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Before calculating the EVM the measured waveform is corrected by the sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM.

The measured waveform is further modified by selecting the absolute phase and absolute amplitude of the Tx chain. The EVM result is defined after the front-end IDFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %.

The basic EVM measurement interval in the time domain is one preamble sequence for the PRACH and is one slot for the PUCCH and PUSCH in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the EVM measurement interval is reduced by one symbol, accordingly. The PUSCH or PUCCH EVM measurement interval is also reduced when the mean power, modulation or allocation between slots is expected to change. In the case of PUSCH transmission, the measurement interval is reduced by a time interval equal to the sum of 5 μs and the applicable exclusion period defined in subclause 6.3.4, adjacent to the boundary where the power change is expected to occur. The PUSCH exclusion period is applied to the signal obtained after the front-end IDFT. In the case of PUCCH transmission, the PUCCH EVM measurement interval is reduced by one symbol adjacent to the slot boundary.

6.5.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.5.2.1.3 Minimum conformance requirements

EVM measurements are evaluated for 10 uplink sub-frames excluding any transient period for the average EVM case, and 60 subframes excluding any transient period for the reference signal EVM case, the different modulations schemes shall not exceed the values specified in Table 6.5.2.1.3-1 for the parameters defined in Table 6.5.2.1.3-2. For EVM

evaluation purposes, [all PRACH preamble formats 0-4 and] all PUCCH formats 1, 1a, 1b, 2, 2a and 2b are considered to have the same EVM requirement as QPSK modulated.

Table 6.5.2.1.3-1: Minimum requirements for Error Vector Magnitude

Parameter	Unit	Average EVM Level	Reference Signal EVM Level
QPSK or BPSK	%	17.5	17.5
16QAM	%	12.5	12.5

Table 6.5.2.1.3-2: Parameters for Error Vector Magnitude

Parameter	Unit	Level
UE Output Power	dBm	≥ -40
Operating conditions		Normal conditions

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2.1.1.

6.5.2.1.4 Test description

6.5.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2.1.4.1-1: Test Configuration Table for PUSCH

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		**NC**		
Test Frequencies **(as specified in TS36.508 [7] subclause 4.3.1)**		**See Table 6.5.1.4.1-1**		
Test Channel Bandwidths **(as specified in TS 36.508 [7] subclause 4.3.1)**		**See Table 6.5.1.4.1-1**		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for PUSCH EVM testing	Modulation	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
1.4MHz		QPSK	1	1
1.4MHz		16QAM	6	6
1.4MHz		16QAM	1	1
3MHz		QPSK	15	15
3MHz		QPSK	4	4
3MHz		16QAM	15	15
3MHz		16QAM	4	4
5MHz		QPSK	25	25
5MHz		QPSK	8	8
5MHz		16QAM	25	25
5MHz		16QAM	8	8
10MHz		QPSK	50	50
10MHz		QPSK	12	12
10MHz		16QAM	50 (Note 3)	50 (Note 3)
10MHz		16QAM	12	12
15MHz		QPSK	75	75
15MHz		QPSK	16	16
15MHz		16QAM	75 (Note 3)	75 (Note 3)
15MHz		16QAM	16	16
20MHz		QPSK	100	100
20MHz		QPSK	18	18
20MHz		16QAM	100 (Note 3)	100 (Note 3)
20MHz		16QAM	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2

Table 6.5.2.1.4.1-2: Test Configuration Table for PUCCH

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	NC			
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**	See Table 6.5.1.4.1-1			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	See Table 6.5.1.4.1-1			
Test Parameters for Channel Bandwidths				
	Downlink Configuration			**Uplink Configuration**
Ch BW	Mod'n	RB allocation		FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a / 1b
		FDD	TDD	
1.4MHz	QPSK	3	3	
3MHz	QPSK	4	4	
5MHz	QPSK	8	8	
10MHz	QPSK	16	16	
15MHz	QPSK	25	25	
20MHz	QPSK	30	30	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

Table 6.5.2.1.4.1-3: Test Configuration for PRACH

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1	
PRACH preamble format		
	FDD	TDD
PRACH Configuration Index	4	53
RS EPRE setting for test point 1 (dBm/15kHz)	-71	-63
RS EPRE setting for test point 2 (dBm/15kHz)	-86	-78

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.1.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2.1.4.3.

6.5.2.1.4.2 Test procedure

Test procedure for PUSCH:

1.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

1.2 Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at $P_{UMAX\ level}$.

1.3 Measure the EVM and $\overline{EVM}_{DMRS}$ using Global In-Channel Tx-Test (Annex E).

1.4 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is –36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.5 Measure the EVM and $\overline{EVM}_{DMRS}$ using Global In-Channel Tx-Test (Annex E).

Test procedure for PUCCH:

2.1 PUCCH are set according to Table 6.5.2.1.4.1-2.

2.2 SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.5.2.1.4.1-2. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. There is no PUSCH transmission.

2.3 SS send appropriate TPC commands for PUCCH to the UE until the UE transmit PUCCH at P_{UMAX} level.

2.4 Measure PUCCH EVM using Global In-Channel Tx-Test (Annex E).

2.5 Send the appropriate TPC commands for PUCCH to the UE until the UE transmits PUCCH at -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.6 Measure PUCCH EVM using Global In-Channel Tx-Test (Annex E).

Test procedure for PRACH:

3.1 The SS shall set RS EPRE according to Table 6.5.2.1.4.1-3.

3.2 PRACH is set according to Table 6.5.2.1.4.1-3.

3.3 The SS shall signal a Random Access Preamble ID via a PDCCH order to the UE and initiate a Non-contention based Random Access procedure

3.4 The UE shall send the signalled preamble to the SS.

3.5 In response to the preamble, the SS shall transmit a random access response not corresponding to the transmitted random access preamble, or send no response.

3.6 The UE shall consider the random access response reception not successful then re-transmit the preamble with the calculated PRACH transmission power.

3.7 Repeat step 5 and 6 until the SS collect enough PRACH preambles (2 preambles for format 0 and 10 preambles for format 4). Measure the EVM in PRACH channel using Global In-Channel Tx-Test (Annex E).

6.5.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.5.2.1.4.3-1: *PRACH-ConfCommonDEFAULT*: PRACH EVM measurement for FDD

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-7 PRACH-ConfCommonDEFAULT			
Information Element	Value/remark	Comment	Condition
PRACH-ConfigInfo SEQUENCE {			
prach-ConfigIndex	4		

Table 6.5.2.1.4.3-2: *PRACH-ConfCommonDEFAULT*: PRACH EVM measurement for TDD

Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-1 PRACH-ConfCommonDEFAULT			
Information Element	Value/remark	Comment	Condition
PRACH-ConfigInfo SEQUENCE {			
prach-ConfigIndex	53		

Table 6.5.2.1.4.3-4: *RACH-ConfigCommon-DEFAULT:* PRACH EVM measurement

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-12 RACH-ConfigCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RACH-ConfigCommon-DEFAULT ::= SEQUENCE {			
preambleInfo SEQUENCE {			
numberOfRA-Preambles	n52		
preamblesGroupAConfig SEQUENCE {}	Not present		
}			
powerRampingParameters SEQUENCE {			
powerRampingStep	dB0		
preambleInitialReceivedTargetPower	dBm-120 Test point 1 dBm-90 Test point 2		
}			
ra-SupervisionInfo SEQUENCE {			
preambleTransMax	n10		FDD
	n20		TDD
ra-ResponseWindowSize	Sf10		
mac-ContentionResolutionTimer	sf48		
}			
ra-SupervisionInfo SEQUENCE {			

Table 6.5.2.1.4.3-5: *TDD-Config-DEFAULT:* PRACH EVM measurement for TDD

Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-1: TDD-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.5.2.1.5 Test requirement

The PUSCH EVM derived in E.4.2 shall not exceed 17,5 % for QPSK and BPSK, 12,5% for 16 QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in E.4.6.2 shall not exceed 17,5 % when embedded with data symbols of QPSK and BPSK, 12,5% for 16 QAM.

The PUCCH EVM and derived in E.5.9.2 shall not exceed 17,5 %.

The PRACH EVM derived in FFS shall not exceed 17.5%.

6.5.2.1_1 Error Vector Magnitude (EVM) for UL 64QAM

6.5.2.1_1.1 Test Purpose

Same test purpose as in clause 6.5.2.1.1

6.5.2.1_1.2 Test applicability

This test applies to E-UTRA UE from release 13 and forward that support UL 64QAM.

6.5.2.1_1.3 Minimum conformance requirements

The RMS average of the basic EVM measurements for 10 sub-frames excluding any transient period for the average EVM case, and 60 sub-frames excluding any transient period for the reference signal EVM case, for 64QAM shall not exceed the value specified in Table 6.5.2.1_1.3-1 for the parameters defined in Table 6.5.2.1_1.3-2.

Table 6.5.2.1_1.3-1: Minimum requirements for Error Vector Magnitude

Parameter	Unit	Average EVM Level	Reference Signal EVM Level
64QAM	%	8	8

Table 6.5.2.1_1.3-2: Parameters for Error Vector Magnitude

Parameter	Unit	Level
UE Output Power	dBm	≥ -40
Operating conditions		Normal conditions

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2.1.1.

6.5.2.1_1.4 Test description

6.5.2.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.1_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2.1_1.4.1-1: Test Configuration Table for PUSCH

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for PUSCH EVM testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		64QAM	6	6
1.4MHz		64QAM	1	1
3MHz		64QAM	15	15
3MHz		64QAM	4	4
5MHz		64QAM	25	25
5MHz		64QAM	8	8
10MHz		64QAM	50	50
10MHz		64QAM	12	12
15MHz		64QAM	75	75
15MHz		64QAM	16	16
20MHz		64QAM	100	100
20MHz		64QAM	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.				

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.1_1.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2.1_1.4.3.

6.5.2.1_1.4.2 Test procedure

Same test procedure as in clause 6.5.2.1.4.2

6.5.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6

6.5.2.1_1.5 Test requirement

The PUSCH EVM derived in E.4.2 shall not exceed 8% for 64QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in E.4.6.2 shall not exceed 8% for 64QAM.

6.5.2.1A PUSCH-EVM with exclusion period

6.5.2.1A.1 Test purpose

To verify the ability of the UE transmitter to keep the EVM minimum requirements, even in the presence of transients according to subclause 6.5.2.1.1 third paragraph:

In the case of PUSCH transmission, the measurement interval is reduced by a time interval equal to the sum of 5 μs and the applicable exclusion period defined in subclause 6.3.4, adjacent to the boundary where the power change is expected to occur. The PUSCH exclusion period is applied to the signal obtained after the front-end IDFT.

6.5.2.1A.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

6.5.2.1A.3 Minimum conformance requirement

EVM measurements are evaluated for 10 uplink sub-frames in a reduced time interval due to exclusion periods for the average EVM. The different modulations schemes shall not exceed the values specified in Table 6.5.2.1.3-1 for the parameters defined in Table 6.5.2.1.3-2.

6.5.2.1A.4 Test description

6.5.2.1A.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.1A.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2.1A.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal Conditions			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	10 MHz			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A	Mod'n	RB allocation	
			FDD	TDD
10MHz		QPSK	Alternating 12 and 1 (as shown in Figure 6.5.2.1A.4.2-1)	Alternating 12 and 1 (as shown in Figure 6.5.2.1A.4.2-1)
10MHz		16 QAM	Alternating 12 and 1 (as shown in Figure 6.5.2.1A.4.2-1)	Alternating 12 and 1 (as shown in Figure 6.5.2.1A.4.2-1)

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to table 6.5.2.1A.4.1-1

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.3.5.2.4.3.

6.5.2.1A.4.2 Test procedure

The test pattern is illustrated in figure 6.5.2.1A.4.2-1.

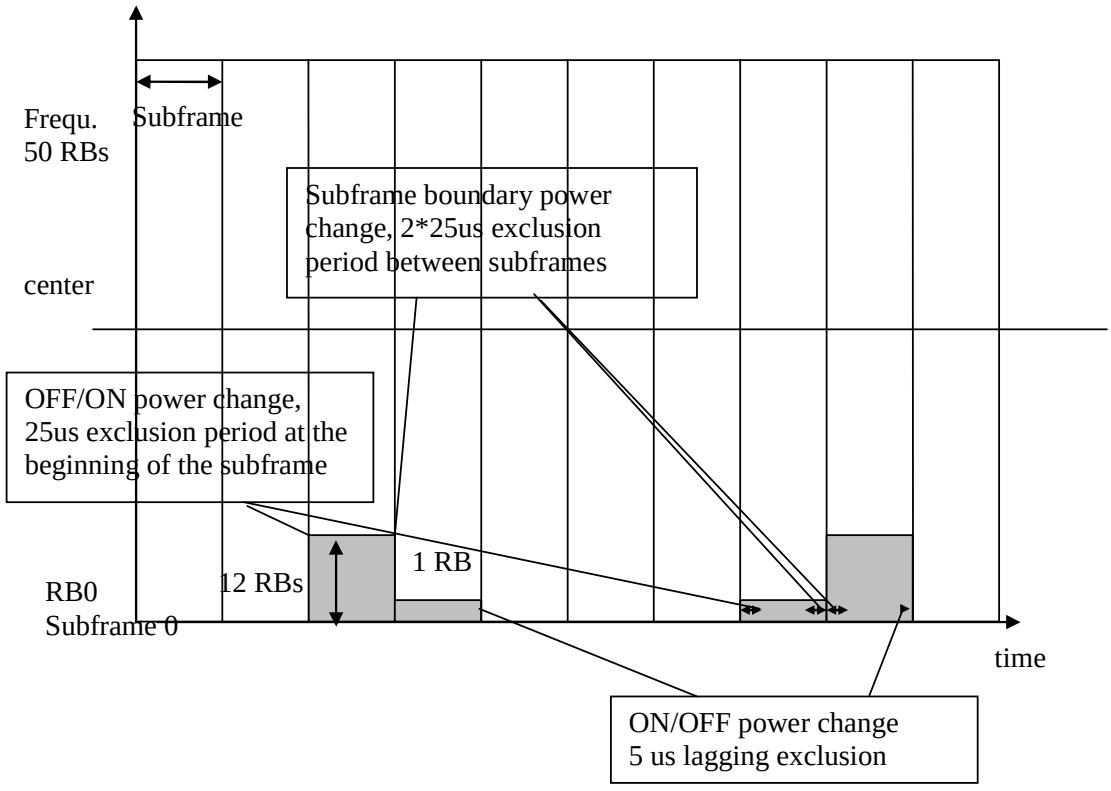


Figure 6.5.2.1A.4.2-1: Test pattern

NOTE 1: In TDD the free subframes are special subframes or DL, in FDD the free subframes are OFF.

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH... Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. The initial uplink RB allocation is 12. Send appropriate TPC commands for PUSCH to the UE to ensure the UE transmits PUSCH at 0dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or 0dBm ±3.5 dB for carrier frequency 3.0GHz $< f \leq$ 4.2GHz.

2. Schedule the UE's PUSCH data transmission as described in Figure 6.5.2.1A.4.2-1 for 16[1)] active time slots with an uplink RB allocation alternating pattern as described in table 6.5.2.1A.4.1-1 while transmitting 0dB TPC command for PUSCH via the PDCCH.

3. Measure the EVM using Global In-Channel Tx-Test. The averaging across 16[1)] timeslots is done across mixed RB allocations, as illustrated in Figure 6.5.2.1A.4.2-1

NOTE 2: Averaging across 16 timeslots is used to represent each type of transition equally in the average.

6.5.2.1A.5 Test requirement

The PUSCH EVM derived in Annex E.4.2 taking into account Annex E.7 shall not exceed 17,5 % for QPSK and 12,5% for 16 QAM. The test requirements shall be fulfilled for early and late EVM window.

6.5.2.1E Error Vector Magnitude (EVM) for UE category 0

6.5.2.1E.1 Error Vector Magnitude (EVM) for UE category 0

6.5.2.1E.1.1 Test Purpose

Same test purpose as in clause 6.5.2.1.1.

6.5.2.1E.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.5.2.1E.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.1.3.

6.5.2.1E.1.4 Test description

6.5.2.1E.1.4.1 Initial conditions

Same initial conditions as in clause 6.5.2.1.4.1 with following exceptions:

- Instead of Table 6.5.2.1.4.1-1 to Table 6.5.2.1.4.1-3 → use Table 6.5.2.1E.4.1-1 to Table 6.5.2.1E.4.1-3.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.5.2.1E.1.4.1-1: Test Configuration Table for PUSCH

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		**NC**		
Test Frequencies **(as specified in TS36.508 [7] subclause 4.3.1)**		**See Table 6.5.1.4.1-1**		
Test Channel Bandwidths **(as specified in TS 36.508 [7] subclause 4.3.1)**		**See Table 6.5.1.4.1-1**		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for PUSCH EVM testing	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	6	6
1.4MHz		QPSK	1	1
1.4MHz		16QAM	5	5
1.4MHz		16QAM	1	1
3MHz		QPSK	15	15
3MHz		QPSK	4	4
3MHz		16QAM	5	5
3MHz		16QAM	4	4
5MHz		QPSK	25	25
5MHz		QPSK	8	8
5MHz		16QAM	5	5
10MHz		QPSK	36	36
10MHz		QPSK	12	12
10MHz		16QAM	5	5
15MHz		QPSK	36	36
15MHz		QPSK	16	16
15MHz		16QAM	5	5
20MHz		QPSK	36	36
20MHz		QPSK	18	18
20MHz		16QAM	5	5
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.				

Table 6.5.2.1E.1.4.1-2: Test Configuration Table for PUCCH

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1		NC		
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**		See Table 6.5.1.4.1-1		
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration		**Uplink Configuration**	
Ch BW	Mod'n	RB allocation		FDD and HD-FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a / 1b
		FDD	TDD	
1.4MHz	QPSK	3	3	
3MHz	QPSK	4	4	
5MHz	QPSK	8	8	
10MHz	QPSK	14	14	
15MHz	QPSK	14	14	
20MHz	QPSK	14	14	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

Table 6.5.2.1E.1.4.1-3: Test Configuration for PRACH

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1	
PRACH preamble format		
	FDD and HD-FDD	TDD
PRACH Configuration Index	4	53
RS EPRE setting for test point 1 (dBm/15kHz)	-71	-63
RS EPRE setting for test point 2 (dBm/15kHz)	-86	-78

6.5.2.1E.1.4.2 Test procedure

Same test procedure as in clause 6.5.2.1E.1.4.2.

6.5.2.1E.1.4.3 Message contents

Same message contents as in clause 6.5.2.1E.1.4.3.

6.5.2.1E.1.5 Test requirement

The PUSCH EVM derived in E.4.2 shall not exceed 17,5 % for QPSK and BPSK, 12,5% for 16 QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in E.4.6.2 shall not exceed [17,5 %] when embedded with data symbols of QPSK and BPSK, [12,5%] for 16 QAM.

The PUCCH EVM and derived in E.5.9.2 shall not exceed 17,5 %.

The PRACH EVM derived in FFS shall not exceed 17.5%.

6.5.2.1E.2 PUSCH-EVM with exclusion period for UE category 0

6.5.2.1E.2.1 Test purpose

Same test purpose as in clause 6.5.2.1A.1

6.5.2.1E.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.5.2.1E.2.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.5.2.1A.3

6.5.2.1E.2.4 Test description

6.5.2.1E.2.4.1 Initial conditions

Same initial conditions as in clause 6.5.2.1.2.4.1 with following exceptions for HD-FDD:

- Instead of Table 6.5.2.1.2.4.1-1 → use Table 6.5.2.1E.2.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.5.2.1E.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal Conditions			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	10 MHz			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
10MHz		QPSK	Alternating 12 and 1 (as shown in Figure 6.5.2.1E.2.4.2-1)	Alternating 12 and 1 (as shown in Figure 6.5.2.1E.2.4.2-1)
10MHz		16 QAM	Alternating 5 and 1 (as shown in Figure 6.5.2.1E.2.4.2-1)	Alternating 5 and 1 (as shown in Figure 6.5.2.1E.2.4.2-1)

6.5.2.1E.2.4.2 Test procedure

The test pattern is illustrated in figure 6.5.2.1E.2.4.2-1.

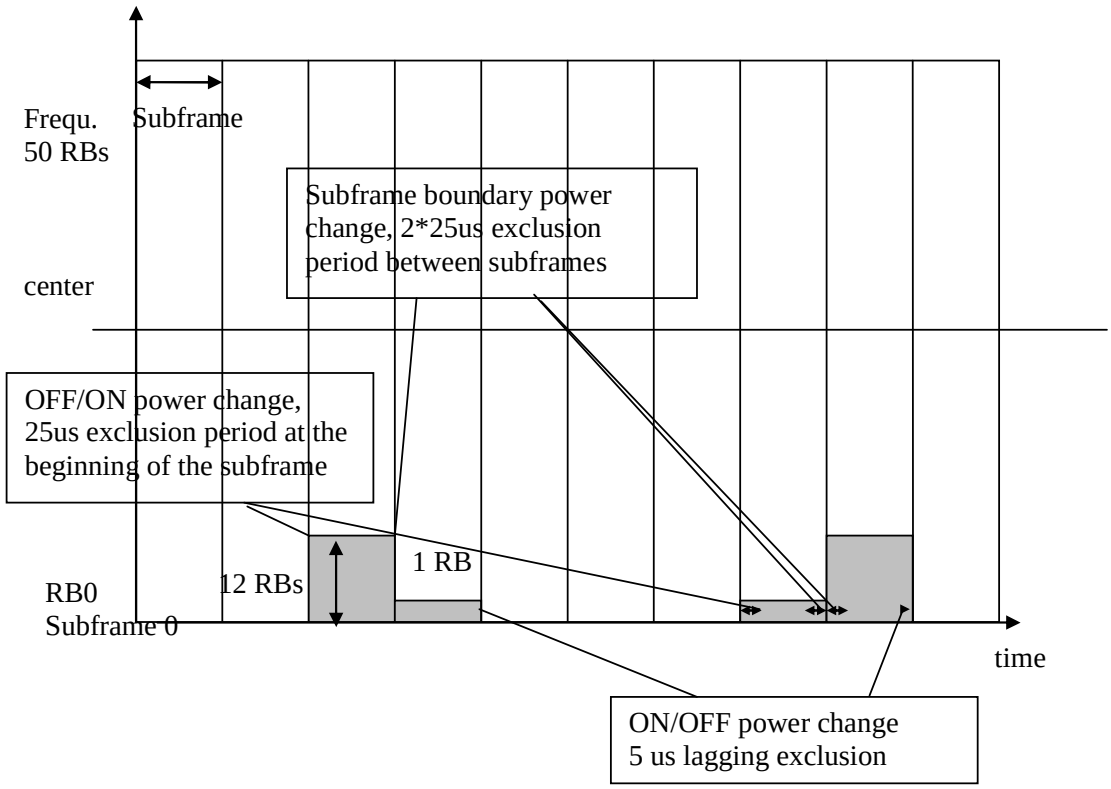


Figure 6.5.2.1E.2.4.2-1: Test pattern

NOTE 1: In TDD the free subframes are special subframes or DL, in FDD the free subframes are OFF.

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the PUSCH... Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. The initial uplink RB allocation is 12 or 5. Send appropriate TPC commands for PUSCH to the UE to ensure the UE transmits PUSCH at 0dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or 0dBm ±3.5 dB for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

2. Schedule the UE's PUSCH data transmission as described in Figure 6.5.2.1E.2.4.2-1 for 16[1)] active time slots with an uplink RB allocation alternating pattern as described in table 6.5.2.1E.2.4.1-1 while transmitting 0dB TPC command for PUSCH via the PDCCH.

3. Measure the EVM using Global In-Channel Tx-Test. The averaging across 16[1)] timeslots is done across mixed RB allocations, as illustrated in Figure 6.5.2.1E.2.4.2-1

NOTE 2: Averaging across 16 timeslots is used to represent each type of transition equally in the average.

6.5.2.1E.2.5 Test requirement

The PUSCH EVM derived in Annex E.4.2 taking into account Annex E.7 shall not exceed 17,5 % for QPSK and 12,5% for 16 QAM. The test requirements shall be fulfilled for early and late EVM window.

6.5.2.1EA Error Vector Magnitude (EVM) for UE category M1

6.5.2.1EA.1 Error Vector Magnitude (EVM) for UE category M1

6.5.2.1EA.1.1 Test Purpose

Same test purpose as in clause 6.5.2.1.1.

6.5.2.1EA.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.5.2.1EA.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.1.3.

6.5.2.1EA.1.4 Test description

6.5.2.1EA.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands . All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.1EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.5.2.1EA.1.4.1-1: Test Configuration Table for PUSCH

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC			
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		Low range, Mid range, High range			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		5MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for PUSCH EVM testing	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowb and index[1]
5MHz		QPSK	6	6	0
5MHz		QPSK	1 (Note 3), 3 (Note 4)	1 (Note 3), 3 (Note 4)	0
5MHz		16QAM	5	5	0
5MHz		16QAM	1 (Note 3), 3 (Note 4)	1 (Note 3), 3 (Note 4)	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (6 - RB allocation) of the channel bandwidth. Note 3: Only applicable for Power class 3 Note 4: Only applicable for Power class 5					

Table 6.5.2.1EA.1.4.1-2: Test Configuration Table for PUCCH

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1	NC				
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**	Low range, Mid range, High range				
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	5MHz				
Test Parameters for Channel Bandwidths					
	Downlink Configuration				**Uplink Configuration**
Ch BW	Mod'n	RB allocation			FDD and HD-FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a / 1b
		FDD	TDD	Narrowband index[2]	
5MHz	QPSK	4	4	0	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4. Note 3: The RB_{start} of partial RB allocation can be either RB#0 or RB# (6 - RB allocation) of the narrowband.					

Table 6.5.2.1EA.1.4.1-3: Test Configuration for PRACH

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	Low range, Mid range, High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 15MHz	
PRACH preamble format		
	FDD and HD-FDD	TDD
PRACH Configuration Index	4	53
RS EPRE setting for test point 1 (dBm/15kHz)	-71	-63
RS EPRE setting for test point 2 (dBm/15kHz)	-86	-78

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.1EA.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.5.2.1EA.4.3.

6.5.2.1EA.1.4.2 Test procedure

Test procedure for PUSCH:

1.1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.5.2.1EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

1.2 Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at $P_{UMAX\ level}$.

1.3 Measure the EVM and $\overline{EVM}_{DMRS}$ using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

1.4 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is –36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.5 Measure the EVM and $\overline{EVM}_{DMRS}$ using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

Test procedure for PUCCH:

2.1 PUCCH are set according to Table 6.5.2.1EA.4.1-2.

2.2 SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 6.5.2.1EA.4.1-2. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. There is no PUSCH transmission.

2.3 SS send appropriate TPC commands for PUCCH to the UE until the UE transmit PUCCH at P_{UMAX} level.

2.4 Measure PUCCH EVM using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

2.5 Send the appropriate TPC commands for PUCCH to the UE until the UE transmits PUCCH at -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.6 Measure PUCCH EVM using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

Test procedure for PRACH:

3.1 The SS shall set RS EPRE according to Table 6.5.2.1EA.4.1-3.

3.2 PRACH is set according to Table 6.5.2.1EA.4.1-3.

3.3 The SS shall signal a Random Access Preamble ID via a MPDCCH order to the UE and initiate a Non-contention based Random Access procedure

3.4 The UE shall send the signalled preamble to the SS.

3.5 In response to the preamble, the SS shall transmit a random access response not corresponding to the transmitted random access preamble, or send no response.

3.6 The UE shall consider the random access response reception not successful then re-transmit the preamble with the calculated PRACH transmission power.

3.7 Repeat step 5 and 6 until the SS collect enough PRACH preambles (2 preambles for format 0 and 10 preambles for format 4). Measure the EVM in PRACH channel using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

6.5.2.1EA.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA and the following exceptions:

Table 6.5.2.1EA.4.3-1: *PRACH-Config-DEFAULT*: PRACH EVM measurement for FDD

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-7 PRACH-Config-DEFAULT			
Information Element	Value/remark	Comment	Condition
PRACH-ConfigInfo SEQUENCE {			
prach-ConfigIndex	4		

Table 6.5.2.1EA.4.3-2: *PRACH-ConfCommonDEFAULT*: PRACH EVM measurement for TDD

Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-3 PRACH-Config-DEFAULT			
Information Element	Value/remark	Comment	Condition
PRACH-ConfigInfo SEQUENCE {			
prach-ConfigIndex	53		

Table 6.5.2.1EA.4.3-4: *RACH-ConfigCommon-DEFAULT:* PRACH EVM measurement

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-12 RACH-ConfigCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RACH-ConfigCommon-DEFAULT ::= SEQUENCE {			
preambleInfo SEQUENCE {			
numberOfRA-Preambles	n52		
preamblesGroupAConfig SEQUENCE {}	Not present		
}			
powerRampingParameters SEQUENCE {			
powerRampingStep	dB0		
preambleInitialReceivedTargetPower	dBm-120 Test point 1 dBm-90 Test point 2		
}			
ra-SupervisionInfo SEQUENCE {			
preambleTransMax	n10		FDD
	n20		TDD
ra-ResponseWindowSize	Sf10		
mac-ContentionResolutionTimer	sf48		
}			
ra-SupervisionInfo SEQUENCE {			

Table 6.5.2.1EA.4.3-5: *TDD-Config-DEFAULT:* PRACH EVM measurement for TDD

Derivation Path: TS 36.508 [7] clause 5.3.1, Table 5.3.1-1: TDD-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp5	To enable two symbol UpPTS, and to have 9 symbols GP.	
}			

6.5.2.1EA.1.5 Test requirement

The PUSCH EVM derived in E.4.2 shall not exceed 17,5 % for QPSK and BPSK, 12,5% for 16 QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in E.4.6.2 shall not exceed [17,5 %] when embedded with data symbols of QPSK and BPSK, [12,5%] for 16 QAM.

The PUCCH EVM and derived in E.5.9.2 shall not exceed 17,5 %.

The PRACH EVM derived in FFS shall not exceed 17.5%.

6.5.2.1EA.2 PUSCH-EVM with exclusion period for UE category M1

6.5.2.1EA.2.1 Test purpose

Same test purpose as in clause 6.5.2.1A.1

6.5.2.1EA.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.5.2.1EA.2.3 Minimum conformance requirement

Same minimum conformance requirements as in clause 6.5.2.1A.3

6.5.2.1EA.2.4 Test description

6.5.2.1EA.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.1EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.5.2.1EA.2.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal Conditions				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
5MHz		QPSK	Alternating 6 and 1 (as shown in Figure 6.5.2.1EA.2.4.2-1) and 6.5.2.1EA.2.4.2-2	Alternating 6 and 1 (as shown in Figure 6.5.2.1EA.2.4.2-1)	0
5MHz		16 QAM	Alternating 5 and 1 (as shown in Figure 6.5.2.1EA.2.4.2-1) and 6.5.2.1EA.2.4.2-2	Alternating 5 and 1 (as shown in Figure 6.5.2.1EA.2.4.2-1)	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4					

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.1EA.4.1-1.
5. Propagation conditions are set according to Annex B.0

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.5.2.1EA.4.3.

6.5.2.1EA.2.4.2 Test procedure

The test pattern is illustrated in figure 6.5.2.1EA.2.4.2-1 and 6.5.2.1EA.2.4.2-2.

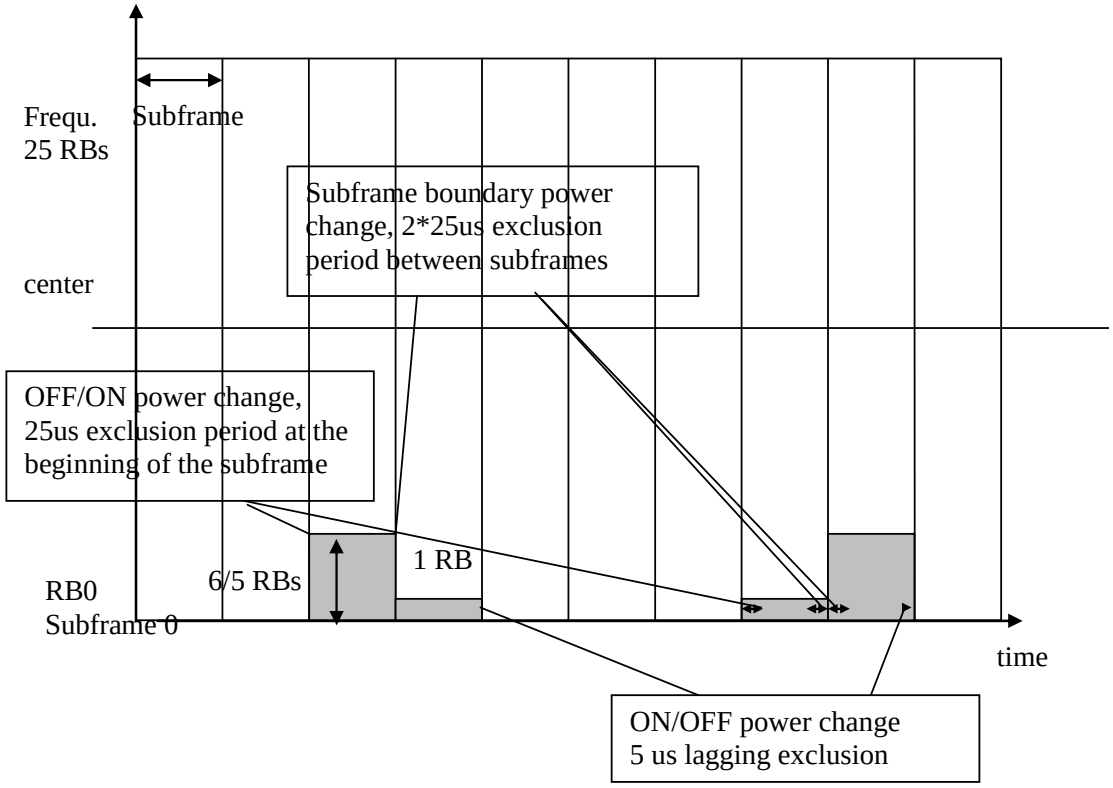


Figure 6.5.2.1EA.2.4.2-1: Test pattern for FDD and TDD

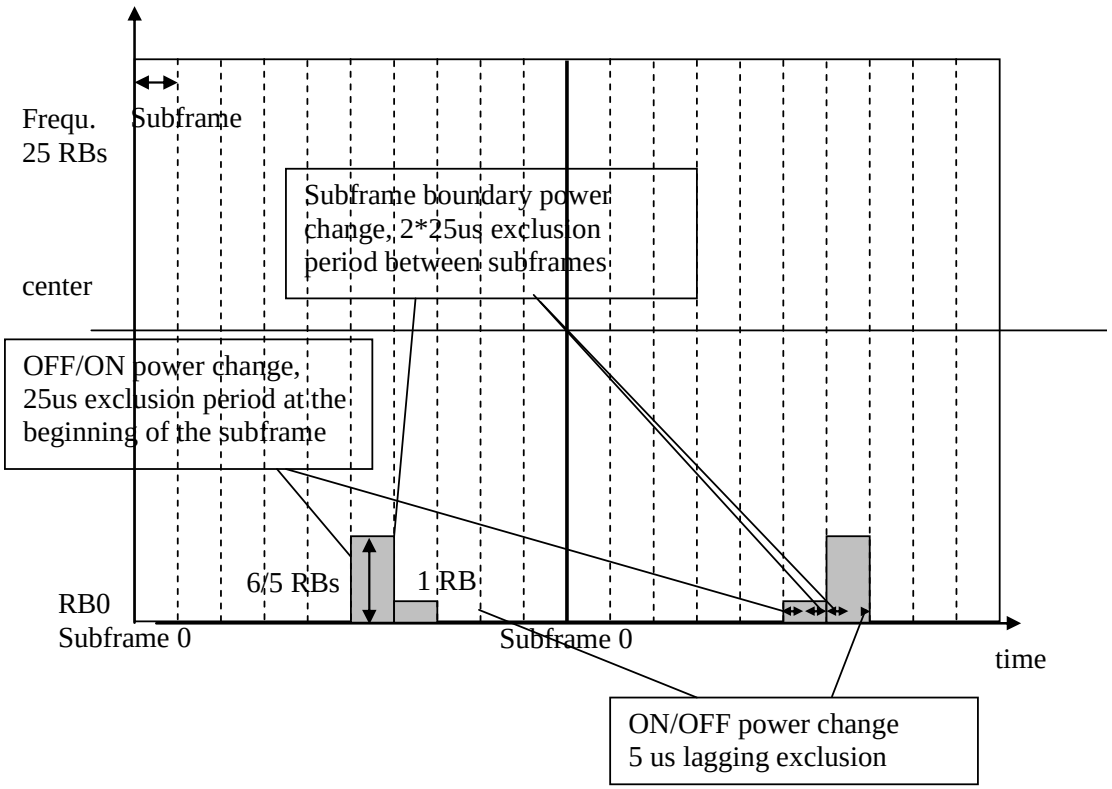


Figure 6.5.2.1EA.2.4.2-2: Test pattern for HD-FDD

NOTE 1: In TDD the free subframes are special subframes or DL, in FDD and HD-FDD the free subframes are OFF.

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the PUSCH. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. The initial uplink RB allocation is 6 or 5. Send appropriate TPC commands for PUSCH to the UE to ensure the UE transmits PUSCH at 0dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 0dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2. Schedule the UE's PUSCH data transmission as described in Figure 6.5.2.1EA.2.4.2-1 and 6.5.2.1EA.2.4.2-2 for 16[1)] active time slots with an uplink RB allocation alternating pattern as described in table 6.5.2.1EA.2.4.1-1 while transmitting 0dB TPC command for PUSCH via the MPDCCH.

3. Measure the EVM using Global In-Channel Tx-Test according to the UE's declaration on the position of carrier centre frequency. The averaging across 16[1)] timeslots is done across mixed RB allocations, as illustrated in Figure 6.5.2.1EA.2.4.2-1 and 6.5.2.1EA.2.4.2-2.

NOTE 1: Averaging across 16 timeslots is used to represent each type of transition equally in the average.

6.5.2.1EA.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA.

6.5.2.1EA.2.5 Test requirement

The PUSCH EVM derived in Annex E.4.2 taking into account Annex E.7 shall not exceed 17,5 % for QPSK and 12,5% for 16 QAM. The test requirements shall be fulfilled for early and late EVM window.

6.5.2.1F.1 Error Vector Magnitude (EVM) for category NB1

6.5.2.1F.1.1 Test Purpose

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Before calculating the EVM the measured waveform is corrected by the sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM.

The measured waveform is further modified by selecting the absolute phase and absolute amplitude of the Tx chain. The EVM result is defined after the front-end IDFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %.

6.5.2.1F.1.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1

6.5.2.1F.1.3 Minimum conformance requirements

The RMS average of the basic EVM measurements for $240/L_{Ctone}$ slots excluding any transient period for the average EVM case, where $L_{Ctone} = \{1, 3, 6, 12\}$ is the number of subcarriers for the NB-IoT transmission, for the different modulations schemes shall not exceed the values specified in Table 6.5.2.1F.1.3-1 for the parameters defined in Table 6.5.2.1F.1.3-2. For EVM evaluation purposes, both NPRACH formats are considered to have the same EVM requirement as QPSK modulated.

Table 6.5.2.1F.1.3-1: Minimum requirements for Error Vector Magnitude

Parameter	Unit	Average EVM Level	Reference Signal EVM Level
BPSK or QPSK	%	17.5	17.5

Table 6.5.2.1F.1.3-2: Parameters for Error Vector Magnitude

Parameter	Unit	Level
UE Output Power	dBm	≥ -40
Operating conditions		Normal conditions

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2F.1.

6.5.2.1F.1.4 Test description

6.5.2.1F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.1F.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex TBD.

Table 6.5.2.1F.1.4.1-1: Test Configuration for NPUSCH

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}, start position	Sub-carrier spacing (kHz)
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		QPSK	1@0	15
4		QPSK	1@11	15
5 (Note 1)		QPSK	12@0	15
Note 1: Applicable to UE supporting UL multi-tone transmissions				

Table 6.5.2.1F.1.4.1-2: Test Configuration for NPRACH

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 8.1.1)	Normal
Test Frequencies (as specified in TS36.508 [7] subclause 8.1.3.1)	Frequency ranges defined in Annex K.1.1
NPRACH preamble format	1
NRS EPRE setting for test point (dBm/15kHz)	-110

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C, and uplink signals according to Annex H.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.1F.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.5.2.1F.1.4.3.

6.5.2.1F.1.4.2 Test procedure

Test procedure for NPUSCH:

1.1. SS sends uplink scheduling information for UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.1F.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

1.2 Configure the UE to transmit at $P_{UMAX\ level}$.

1.3 Measure the EVM and $\overline{EVM}_{DMRS}$ using Global In-Channel Tx-Test (Annex E). The measurement period of EVM for $240/N_{tones}$ slots should exclude any transient period for the average EVM case, where N_{tones} = {1, 3, 6, 12} is the number of subcarriers for the NB-IoT transmission.

1.4 Release the connection through State 3A-NB.

1.5 Modify system information elements according to Table 6.5.2.1F.1.4.3-1 and Table 6.5.2.1F.1.4.3-2 and notify the UE via paging message with SystemInformationModification included (test point 2).

1.6 Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the new UL power control setting.

1.7 SS sends uplink scheduling information for UL HARQ process via NPDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.2F.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

1.8 Measure the EVM and $\overline{EVM}_{DMRS}$ using Global In-Channel Tx-Test (Annex E). The measurement period of EVM for $240/N_{tones}$ slots should exclude any transient period for the average EVM case, where N_{tones} = {1, 3, 6, 12} is the number of subcarriers for the NB-IoT transmission.

Test procedure for NPRACH:

2.1 The SS shall set RS EPRE according to Table 6.5.2.1F.1.4.1-2.

2.2 NPRACH is set according to Table 6.5.2.1F.1.4.1-2.

2.3 The UE shall send a preamble to the SS.

2.4 In response to the preamble, the SS shall transmit a random access response not corresponding to the transmitted random access preamble, or send no response.

2.5 The UE shall consider the random access response reception not successful then re-transmit the preamble with the calculated NPRACH transmission power.

2.6 Repeat step 4 and 5 until the SS collect enough NPRACH preambles (64 preambles). Measure the EVM in NPRACH channel using Global In-Channel Tx-Test (Annex E).

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.5.2.1F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions:

Table 6.5.2.1F.1.4.3-1: P0-NominalNPUSCH-r13 configuration for test point 2

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-14: UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	-117 (dBm)		
alpha-r13	al1 (1)		
deltaPreambleMsg3-r13	4		
}			

Table 6.5.2.1F.1.4.3-2: NPDSCH-ConfigCommon-NB-DEFAULT configuration for test point 2

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-4: NPDSCH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	21 (dBm)		
}			

Table 6.5.2.1F.1.4.3-3: RACH-ConfigCommon-NB-DEFAULT for test point 2

Derivation Path: TS 36.508 [7] clause 8.1.6, Table 8.1.6.3-8 RACH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
RACH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
powerRampingParameters-r13 SEQUENCE {			
powerRampingStep	dB0	0 dB	
}			
)			

6.5.2.1F.1.5 Test requirement

The NPUSCH EVM derived in E.8.1 shall not exceed 17,5% for BPSK and QPSK.

The NPUSCH $\overline{EVM}_{DMRS}$ derived in E.8.2 shall not exceed 17,5 % when embedded with data symbols of BPSK and QPSK.

The NPRACH EVM derived in E.8.3 shall not exceed 17.5%.

6.5.2.2 Carrier leakage

6.5.2.2.1 Test Purpose

Carrier leakage expresses itself as unmodulated sine wave with the carrier frequency or centre frequency of aggregated transmission bandwidth configuration. It is an interference of approximately constant amplitude and independent of the amplitude of the wanted signal. Carrier leakage interferes with the centre sub carriers of the UE under test (if allocated), especially, when their amplitude is small. The measurement interval is defined over one slot in the time domain.

The purpose of this test is to exercise the UE transmitter to verify its modulation quality in terms of carrier leakage.

6.5.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.5.2.2.3 Minimum conformance requirements

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.5.2.2.3-1 or 6.5.2.2.3-2.

Table 6.5.2.2.3-1: Minimum requirements for Relative Carrier Leakage Power for UE supporting Rel-8 to Rel-10

LO Leakage	Parameters	Relative Limit (dBc)
	Output power >0 dBm	-25
	-30 dBm ≤ Output power ≤0 dBm	-20
	-40 dBm ≤ Output power < -30 dBm	-10

Table 6.5.2.2.3-2: Minimum requirements for Relative Carrier Leakage Power for UE supporting Rel.11 and higher

Parameters	Relative limit (dBc)	Applicable frequencies
Output power >10 dBm	-28	Carrier centre frequency < 1 GHz
	-25	Carrier centre frequency ≥ 1 GHz
0 dBm ≤ Output power ≤10 dBm	-25	
-30 dBm ≤ Output power ≤0 dBm	-20	
-40 dBm ≤ Output power < -30 dBm	-10	

The normative reference for this requirement is TS 36.101 clause 6.5.2.2.1

6.5.2.2.4 Test description

6.5.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		See Table 6.5.1.4.1-1		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for carrier leakage testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (max +1- RB allocation) of the channel bandwidth.				

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.2.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2.2.4.3.

6.5.2.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC
2. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 13.2 dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or 13.5dBm ±3.5 dB for carrier frequency 3.0GHz $< f \leq$ 4.2GHz.
3. Measure carrier leakage using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

4. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

5. Measure carrier leakage using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

7. Measure carrier leakage using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test

8. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

9. Measure carrier leakage using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test

NOTE: The step 2 and 3 only apply to UE supporting Rel.11 and higher.

6.5.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.5.2.2.5 Test requirement

Each of the 20 carrier leakage results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2.2.5-1 or 6.5.2.2.5-2.

Table 6.5.2.2.5-1: Test requirements for Relative Carrier Leakage Power for UE supporting Rel-8 to Rel-10

LO Leakage	Parameters	Relative Limit (dBc)
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	-24.2
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	-19.2
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	-9.2

Table 6.5.2.2.5-2: Test requirements for Relative Carrier Leakage Power for UE supporting Rel.11 and higher

LO Leakage	Parameters	Relative limit (dBc)	Applicable frequencies
	f ≤ 3.0GHz: 13.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 13.5 dBm ±3.5dB	-27.2	Carrier centre frequency < 1 GHz
		-24.2	Carrier centre frequency ≥ 1 GHz
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	-24.2	
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	-19.2	
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	-9.2	

6.5.2.2E Carrier leakage for UE category 0

6.5.2.2E.1 Test Purpose

Same test purpose in clause 6.5.2.2.1.

6.5.2.2E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.5.2.2E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3.

6.5.2.2E.4 Test description

6.5.2.2E.4.1 Initial conditions

Same initial conditions as in clause 6.5.2.2.4.1 with the following exceptions:

- Instead of Table 6.5.2.2.4.1-1 → use Table 6.5.2.2E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.5.2.2E.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	See Table 6.5.1.4.1-1			
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for carrier leakage testing	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (max +1- RB allocation) of the channel bandwidth.				

6.5.2.2.4.2 Test procedure

Same test procedure as in clause 6.5.2.2.4.1 with the following exception for HD-FDD:

- Instead of Table 6.5.2.2.4.1-1 → use Table 6.5.2.2E.4.1-1.
- In step 3, slots with transient periods are not under test. Half-duplex guard subframes are not under test.

6.5.2.2E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.5.2.2E.5 Test requirement

Each of the 20 IQ offset results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2.2E.5-1

Table 6.5.2.2E.5-1: Test requirements for Relative Carrier Leakage Power

LO Leakage	Parameters	Relative Limit (dBc)
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	-24.2
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	-19.2
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	-9.2

6.5.2.2EA Carrier leakage for UE category M1

6.5.2.2EA.1 Test Purpose

Same test purpose in clause 6.5.2.2.1.

6.5.2.2EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.5.2.2EA.3 Minimum conformance requirements

Carrier leakage is an additive sinusoid waveform that has the same frequency as a modulated waveform carrier frequency. For UE of UL Category M1, the sinusoid waveform may alternatively lie at the centre of the 6 RB narrowband assigned for transmission. The measurement interval is one slot in the time domain.

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power at the centre of the channel bandwidth or the 6 RB narrowband assigned for transmission shall not exceed the values specified in Table 6.5.2.2.3-2. The normative reference for this requirement is TS 36.101 [2] clause 6.5.2E.2.1.

6.5.2.2EA.4 Test description

6.5.2.2EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.2EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.5.2.2EA.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		See Table 6.5.1.4.1-1			
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		5MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for carrier leakage testing	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
5MHz		QPSK	1	1	0
5MHz		QPSK	6	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (6 - RB allocation) of the channel bandwidth.					

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to in Table 6.5.2.2EA.4.1-1.

5. Propagation conditions are set according to Annex B.0

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.5.2.2EA.4.3.

6.5.2.2EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.5.2.2EA.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC

2. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 13.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 13.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

3. Measure carrier leakage using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency. For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods are not under test. Half-duplex guard subframes are not under test.

4. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

5. Measure carrier leakage using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency. For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods are not under test. Half-duplex guard subframes are not under test.

6. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

7. Measure carrier leakage using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency. For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods are not under test. Half-duplex guard subframes are not under test.

8. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

9. Measure carrier leakage using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency. For TDD slots with transient periods are not under test

6.5.2.2EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA.

6.5.2.2EA.5 Test requirement

Each of the 20 IQ offset results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2.2EA.5-1

Table 6.5.2.2EA.5-1: Test requirements for Relative Carrier Leakage Power

LO Leakage	Parameters	Relative limit (dBc)	Applicable frequencies
	f ≤ 3.0GHz: 13.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 13.5 dBm ±3.5dB	-27.2	Carrier centre frequency < 1 GHz
		-24.2	Carrier centre frequency ≥ 1 GHz
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	-24.2	
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	-19.2	
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	-9.2	

6.5.2.2F Carrier leakage for category NB1

6.5.2.2F.1 Test Purpose

Carrier leakage expresses itself as unmodulated sine wave with the carrier frequency or centre frequency of aggregated transmission bandwidth configuration. It is an interference of approximately constant amplitude and independent of the amplitude of the wanted signal. Carrier leakage interferes with the centre sub carriers of the UE under test (if allocated), especially, when their amplitude is small. The measurement interval is defined over one slot in the time domain.

The purpose of this test is to exercise the UE transmitter to verify its modulation quality in terms of carrier leakage.

6.5.2.2F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.5.2.2F.3 Minimum conformance requirements

Carrier leakage is an additive sinusoid waveform that has the same frequency as a modulated waveform carrier frequency. The measurement interval is one slot in the time domain. The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power of category NB1 UE shall not exceed the values specified in Table 6.5.2.2F.3-1.

Table 6.5.2.2F.3-1: Minimum requirements for relative carrier leakage power

Parameters	Relative limit (dBc)
0 dBm ≤ Output power	-25
-30 dBm ≤ Output power ≤ 0 dBm	-20
-40 dBm ≤ Output power < -30 dBm	-10

The normative reference for this requirement is TS 36.101 clause 6.5.2F.2

6.5.2.2F.4 Test description

6.5.2.2F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations in table 6.5.2.2F.4.1-1 shall be tested. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex TBD.

Table 6.5.2.2F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}, start position	Sub-carrier spacing (kHz)
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		QPSK	1@0	15
4		QPSK	1@11	15

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C, and uplink signals according to Annex H.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.2F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.5.2.2F.4.3.

6.5.2.2F.4.2 Test procedure

1. SS sends uplink scheduling information for UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.2F.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC
2. Configure UE to transmit at P_{UMAX} level.
3. Measure carrier leakage using Global In-Channel Tx-Test (Annex E).
4. Release the connection through State 3A-NB.
5. Modify system information elements according to Table 6.5.2.1F.1.4.3-1 and Table 6.5.2.1F.1.4.3-2 and notify the UE via paging message with SystemInformationModification included (test point 2).
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the new UL power control setting.
7. SS sends uplink scheduling information for UL HARQ process via NPDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.2F.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
8. Measure carrier leakage using Global In-Channel Tx-Test (Annex E).

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.5.2.2F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions:

Table 6.5.2.1F.1.4.3-1: P0-NominalNPUSCH-r13 configuration for test point 2

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-14: UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	-117 (dBm)		
alpha-r13	al1 (1)		
deltaPreambleMsg3-r13	4		
}			

Table 6.5.2.1F.1.4.3-2: NPDSCH-ConfigCommon-NB-DEFAULT configuration for test point 2

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-4: NPDSCH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	21 (dBm)		
}			

6.5.2.2F.5 Test requirement

Each of the carrier leakage results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2.2F.5-1

Table 6.5.2.2F.5-1: Test requirements for Relative Carrier Leakage Power

LO Leakage	Parameters	Relative Limit (dBc)
	Test point 1	-24.2
	Test point 2	-19.2

6.5.2.3 In-band emissions for non allocated RB

6.5.2.3.1 Test Purpose

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks

The in-band emission is defined as the average across 12 sub-carrier and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non–allocated RB to the UE output power in an allocated RB. The basic in-band emissions measurement interval is defined over one slot in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one SC-FDMA symbol, accordingly.

6.5.2.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.5.2.3.3 Minimum conformance requirements

The relative in-band emission shall not exceed the values specified in Tables 6.5.2.3.3-1 or 6.5.2.3.3-2.

Table 6.5.2.3.3-1: Minimum requirements for in-band emissions for UE supporting Rel-8 to Rel-10

Parameter Description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25-10\cdot\log_{10}(N_{RB}/L_{CRB}),$ $20\cdot\log_{10} EVM -3-5\cdot(\lvert\Delta_{RB}\rvert-1)/L_{CRB},$ $-57\ dBm/180\ kHz - P_{RB}\}$		Any non-allocated (Note 2)
IQ Image	dB	-25		Image frequencies (Notes 2, 3)
Carrier leakage	dBc	-25	Output power > 0 dBm	LO frequency (Notes 4, 5)
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

Note 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

Note 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

Note 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

Note 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

Note 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

Note 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.4.2-1).

Note 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

Note 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

Note 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB}=1$ or $\Delta_{RB}=-1$ for the first adjacent RB outside of the allocated bandwidth.

Note 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

Table 6.5.2.3.3-2: Minimum requirements for in-band emissions for UE supporting Rel.11 and higher

Parameter description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25-10\cdot\log_{10}(N_{RB}/L_{CRBs}),$ $20\cdot\log_{10} EVM -3-5\cdot(\lvert\Delta_{RB}\rvert-1)/L_{CRBs},$ $-57\ dBm/180\ kHz - P_{RB}\}$		Any non-allocated (Note 2)
IQ Image	dB	-28	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	(Notes 2, 3)
		-25	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-25	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-28	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (Notes 4, 5)
		-25	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-25	0 dBm ≤ Output power ≤10 dBm	
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.
NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.
NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.
NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.
NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.
NOTE 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.6-1).
NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1).
NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.
NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.
NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2.3.1.

The in-band emission is defined as the average across 12 sub-carrier and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non–allocated RB to the UE output power in an allocated RB. The basic in-band emissions measurement interval is defined over one slot in the time domain.

6.5.2.3.4 Test description

6.5.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.3.4.1-1 and 6.5.2.3.4.1-2. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2.3.4.1-1: Test Configuration Table for PUSCH

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		See Table 6.5.1.4.1-1		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for in-band emissions testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: For partial RB allocation, the starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.				

Table 6.5.2.3.4.1-2: Test Configuration Table for PUCCH

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1		See Table 6.5.1.4.1-1		
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**		See Table 6.5.1.4.1-1		
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration			**Uplink Configuration**
Ch BW	Mod'n	RB allocation		FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a / 1b
		FDD	TDD	
1.4MHz	QPSK	3	3	
3MHz	QPSK	4	4	
5MHz	QPSK	8	8	
10MHz	QPSK	16	16	
15MHz	QPSK	25	25	
20MHz	QPSK	30	30	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to in Table 6.5.2.3.4.1-1 (PUSCH sub-test) and Table 6.5.2.3.4.1-2 (PUCCH sub-test).
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2.3.4.3.

6.5.2.3.4.2 Test procedure

Test procedure for PUSCH:

1.1 SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC

1.2 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 13.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 13.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.3 Measure In-band emission using Global In-Channel Tx-Test (Annex E)

1.4 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.5 Measure In-band emission using Global In-Channel Tx-Test (Annex E)

1.6 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.7 Measure In-band emission using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test

1.8 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.9 Measure In-band emission using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test

Test procedure for PUCCH:

2.1 PUCCH is set according to Table 6.5.2.3.4.1-2. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.5.2.3.4.1-2. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH.

2.2 Send the appropriate TPC commands in the uplink scheduling information for PUCCH to the UE until UE output power is 13.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 13.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.3 Measure In-band emission using Global In-Channel Tx-Test (Annex E)

2.4 Send the appropriate TPC commands in the uplink scheduling information for PUCCH to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.5 Measure In-band emission using Global In-Channel Tx-Test (Annex E)

2.6 Send the appropriate TPC commands for PUCCH in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.7 Measure In-band emission using Global In-Channel Tx-Test (Annex E)

2.8 Send the appropriate TPC commands for PUCCH in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.9 Measure In-band emission using Global In-Channel Tx-Test (Annex E)

NOTE: The step 1.2, 1.3, 2.2 and 2.3 only apply to UE supporting Rel.11 and higher.

6.5.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 4.6.3-8: *PUCCH-ConfigCommon*: PUCCH in-band emissions measurement

Derivation Path: 36.331 clause 6.3.2, Table 4.6.3-8: PUCCH-ConfigCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigCommon-DEFAULT ::= SEQUENCE {			
nRB-CQI	0		
}			

6.5.2.3.5 Test requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Tables 6.5.2.3.5-1 or 6.5.2.3.5-2 based on supported UE release version.

Table 6.5.2.3.5-1: Test requirements for in-band emissions for UE supporting Rel.8 to Rel.10

Parameter Description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs},$ $-57\ dBm\ /\ 180\ kHz - P_{RB}\}$	+0.8	Any non-allocated (Note 2)
IQ Image	dB	-24.2		Image frequencies (Notes 2, 3)
Carrier leakage	dBc	-24.2	Output power f ≤ 3.0GHz: 3.2dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	LO frequency (Notes 4, 5)
		-19.2	Output power f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	
		-9.2	Output power f ≤ 3.0GHz: -36.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	

Note 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the test requirement is calculated as the higher of $P_{RB} - 29.2$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

Note 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

Note 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

Note 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

Note 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

Note 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.4.2-1).

Note 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

Note 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

Note 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

Note 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

Table 6.5.2.3.5-2: Test requirements for in-band emissions for UE supporting Rel.11 and higher

Parameter description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs}$, $-57\ dBm / 180\ kHz - P_{RB}\}$	+0.8	Any non-allocated (Note 2)
IQ Image	dB	-27.2	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	(Notes 2, 3)
		-24.2	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-24.2	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-27.2	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (Notes 4, 5)
		-24.2	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-24.2	0 dBm ≤ Output power ≤10 dBm	
		-19.2	-30 dBm ≤ Output power ≤ 0 dBm	
		-9.2	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 29.2 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

NOTE 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.4.2-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

6.5.2.3E In-band emissions for non allocated RB for UE category 0

6.5.2.3E.1 Test Purpose

Same test purpose as in clause 6.5.2.3.1.

6.5.2.3E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.5.2.3E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.3.3.

6.5.2.3E.4 Test description

6.5.2.3E.4.1 Initial conditions

Same initial conditions as in clause 6.5.2.3.4.1 with following exceptions:

- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

6.5.2.3E.4.2 Test procedure

Same test procedure as in clause 6.5.2.3.4.2

6.5.2.3E.4.3 Message contents

Same message contents as in clause 6.5.2.3.4.3.

6.5.2.3E.5 Test requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.5.2.3E.5-1

Table 6.5.2.3E.5-1: Test requirements for in-band emissions

Parameter Description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs},$ $-57\ dBm\ /180\ kHz - P_{RB}\}$ +0.8		Any non-allocated (Note 2)
IQ Image	dB	-24.2		Image frequencies (Notes 2, 3)
DC	dBc	-24.2	Output power f ≤ 3.0GHz: 3.2dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	LO frequency (Notes 4, 5)
		-19.2	Output power f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	
		-9.2	Output power f ≤ 3.0GHz: -36.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	

Note 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the test requirement is calculated as the higher of $P_{RB} - 29.2$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

Note 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

Note 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

Note 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

Note 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

Note 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.4.2-1).

Note 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

Note 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

Note 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

Note 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

6.5.2.3EA In-band emissions for non allocated RB for UE category M1

6.5.2.3EA.1 Test Purpose

Same test purpose as in clause 6.5.2.3.1.

6.5.2.3EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.5.2.3EA.3 Minimum conformance requirements

The relative in-band emission when centre carrier frequency is at the centre of channel bandwidth or when at the 6RB narrowband assigned for transmission shall not exceed the values specified in Table 6.5.2.3EA.3-1

Table 6.5.2.3EA.3-1: Minimum requirements for in-band emissions

Parameter description	Unit	Limit (NOTE 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},$ $-57\ dBm / 180\ kHz - P_{RB}\}$		Any non-allocated (NOTE 2)
IQ Image	dB	-28	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (NOTES 2, 3)
		-25	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-25	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-28	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (NOTES 4, 5)
		-25	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-25	0 dBm ≤ Output power ≤10 dBm	
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs. For UE of UL Category M1, applicable frequencies shall alternatively include those found by reflection on the centre of the assigned 6 RB narrowband, but excluding any allocated RBs.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB. For UE of UL Category M1, the applicable frequencies shall alternatively be the centre frequency of the supported 6RBs additionally.

NOTE 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.6-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

The in-band emission is defined as the average across 12 sub-carrier and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non–allocated RB to the UE output power in an allocated RB. The basic in-band emissions measurement interval is defined over one slot in the time domain.

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2E.3.1.

6.5.2.3EA.4 Test description

6.5.2.3EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.3EA.4.1-1 and 6.5.2.3EA.4.1-2. The details of the uplink

reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.5.2.3EA.4.1-1: Test Configuration Table for PUSCH

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		See Table 6.5.1.4.1-1			
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		5MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for in-band emissions testing	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
5MHz		QPSK	1	1	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4. Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.5.2.3EA.4.1-2: Test Configuration Table for PUCCH

	Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	See Table 6.5.1.4.1-1				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	See Table 6.5.1.4.1-1				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration				**Uplink Configuration**
Ch BW	Mod'n	RB allocation			FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a / 1b
		FDD	TDD	Narrowband index[1]	
5MHz	QPSK	4@0	4@0	0	
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and DL Reference Measurement channels are set according to in Table 6.5.2.3.4.1-1 (PUSCH sub-test) and Table 6.5.2.3EA.4.1-2 (PUCCH sub-test).

5. Propagation conditions are set according to Annex B.0

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.5.2.3EA.4.3.

6.5.2.3EA.4.2 Test procedure

Test procedure for PUSCH:

1.1 SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.3EA.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC

1.2 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 13.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 13.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.3 Measure In-band emission using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

1.4 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.5 Measure In-band emission using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

1.6 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±2.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.7 Measure In-band emission using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency. For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods are not under test. Half-duplex guard subframes are not under test.

1.8 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.9 Measure In-band emission using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency. For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods are not under test. Half-duplex guard subframes are not under test.

Test procedure for PUCCH:

2.1 PUCCH is set according to Table 6.5.2.3EA.4.1-2. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 6.5.2.3EA.4.1-2. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH.

2.2 Send the appropriate TPC commands in the uplink scheduling information for PUCCH to the UE until UE output power is 13.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 13.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.3 Measure In-band emission using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

2.4 Send the appropriate TPC commands in the uplink scheduling information for PUCCH to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.5 Measure In-band emission using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

2.6 Send the appropriate TPC commands for PUCCH in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.7 Measure In-band emission using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

2.8 Send the appropriate TPC commands for PUCCH in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.9 Measure In-band emission using Global In-Channel Tx-Test (Annex E) according to the UE's declaration on the position of carrier centre frequency.

6.5.2.3EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA and the following exceptions:

Table 6.5.2.3EA.4.3-1: *PUCCH-ConfigCommon*: PUCCH in-band emissions measurement

Derivation Path: TS 36.508 [7] clause 6.3.2, Table 4.6.3-8: PUCCH-ConfigCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigCommon-DEFAULT ::= SEQUENCE {			
nRB-CQI	0		
}			

6.5.2.3EA.5 Test requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.5.2.3EA.5-1

Table 6.5.2.3EA.5-1: Test requirements for in-band emissions

Parameter description	Unit	Limit (NOTE 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB}$, +0.8 $-57\ dBm / 180\ kHz - P_{RB}\}$		Any non-allocated (NOTE 2)
IQ Image	dB	-27.2	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (NOTES 2, 3)
		-24.2	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-24.2	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-27.2	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (NOTES 4, 5)
		-24.2	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-24.2	0 dBm ≤ Output power ≤10 dBm	
		-19.2	-30 dBm ≤ Output power ≤ 0 dBm	
		-9.2	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 29.2 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs. For UE of UL Category M1, applicable frequencies shall alternatively include those found by reflection on the centre of the assigned 6 RB narrowband, but excluding any allocated RBs.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB. For UE of UL Category M1, the applicable frequencies shall alternatively be the centre frequency of the supported 6RBs additionally.

NOTE 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.6-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

6.5.2.3F In-band emissions for non allocated RB for category NB1

6.5.2.3F.1 Test purpose

The in-band emissions are a measure of the interference falling into the non-allocated tones.

The in-band emission is defined as a function of the tone offset from the edge of the allocated UL transmission tone(s) within the transmission bandwidth configuration. The in-band emission is measured as the ratio of the UE output power in a non–allocated tone to the UE output power in an allocated tone. The basic in-band emissions measurement interval is defined over one slot in the time domain.

6.5.2.3F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.5.2.3F.3 Minimum conformance requirements

The category NB1 UE relative in-band emission shall not exceed the values specified in Table 6.5.2.3F.3-1.

Table 6.5.2.3F.3-1: Minimum requirements for in-band emissions

Parameter description	Unit	Limit (NOTE 1)		Applicable Frequencies
General	dB	$\max\{ -15 - 10 \cdot \log_{10}(N_{tone} / L_{Ctone}),$ $-18 - 5 \cdot (\lvert\Delta_{tone}\rvert - 1) / L_{Ctone},$ $-57\ dBm\ /(3.75kHz\ or\ 15kHz) - P_{tone}\}$		Any non-allocated (NOTE 2)
IQ Image	dB	-25		Image frequencies (NOTES 2, 3)
Carrier leakage	dBc	-25	0 dBm ≤ Output power	Carrier frequency (NOTES 4, 5)
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated tone. For each such tone, the minimum requirement is calculated as the higher of P_{tone} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{tone} is defined in NOTE 10.

NOTE 2: The measurement bandwidth is 1 tone and the limit is expressed as a ratio of measured power in one non-allocated tone to the measured average power per allocated tone, where the averaging is done across all allocated tones.

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated tones.

NOTE 4: The measurement bandwidth is 1 tone and the limit is expressed as a ratio of measured power in one non-allocated tone to the measured total power in all allocated tones.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the tones containing the DC frequency if N_{tone} is odd, or in the two tones immediately adjacent to the DC frequency if N_{tone} is even, but excluding any allocated tone.

NOTE 6: L_{Ctone} is the Transmission Bandwidth (tones).

NOTE 7: N_{tone} is the Transmission Bandwidth Configuration (tones).

NOTE 8: Δ_{tone} is the starting frequency offset between the allocated tone and the measured non-allocated tone. (e.g. $\Delta_{tone} = 1$ or $\Delta_{tone} = -1$ for the first adjacent tone outside of the allocated bandwidth.

NOTE 9: P_{tone} is the transmitted power per 3.75 kHz or 15 kHz in allocated tones, measured in dBm.

The normative reference for this requirement is TS 36.101[2] clause 6.5.2F.3.

6.5.2.3F.4 Test description

6.5.2.3F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters shown in table 6.5.2.3F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.5.2.3F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1		QPSK	1@0	3.75kHz
2		QPSK	1@47	3.75kHz
3		QPSK	1@0	15kHz
4		QPSK	1@11	15kHz

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.4.0.
4. The UL Reference Measurement channels are set according to Table 6.5.2.3F.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5.

6.5.2.3F.4.2 Test procedure

1. SS sends uplink scheduling information via NPDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.3F.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Measure In-band emission using Global In-Channel Tx-Test (Annex E).
3. Release the connection through State 3A-NB.
4. Modify system information elements according to Table 6.5.2.3F.4.3-1 and Table 6.5.2.3F.4.3-2 and notify the UE via paging message with SystemInformationModification included.
5. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the new UL power control setting.
6. SS sends uplink scheduling information for UL HARQ process via NPDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.3F.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
7. Measure In-band emission using Global In-Channel Tx-Test (Annex E).

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.5.2.3F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions..

Table 6.5.2.3F.4.3-1: P0-NominalNPUSCH-r13 configuration for test point 2

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-14: UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE {			
p0-NominalNPUSCH-r13	-117 (dBm)		
alpha-r13	al1 (1)		
deltaPreambleMsg3-r13	4		
}			

Table 6.5.2.3F.4.3-2: NPDSCH-ConfigCommon-NB-DEFAULT configuration for test point 2

Derivation Path: 36.508 clause 8.1.6.3 Table 8.1.6.3-4: NPDSCH-ConfigCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
NPDSCH-ConfigCommon-NB-DEFAULT ::= SEQUENCE {			
nrs-Power-r13	21 (dBm)		
}			

6.5.2.3F.5 Test requirement

Each of the 20 In-band emissions results, derived in [Annex E.4.3] shall not exceed the corresponding values in Table 6.5.2.3F.5-1 based on supported UE release version.

Table 6.5.2.3F.5-1: Test requirements for in-band emissions for UE category NB1

Parameter description	Test point	Unit	Limit (NOTE 1)		Applicable Frequencies
General	1, 2	dB	$\max\{ -15 - 10 \cdot \log_{10}(N_{tone} / L_{Ctone}),$ $-18 - 5 \cdot (\lvert\Delta_{tone}\rvert - 1) / L_{Ctone},$ $-57\ dBm\ /(3.75kHz\ or\ 15kHz) - P_{tone}\}$ +0.8		Any non-allocated (NOTE 2)
IQ Image		dB	-24.2		Image frequencies (NOTES 2, 3)
Carrier leakage	1	dBc	-24.2	0 dBm ≤ Output power f ≤ 3.0GHz: 3.2dBm ±3.2dB	Carrier frequency (NOTES 4, 5)
	2		-19.2	-30 dBm ≤ Output power ≤ 0 dBm f ≤ 3.0GHz: -26.8 dBm ±3.2dB	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated tone. For each such tone, the minimum requirement is calculated as the higher of P_{tone} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{tone} is defined in NOTE 10.

NOTE 2: The measurement bandwidth is 1 tone and the limit is expressed as a ratio of measured power in one non-allocated tone to the measured average power per allocated tone, where the averaging is done across all allocated tones.

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated tones.

NOTE 4: The measurement bandwidth is 1 tone and the limit is expressed as a ratio of measured power in one non-allocated tone to the measured total power in all allocated tones.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the tones containing the DC frequency if N_{tone} is odd, or in the two tones immediately adjacent to the DC frequency if N_{tone} is even, but excluding any allocated tone.

NOTE 6: L_{Ctone} is the Transmission Bandwidth (tones).

NOTE 7: N_{tone} is the Transmission Bandwidth Configuration (tones).

NOTE 8: Δ_{tone} is the starting frequency offset between the allocated tone and the measured non-allocated tone. (e.g. $\Delta_{tone} = 1$ or $\Delta_{tone} = -1$ for the first adjacent tone outside of the allocated bandwidth.

NOTE 9: P_{tone} is the transmitted power per 3.75 kHz or 15 kHz in allocated tones, measured in dBm.

6.5.2.3G In-band emissions for non-allocated RB for V2X Communication

6.5.2.3G.1 In-band emissions for non-allocated RB for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test mode of side link State [5A-V2X] in 36.508 is FFS.
- The test tolerance is left FFS for carrier frequency operating on band 47 f > 5GHz
- PSBCH is left TBD

6.5.2.3G.1.1 Test Purpose

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks, this is to verify that the inband emissions of V2X sidelink non-concurrent with E-UTRAN uplink transmissions satisfy the minimum requirements listed in 6.5.2.3G.1.3.

6.5.2.3G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that supports V2X communication and is capable of V2X sidelink communication.

6.5.2.3G.1.3 Minimum conformance requirements

The in-band emission is defined as the average across 12 sub-carrier and as a function of the RB offset from the edge of the allocated sidelink transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non–allocated RB to the UE output power in an allocated RB.

The basic in-band emissions measurement interval is defined over one slot in the time domain When V2X transmissions are shortened due to transmission gap of 1 symbol at the end of the subframe, the In-band emissions measurement interval is reduced by one symbol, accordingly.

For V2X sidelink physical channels PSCCH, PSSCH and PSBCH, the In-band emissions requirements shall be as specified for PUSCH in subclause 36.101[2] 6.5.2.3 for the corresponding modulation and transmission bandwidth. For intra-band contiguous multi-carrier operation the in-band emission requirement of subclause 36.101 [2] 6.5.2.3 shall apply for each component carrier.

Consequently, the relative in-band emission of each sidelink physical channel shall not exceed the values specified in Tables 6.5.2.3G.1.3.

Table 6.5.2.3G.1.3-1: Minimum requirements for in-band emissions

Parameter description	Unit	Limit (NOTE 1)		Applicable Frequencies
General	dB	For Frame Structure Type 1 and Frame Structure Type 2: $\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),\ 20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},\ -57\ dBm/180\ kHz - P_{RB} \}$ For Frame Structure Type 3 and 20 MHz channel bandwidth: $\max\{ -10 - 6(\lvert\Delta_{RB}\rvert - 1),\ -57\ dBm/180\ kHz - P_{RB} \}$		Any non-allocated (NOTE 2)
IQ Image	dB	-28	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (NOTES 2, 3)
		-25	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-25	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-28	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (NOTES 4, 5)
		-25	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-25	0 dBm ≤ Output power ≤10 dBm	
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For Frame Structure Type 3 and 20 MHz channel bandwidth, the requirement applies with $|\Delta_{RB}| \le 5$ for any non-allocated RB and $RIV = 1$ in the uplink scheduling grant with RIV specified in [6].

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs. For Frame Structure Type 3 with 20 MHz channel bandwidth, the applicable frequency is $n_{PRB} = 98$.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs. For Frame Structure Type 3 and 20 MHz channel bandwidth, the requirement applies with $RIV = 5$ in the uplink scheduling grant.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

NOTE 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.6-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

[NOTE 11: For V2V-V2X waveforms, the requirements are applied when PSSCH and PSCCH are adjacent in frequency. The limit values (General, IQ Image or Carrier leakage) of each channel is calculated separately as $P_{general,\ PSSCH}$, $P_{IQ,\ PSSCH}$, $P_{LO,\ PSSCH}$, $P_{general,\ PSCCH}$, $P_{IQ,\ PSCCH}$, $P_{LO,\ PSCCH}$,respectively. In-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of $P_{RB,\ PSSCH}$ - 30 dB and the $P_{sumIBE.SSCH}$, where $P_{sumIBE.SSCH}$ is the linear sum of $P_{general,\ PSSCH}$, $P_{IQ,\ PSSCH}$, $P_{LO,\ PSSCH}$, $P_{general,\ PSCCH}$, $P_{IQ,\ PSCCH}$, $P_{LO,\ PSCCH}$.]

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2G.3.

6.5.2.3G.1.4 Test description

6.5.2.3G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.3G.1.4.1-1 and 6.5.2.3G.1.4.1-2. The details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3 and refer GNSS system simulator configuration to Annex C Table C.2-8.

Table 6.5.2.3G.1.4.1-1: Test Configuration Table for PSSCH and PSCCH

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	Low range, Mid range, High range	
Test Channel Bandwidths (as specified in subclause 5.4.2G)	Lowest, Mid, Highest	
Test Parameters for Channel Bandwidths		
	V2X sidelink transmission	
Ch BW	Mod'n	RB Allocation
10MHz	QPSK	12
20MHz	QPSK	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in specified in subclause 5.4.2G. Note 2: The starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.		

Table 6.5.2.3G.1.4.1-2: Test Configuration Table for PSBCH

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	Low range, Mid range, High range	
Test Channel Bandwidths (as specified in subclause 5.4.2G)	Lowest, Mid, Highest	
Test parameters for channel bandwidths		
PSBCH Configuration		
Ch BW	Mod'n	RB allocation
10MHz	QPSK	6
20MHz	QPSK	6
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in subclause 5.4.2G. Note 2: The starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.		

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.67.

2. Propagation conditions are set according to Annex B.0;

6.5.2.3G.1.4.2 Test procedure

Test procedure for PSCCH+PSSCH:

[TP1: V2X UE output power > 10dBm]

1. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to *SL-V2X-Preconfiguration* in TS36.508[7] subclause Table 6.8.2.1-1 with the exception specified in table 6.5.2.3G.1.4.3-1;

2. Ensure the UE is in Side link State [5A-V2X], according to TS 36.508 [7] clause [4.5.9] ;

3. V2X UE schedules the V2X RMC according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.5.2.3G.1.4.1-1;

4. Measure the V2X UE output power to make sure V2X UE transmission power to be 10dBm +/- TT1[TBD] for carrier frequency f > 5GHz, otherwise go back to step1 after tuning up power control parameters listed in table 6.5.2.3G.1.4.3-1 and Table 6.5.2.3G.1.4.3-2;

5. Measure In-band emission using Global In-Channel Tx-Test (Annex E)

[TP2: V2X UE output power within (0, 10) dBm]

Repeat the above steps 1~4 with the exception that making sure V2X UE transmission power to be 0dBm +/- TT1 for carrier frequency f > 5GHz in step3.

[TP3: V2X UE output power within (0 -30) dBm]

Repeat the above steps 1~4 with the exception that making sure V2X UE transmission power to be -30dBm +/- TT1 for carrier frequency f > 5GHz in step3.

[TP4: V2X UE output power (-40 -30) dBm]

Repeat the above steps 1~4 with the exception that making sure V2X UE transmission power to be -40dBm +/- TT1 for carrier frequency f > 5GHz in step3.

Test procedure for PSBCH

TBD

6.5.2.3G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause Table 6.8.2.1-1with the following exceptions:

Table 6.5.2.3G.1.4.3-1: SL-V2X-PreconfigFreqInfo-r14-DEFAULT

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-PreconfigFreqInfo-r14-DEFAULT ::= SEQUENCE {			
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
maxTxPower-r12	10		PSSCH+PSCCH TP1
	0		PSSCH+PSCCH TP2
	-30		PSSCH+PSCCH TP3, PSSCH+PSCCH TP4
sl-bandwidth-r12	n50	10Mhz	
	n100	20Mhz	
}			
}			
v2x-CommPreconfigSync-r14 SEQUENCE {		SL-PreconfigSync-r12	
syncOffsetIndicators-r14 SEQUENCE {			
syncOffsetIndicator1-r14	Not Present	Double synchronization signal transmission	
}			
}			
v2x-CommRxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-RxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {	1 entry		
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table Table 6.5.2.3G.1.4.3-2		
}			
v2x-CommTxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-TxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {			
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.5.2.3G.1.4.3-2		
}			
}			

Table 6.5.2.3G.1.4.3-2: SL-V2X-PreconfigCommPool-r14-DEFAULT

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-CommResroucePoolV2X-r14-DEFAULT ::= SEQUENCE {			
sl-Subframe-r14 CHOICE {			
bs20-r14	11111111111111111111		BITMAP_6
}			
sizeSubchannel-r14	n12		BW10
	n18		BW20
numSubchannel-r14	n1		
startRB-Subchannel-r14	As required in the test configuration tables in subclause 6.5.2.3G.1.4.1	The starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.	
dataTxParameters-r14 SEQUENCE {			
p0-r12	31	It's set to the maximum value to disable its effect on transmission power.	PSSCH+PSCCH TP1 , PSSCH+PSCCH TP2, PSSCH+PSCCH TP3
	-53		PSSCH+PSCCH TP4
}			
}			

Condition	Explanation
BW10	10 MHz channel bandwidth cell environment
BW20	20 MHz channel bandwidth cell environment
PSSCH+PSCCH TPn	Test point n for PSCCH+PSSCH defined in the section of test procedure, n = 1,2,3,4

6.5.2.3G.1.5 Test requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Tables 6.5.2.3G.1.5-1.

Table 6.5.2.3G.1.5-1: Test requirements for in-band emissions for UE in V2X sidelink communication

Parameter description	Unit	Limit (NOTE 1)		Applicable Frequencies
General	dB	For Frame Structure Type 1 and Frame Structure Type 2: $\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},$ $-57\ dBm/180\ kHz - P_{RB}\}$ +TT For Frame Structure Type 3 and 20 MHz channel bandwidth: $\max\{-10 - 6(\lvert\Delta_{RB}\rvert - 1),$ $-57\ dBm/180\ kHz - P_{RB}\}$ +TT		Any non-allocated (NOTE 2)
IQ Image	dB	-28	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (NOTES 2, 3)
		-25	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-25+TT	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-28	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (NOTES 4, 5)
		-25+TT	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-25+TT	0 dBm ≤ Output power ≤10 dBm	
		-20+TT	-30 dBm ≤ Output power ≤ 0 dBm	
		-10+TT	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For Frame Structure Type 3 and 20 MHz channel bandwidth, the requirement applies with $\lvert\Delta_{RB}\rvert \le 5$ for any non-allocated RB and $RIV = 1$ in the uplink scheduling grant with RIV specified in [6].

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs. For Frame Structure Type 3 with 20 MHz channel bandwidth, the applicable frequency is $n_{PRB} = 98$.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs. For Frame Structure Type 3 and 20 MHz channel bandwidth, the requirement applies with $RIV = 5$ in the uplink scheduling grant.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

NOTE 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.6-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

[NOTE 11: For V2V-V2X waveforms, the requirements are applied when PSSCH and PSCCH are adjacent in frequency. The limit values (General, IQ Image or Carrier leakage) of each channel is calculated separately as $P_{general,\ PSSCH}$, $P_{IQ,\ PSSCH}$, $P_{LO,\ PSSCH}$, $P_{general,\ PSCCH}$, $P_{IQ,\ PSCCH}$, $P_{LO,\ PSCCH}$,respectively. In-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of $P_{RB,\ PSSCH}$ - 30 dB and the $P_{sumIBE.SSCH}$, where $P_{sumIBE.SSCH}$ is the linear sum of $P_{general,\ PSSCH}$, $P_{IQ,\ PSSCH}$, $P_{LO,\ PSSCH}$, $P_{general,\ PSCCH}$, $P_{IQ,\ PSCCH}$, $P_{LO,\ PSCCH}$.]

6.5.2.3G.2 Introduction of In-band emissions for non-allocated RB for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The test tolerance is left FFS for carrier frequency operating on band 47 f > 5GHz

- PSBCH is left TBD
- Connection diagram is TBD

6.5.2.3G.2.1 Test purpose

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks, this is to verify that the inband emissions of V2X sidelink communication simultaneous with E-UTRA uplink/downlink satisfy the minimum requirements listed in 6.5.2.3G.2.3.

6.5.2.3G.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 14 and forward that supports V2X communication and is capable of V2X sidelink communication simultaneous with E-UTRA uplink/downlink.

6.5.2.3G.2.3 Minimum conformance requirements

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in 36.101[2] Table 5.5G-2, the requirements in 36.101[2] subclause 6.5.2G apply for V2X sidelink transmission and the requirements in 36.101[2] subclause 6.5.2 apply for the E-UTRA uplink transmission.

For V2X sidelink physical channels PSCCH, PSSCH and PSBCH, the In-band emissions requirements shall be as specified for PUSCH in 36.101[2] subclause 6.5.2.3 for the corresponding modulation and transmission bandwidth. When V2X transmissions are shortened due to transmission gap of 1 symbol at the end of the subframe, the In-band emissions measurement interval is reduced by one symbol, accordingly.

Consequently, the relative in-band emission of each sidelink physical channel shall not exceed the values specified in Tables 6.5.2.3G.2.3-1.

Table 6.5.2.3G.2.3-1: Minimum requirements for in-band emissions

Parameter description	Unit	Limit (NOTE 1)		Applicable Frequencies
General	dB	For Frame Structure Type 1 and Frame Structure Type 2: $\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),\ 20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},\ -57\ dBm/180\ kHz - P_{RB} \}$ For Frame Structure Type 3 and 20 MHz channel bandwidth: $\max\{ -10 - 6(\lvert\Delta_{RB}\rvert - 1),\ -57\ dBm/180\ kHz - P_{RB} \}$		Any non-allocated (NOTE 2)
IQ Image	dB	-28	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (NOTES 2, 3)
		-25	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-25	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-28	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (NOTES 4, 5)
		-25	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-25	0 dBm ≤ Output power ≤10 dBm	
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For Frame Structure Type 3 and 20 MHz channel bandwidth, the requirement applies with $|\Delta_{RB}| \le 5$ for any non-allocated RB and $RIV = 1$ in the uplink scheduling grant with RIV specified in [6].

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs. For Frame Structure Type 3 with 20 MHz channel bandwidth, the applicable frequency is $n_{PRB} = 98$.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs. For Frame Structure Type 3 and 20 MHz channel bandwidth, the requirement applies with $RIV = 5$ in the uplink scheduling grant.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

NOTE 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.6-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

[NOTE 11: For V2V-V2X waveforms, the requirements are applied when PSSCH and PSCCH are adjacent in frequency. The limit values (General, IQ Image or Carrier leakage) of each channel is calculated separately as $P_{general, PSSCH}$, $P_{IQ, PSSCH}$, $P_{LO, PSSCH}$, $P_{general, PSCCH}$, $P_{IQ, PSCCH}$, $P_{LO, PSCCH}$,respectively. In-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of $P_{RB, PSSCH}$ - 30 dB and the $P_{sumIBE.SSCH}$, where $P_{sumIBE.SSCH}$ is the linear sum of $P_{general, PSSCH}$, $P_{IQ, PSSCH}$, $P_{LO, PSSCH}$, $P_{general, PSCCH}$, $P_{IQ, PSCCH}$, $P_{LO, PSCCH}$.]

The normative reference for this requirement is TS 36.101 [2] clause6.5.2G and 6.5.2G.3.

6.5.2.3G.2.4 Test description

6.5.2.3G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2.3G.2.4.1-1 and 6.5.2.3G.2.4.1-2. The details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3.

Table 6.5.2.3G.2.4.1-1: Test Configuration Table for PSSCH and PSCCH

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, Mid range, High range				
Test Channel Bandwidths as specified in 5.4.2G		Lowest, Mid, Highest				
Test Parameters for Channel Bandwidths						
	Downlink	**Uplink Configuration**		**V2X Configuration PSSCH and PSCCH**		
Ch BW	N/A for In-band emission test case	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz		QPSK	1	10 MHz	QPSK	12
3 MHz		QPSK	4	20 MHz	QPSK	18
5 MHz		QPSK	8			
10 MHz		QPSK	12			
15 MHz		QPSK	16			
20 MHz		QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2G.1-2. Note 2: The starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.						

Table 6.5.2.3G.2.4.1-2: Test Configuration Table for PSBCH

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, Mid range, High range				
Test Channel Bandwidths as specified in 5.4.2G		Lowest, Mid, Highest				
Test Parameters for Channel Bandwidths						
	Downlink	**Uplink Configuration**		**V2X Configuration PSBCH**		
Ch BW	N/A for In-band emission test case	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz		QPSK	1	10 MHz	QPSK	6
3 MHz		QPSK	4	20 MHz	QPSK	6
5 MHz		QPSK	8			
10 MHz		QPSK	12			
15 MHz		QPSK	16			
20 MHz		QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2G.1-2. Note 2: The starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth..						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 6.5.2.3G.2.4.3
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to subclause 6.5.2.3G.2.4.1.
5. Propagation conditions are set according to Annex B.0.

6.5.2.3G.2.4.2 Test procedure

Test procedure for PSCCH+PSSCH:

[TP1: V2X UE output power > 10dBm]

1. Ensure the UE is in the state 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message contents are defined in clause 6.5.2.3G.2.4.3

2. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 6.2.5G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.

3. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE E-UTRA uplink output power is 13.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 13.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz. Configure the UE to transmit PSCCH and PSSCH with the $P_{CMAX,c,V2X}$ level of the test point to make sure V2X UE transmission power to be 10dBm +/- TT1 for carrier frequency f > 5GHz according to table 6.5.2.3G.2.4.3-1 and Table 6.5.2.3G.2.4.3-2.

4. Measure In-band emission using Global In-Channel Tx-Test (Annex E) on all the component carriers with PRB allocated.

[TP2: V2X UE output power within (0,10)dBm]

Repeat the above steps 1~4 with the exception in step3 that making sure UE E-UTRA uplink output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz and V2X UE transmission power is 0dBm +/- TT1 for carrier frequency f > 5GHz.

[TP3: V2X UE output power within (0 -30)dBm]

Repeat the above steps 1~4 with the exception in step3 that making sure UE E-UTRA uplink output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz and V2X UE transmission power is -30dBm +/- TT1 for carrier frequency f > 5GHz.

[TP4: V2X UE output power (-40 -30)dBm]

Repeat the above steps 1~4 with the exception of step3 as below:

Send the appropriate TPC commands in the uplink scheduling information to the UE until UE E-UTRA uplink output power is 36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz. Configure the UE to transmit PSCCH and PSSCH with the initial power set for the test point to make sure V2X UE transmission power to be -40dBm +/- TT1 for carrier frequency f > 5GHz according to table 6.5.2.3G.2.4.3-1 and Table 6.5.2.3G.2.4.3-2.

Test procedure for PSBCH

TBD

6.5.2.3G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.5.2.3G.2.4.3-1: SL-PSSCH-TxConfig-r14-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6, Table 4.6.3-20F SL-PSSCH-TxConfig-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
maxTxPower-r14	-10		PSSCH+PSCCH TP1
	0		PSSCH+PSCCH TP2
	-30		PSSCH+PSCCH TP3, PSSCH+PSCCH TP4

Table 6.5.2.3G.2.4.3-2: SL-CommResourcePoolV2X-r14-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6, Table 4.6.3-20C: SL-CommResourcePoolV2X-r14-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
dataTxParameters-r14 SEQUENCE {			
alpha-r12	a0		
p0-r12	31		PSSCH+PSCCH TP1 , PSSCH+PSCCH TP2, PSSCH+PSCCH TP3
	-53		PSSCH+PSCCH TP4
}			

6.5.2.3G.2.5 Test requirement

For E-UTRA uplink and V2X sidelink, each of the In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Tables 6.5.2.3G.2.5-1.

Table 6.5.2.3G.2.5-1: Test requirements for in-band emissions for UE in V2X sidelink communication

Parameter description	Unit	Limit (NOTE 1)		Applicable Frequencies
General	dB	For Frame Structure Type 1 and Frame Structure Type 2: $\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),\ 20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},\ -57\ dBm/180\ kHz - P_{RB} \}$ +TT For Frame Structure Type 3 and 20 MHz channel bandwidth: $\max\{ -10 - 6(\lvert\Delta_{RB}\rvert - 1),\ -57\ dBm/180\ kHz - P_{RB} \}$ +TT		Any non-allocated (NOTE 2)
IQ Image	dB	-28	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (NOTES 2, 3)
		-25	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-25+TT	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-28	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (NOTES 4, 5)
		-25+TT	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-25+TT	0 dBm ≤ Output power ≤10 dBm	
		-20+TT	-30 dBm ≤ Output power ≤ 0 dBm	
		-10+TT	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For Frame Structure Type 3 and 20 MHz channel bandwidth, the requirement applies with $|\Delta_{RB}| \leq 5$ for any non-allocated RB and $RIV = 1$ in the uplink scheduling grant with RIV specified in [6].

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs. For Frame Structure Type 3 with 20 MHz channel bandwidth, the applicable frequency is $n_{PRB} = 98$.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs. For Frame Structure Type 3 and 20 MHz channel bandwidth, the requirement applies with $RIV = 5$ in the uplink scheduling grant.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

NOTE 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.6-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

[NOTE 11: For V2V-V2X waveforms, the requirements are applied when PSSCH and PSCCH are adjacent in frequency. The limit values (General, IQ Image or Carrier leakage) of each channel is calculated separately as $P_{general, PSSCH}$, $P_{IQ, PSSCH}$, $P_{LO, PSSCH}$, $P_{general, PSCCH}$, $P_{IQ, PSCCH}$, $P_{LO, PSCCH}$,respectively. In-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of $P_{RB, PSSCH}$ - 30 dB and the $P_{sumIBE.SSCH}$, where $P_{sumIBE.SSCH}$ is the linear sum of $P_{general, PSSCH}$, $P_{IQ, PSSCH}$, $P_{LO, PSSCH}$, $P_{general, PSCCH}$, $P_{IQ, PSCCH}$, $P_{LO, PSCCH}$.]

6.5.2.3G.3 In-band emissions for non-allocated RB for V2X Communication / Intra-band contiguous MCC operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The test tolerance is left FFS for carrier frequency operating on band 47 f > 5GHz
- PSBCH is left TBD
- Test mode of side link State [5A-V2X] in 36.508 is FFS.

6.5.2.3G.3.1 Test purpose

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks, this is to verify that the inband emissions of V2X sidelink with intra-band contiguous MCC satisfy the minimum requirements listed in 6.5.2.3G.3.3.

6.5.2.3G.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 14 and forward that supports V2X communication and is capable of V2X sidelink communication.

6.5.2.3G.3.3 Minimum conformance requirements

For intra-band contiguous carrier aggregation bandwidth class B, the requirements in Table 6.5.2.3G.3.3-1 and 6.5.2.3G.3.3-2 apply within the aggregated transmission bandwidth configuration with both component carrier (s) active and one single contiguous PRB allocation of bandwidth L_{CRB} at the edge of the aggregated transmission bandwidth configuration.

Table 6.5.2.3G.3.3-1: Minimum requirements for in-band emissions (allocated component carrier)

Parameter	Unit	Limit		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},$ $-57\ dBm/180\ kHz - P_{RB}\}$		Any non-allocated (NOTE 2)
IQ Image	dB	-25		Exception for IQ image (NOTE 3)
Carrier leakage	dBc	-25	Output power > 0 dBm	Exception for Carrier frequency (NOTE 4)
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 9. The limit is evaluated in each non-allocated RB.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs

NOTE 3: Exceptions to the general limit are allowed for up to L_{CRBs} +1 RBs within a contiguous width of L_{CRBs} +1 non-allocated RBs. The measurement bandwidth is 1 RB.

NOTE 4: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in the non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: L_{CRB} is the Transmission Bandwidth (see Figure 5.4.2-1) not exceeding $\lfloor N_{RB}/2-1 \rfloor$

NOTE 6: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1) of the component carrier with RBs allocated.

NOTE 7: EVM is the limit specified in Table 6.5.2.1G.3-1 for the modulation format used in the allocated RBs.

NOTE 8: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth).

NOTE 9: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

Table 6.5.2.3G.3.3-2: Minimum requirements for in-band emissions (not allocated component carrier)

Para-meter	Unit	Meas BW NOTE 1	Limit		remark	Applicable Frequencies
General	dB	BW of 1 RB (180KHz rectangular)	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},$ $-57\ dBm\ /\ 180\ kHz - P_{RB}\}$		The reference value is the average power per allocated RB in the allocated component carrier	Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
IQ Image	dB	BW of 1 RB (180KHz rectangular)	-25 (NOTE 2)		The reference value is the average power per allocated RB in the allocated component carrier	The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
Carrier leakage	dBc	BW of 1 RB (180KHz rectangular)	NOTE 3		The reference value is the total power of the allocated RBs in the allocated component carrier	The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
			-25	Output power > 0 dBm		
			-20	-30 dBm ≤ Output power ≤ 0 dBm		
			-10	-40 dBm ≤ Output power < -30 dBm		

NOTE1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.

NOTE 2: Exceptions to the general limit are allowed for up to L_{CRB} +1 RBs within a contiguous width of L_{CRB} +1 non-allocated RBs.

NOTE 3: Two Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs

NOTE 4: NOTES 1, 5, 6, 7, 8, 9 from Table 6.5.2.3G.3.3-1 apply for Table 6.5.2.3G.3.3-2 as well.

NOTE 5: Δ_{RB} for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.

The normative reference for this requirement is TS 36.101 [2] subclause 6.5.2G.3 and subclause 6.5.2A.3

6.5.2.3G.3.4 Test Description

6.5.2.3G.3.4.1 Initial Conditions

Initial conditions specify the set of UE parameters that UE needs be test in and the steps that SS should take with UE to reach the correct measurement state.

The initial test conditions consist of environment conditions, test frequencies and channel bandwidth based on E-UTRAN operating bands specified in subclause 5.6G and propagation conditions. All these configurations shall be tested with applicable parameters for each channel bandwidth, and are shown in table 6.5.2.3G.3.4.1-1, the details of reference channel are specified in sub-clause A.8.3 and reference GNSS configuration as defined in Table C.2-8;

6.5.2.3G.3.4.1-1: Table Initial Conditions

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low range, Mid range , High range			
Test Channel Bandwidths as specified in subclause 5.4.2G			Lowest N_{RB_agg}, Highest N_{RB_agg}			
Test Parameters for V2X MCC Configuration						
V2X MCC Channel Bandwidth			**V2X Sidelink Configuration**			
Configuration ID	**CC1 N_{RB}**	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**N_{RB_agg}**	**CC1 and CC2 RB Allocation (LCRB @ RBstart)**	
1	50	50	QPSK	12	CC1_12@0	CC2_0@0
2	50	50	QPSK	12	CC1_0@0	CC2_12@38
Note1: The starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the aggregated channel bandwidth, each correspond to configuration ID 1 or 2.						

1. Connect the SS to UE antenna connectors according to the figure [A.89a] in TS 36.508[7] Annex A.

2. Propagation conditions are set according to Annex B.0;

6.5.2.3G.3.4.2 Test Procedure

Test procedure for PSCCH+PSSCH:

[TP1: V2X UE output power > 10dBm]

1. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to *SL-V2X-Preconfiguration* in TS36.508[7] subclause Table [6.8.2.1-1A] with the exception specified in table 6.5.2.3G.3.4.3-1 and Table 6.5.2.3G.3.4.3-2;

2. Ensure the UE are in the Side link State [5A-V2X], according to TS 36.508 [7] clause [4.5.9]. Message contents are defined in clause 6.5.2.3G.3.4.3

3. V2X UE schedules the V2X RMC according to *SL-V2X-Preconfiguration* in line with the test configuration in Table 6.5.2.3G.3.4.1-1;

4. Measure the V2X UE output power to make sure V2X UE transmission power to be 10dBm +/- TT1 for carrier frequency f > 5GHz, otherwise go back to step1 after tuning up power control parameters listed in table 6.5.2.3G.3.4.3-1 and Table 6.5.2.3G.3.4.3-2;

5. Measure In-band emission using Global In-Channel Tx-Test (Annex E) on the component carrier with PRB allocated, and measure the power spectrum density on the component carrier without PRB allocated.

[TP2: V2X UE output power within (0,10)dBm]

Repeat the above steps 1~4 with the exception that making sure V2X UE transmission power to be 0dBm +/- TT1 for carrier frequency f > 5GHz in step3.

[TP3: V2X UE output power within (0 -30)dBm]

Repeat the above steps 1~4 with the exception that making sure V2X UE transmission power to be -30dBm +/- TT1 for carrier frequency f > 5GHz in step3.

[TP4: V2X UE output power (-40 -30)dBm]

Repeat the above steps 1~4 with the exception that making sure V2X UE transmission power to be -40dBm +/- TT1 for carrier frequency f > 5GHz in step3.

Test procedure for PSBCH

TBD

6.5.2.3G.3.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause Table [6.8.2.1-1A] with the following exceptions:

Table 6.5.2.3G.3.4.3-1: SL-V2X-PreconfigFreqInfo-r14-DEFAULT for CC1 & CC2

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-PreconfigFreqInfo-r14-DEFAULT ::= SEQUENCE {			
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
maxTxPower-r12	10		PSSCH+PSCCH TP1
	0		PSSCH+PSCCH TP2
	-30		PSSCH+PSCCH TP3, PSSCH+PSCCH TP4
sl-bandwidth-r12	n50	10Mhz	
}			
}			
v2x-CommPreconfigSync-r14 SEQUENCE {		SL-PreconfigSync-r12	
syncOffsetIndicators-r14 SEQUENCE {			
syncOffsetIndicator1-r14	Not Present	Double synchronization signal transmission	
}			
}			
v2x-CommRxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-RxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {	1 entry		
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAUL using condition BITMAP_6 and exception listed in Table 6.5.2.3G.3.4.3-2	SL-V2X-PreconfigCommPool-r14	
}			
v2x-CommTxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-TxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {			
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAUL using condition BITMAP_6 and exception listed in Table 6.5.2.3G.3.4.3-2		
}			
syncPriority-r14	GNSS		
}			

Table 6.5.2.3G.3.4.3-2: SL-V2X-PreconfigCommPool-r14-DEFAUL

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-CommResroucePoolV2X-r14-DEFAULT ::= SEQUENCE {			
sl-Subframe-r14 CHOICE {			
bs20-r14	11111111111111111111		BITMAP_6
}			
sizeSubchannel-r14	n12		BW10
numSubchannel-r14	n1		
dataTxParameters-r14 SEQUENCE {			
p0-r12	31	It's set to the maximum value to disable its effect on transmission power.	PSSCH+PSCCH TP1 , PSSCH+PSCCH TP2, PSSCH+PSCCH TP3
	-53		PSSCH+PSCCH TP4
}			
syncAllowed-r14 ::= SEQUENCE {			
gnss-Sync-r14	True	The resource of CC1 can be used if the UE is directly or indirectly synchronized to GNSS	CC with LCRB >0
enb-Sync-r14	True	The resource of CC1 can be used if the UE is directly or indirectly synchronized to enb	CC with LCRB =0
}			
}			

Condition	**Explanation**
BW10	10 MHz channel bandwidth cell environment
BW20	20 MHz channel bandwidth cell environment
PSSCH+PSCCH TPn	Test point n for PSCCH+PSSCH defined in the section of test procedure, n = 1,2,3,4

6.5.2.3G.3.5 Test Requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.5.2.3G.3.5-1.

Table 6.5.2.3G.3.5-1: Test requirements for in-band emissions (allocated component carrier)

Parameter Description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs},$ $-57\ dBm\ /180\ kHz - P_{RB}\}$ +TT		Any non-allocated (Note 2)
IQ Image	dB	-25+TT		Image frequencies (Notes 2, 3)
Carrier leakage	dBc	-25+TT	Output power f ≤ 3.0GHz: 3.2dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	LO frequency (Notes 4, 5)
		-20+TT	Output power f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	
		-10+TT	Output power f ≤ 3.0GHz: -36.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	

Note 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the test requirement is calculated as the higher of $P_{RB} - 29.2$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

Note 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

Note 3: The applicable frequencies for this limit are not known due to unknown LO frequency. See Note 3 in Table 6.5.2A.3.0-1.

Note 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

Note 5: The applicable frequencies for this limit are not known due to unknown LO frequency. See Note 4 in Table 6.5.2A.3.0-1.

Note 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.4.2-1).

Note 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1) of the component carrier with RBs allocated.

Note 8: EVM is the limit specified in Table 6.5.2.1.3-1 for the modulation format used in the allocated RBs.

Note 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth).

Note 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

The in-band emissions results, measured with the spectral test shall not exceed the corresponding values in Table 6.5.2.3G.3.5-2

Table 6.5.2.3G.3.5-2: Test requirements for in-band emissions (not allocated component carrier)

Para-meter	Unit	Meas BW Note 1	Limit		remark	Applicable Frequencies
General	dB	BW of 1 RB (180KHz rectangular)	$\max\{ -25-10\cdot\log_{10}(N_{RB}/L_{CRBs}),$ $20\cdot\log_{10} EVM \ -3-5\cdot(\lvert\Delta_{RB}\rvert-1)/L_{CRBs}$ $-57\ dBm\ /180\ kHz\ -P_{RB}\}$ +TT		The reference value is the average power per allocated RB in the allocated component carrier	Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
IQ Image	dB	BW of 1 RB (180KHz rectangular)	-25+TT Note 2		The reference value is the average power per allocated RB in the allocated component carrier	The frequencies of the L_{CRB} contig uous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
Carrier leakage	dBc	BW of 1 RB (180KHz rectangular)	Note 3		The reference value is the total power of the allocated RBs in the allocated component carrier	The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
			-25+TT	Output power > 0 dBm		
			-20+TT	-30 dBm ≤ Output power ≤ 0 dBm		
			-10+TT	-40 dBm ≤ Output power < -30 dBm		

Note1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.

Note 2: Exceptions to the general limit are allowed for up to L_{CRB} +1 RBs within a contiguous width of L_{CRB} +1 non-allocated RBs.

Note 3: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs.

Note 4: Note s1, 6, 7, 8, 9, 10 from Table 6.5.2A.3.0-1 apply for Table 6.5.2A.3.0-2 as well.

Note 5: Δ_{RB} for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.

6.5.2.4 EVM equalizer spectrum flatness

6.5.2.4.1 Test Purpose

The zero-forcing equalizer correction applied in the EVM measurement process (as described in Annex E) must meet a spectrum flatness requirement for the EVM measurement to be valid. The EVM equalizer spectrum flatness is defined in terms of the maximum peak-to-peak ripple of the equalizer coefficients (dB) across the allocated uplink block variation in dB of the equalizer coefficients generated by the EVM measurement process. The EVM equalizer spectrum flatness requirement does not limit the correction applied to the signal in the EVM measurement process but for the

EVM result to be valid, the equalizer correction that was applied must meet the EVM equalizer spectrum flatness minimum requirements. The basic measurement interval is the same as for EVM.

6.5.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.5.2.4.3 Minimum conformance requirements

The peak-to-peak variation of the EVM equalizer coefficients contained within the frequency range of the uplink allocation shall not exceed the maximum ripple. The EVM equalizer spectrum flatness shall not exceed the values specified in Table 6.5.2.4.3-1 for normal conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 5 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 7 dB (see Figure 6.5.2.4.3-1).

The EVM equalizer spectrum flatness shall not exceed the values specified in Table 6.5.2.4.3-2 for extreme conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 10 dB (see Figure 6.5.2.4.3-1).

Table 6.5.2.4.3-1: Minimum requirements for EVM equalizer spectrum flatness (normal conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 3$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 3$ MHz (Range 1)	4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 3$ MHz or $F_{UL_High} - F_{UL_Meas} < 3$ MHz (Range 2)	8 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

Table 6.5.2.4.3-2: Minimum requirements for EVM equalizer spectrum flatness (extreme conditions)

$F_{UL_Meas} - F_{UL_Low} \geq 5$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 5$ MHz (Range 1)	4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 5$ MHz or $F_{UL_High} - F_{UL_Meas} < 5$ MHz (Range 2)	12 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

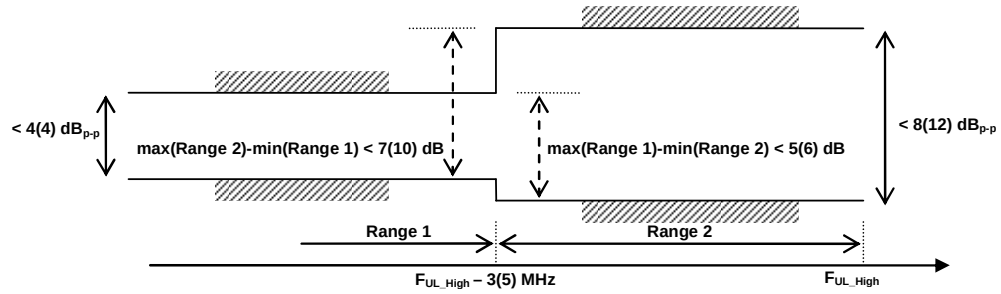


Figure 6.5.2.4.3-1: The limits for EVM equalizer spectrum flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement within brackets)

The normative reference for this requirement is TS 36.101 clause 6.5.2.4.1.

6.5.2.4.4 Test description

6.5.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.4.2.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2.4.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		See Table 6.5.1.4.1-1		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for EVM equalizer spectrum flatness testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to in Table 6.5.2.4.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2.4.4.3.

6.5.2.4.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2.4.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure spectrum flatness using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.5.2.4.5 Test requirement

Each of the 20 spectrum flatness functions, shall derive four ripple results in Annex E.4.4, The derived results shall not exceed the values in Figure 6.5.2.4.5-1:

For normal conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2.4.5-1 and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6.4 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 8.4 dB (see Figure 6.5.2.4.5-1).

For extreme conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2.4.5-2 and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 7.4 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 11.4 dB (see Figure 6.5.2.4.5-1).

Table 6.5.2.4.5-1: Test requirements for EVM equalizer spectrum flatness (normal conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 3$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 3$ MHz (Range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 3$ MHz or $F_{UL_High} - F_{UL_Meas} < 3$ MHz (Range 2)	9.4 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

Table 6.5.2.4.5-2: Test requirements for spectrum flatness (extreme conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 5$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 5$ MHz (Range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 5$ MHz or $F_{UL_High} - F_{UL_Meas} < 5$ MHz (Range 2)	13.4 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

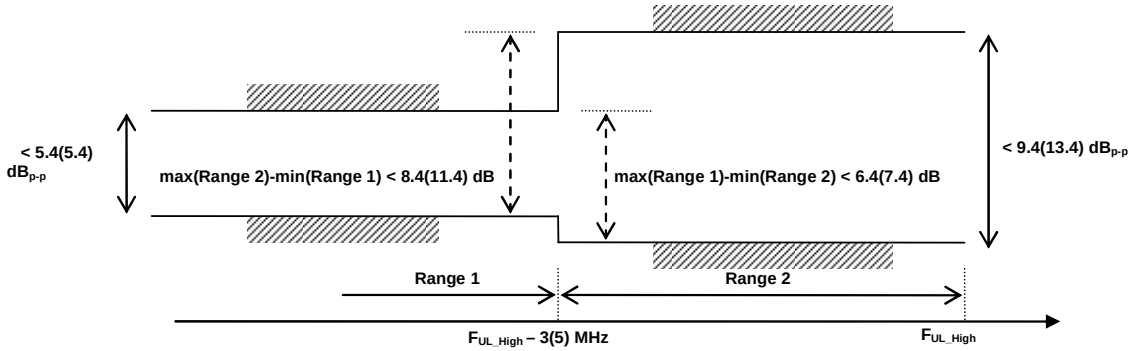


Figure 6.5.2.4.5-1: The limits for EVM equalizer spectrum flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement within brackets)

6.5.2.4E EVM equalizer spectrum flatness for UE category 0

6.5.2.4E.1 Test Purpose

Same test purpose as in clause 6.5.2.4.1.

6.5.2.4E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.5.2.4E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.4.3.

6.5.2.4E.4 Test description

6.5.2.4E.4.1 Initial conditions

Same initial conditions as in clause 6.5.2.4.4.1 with following exceptions:

- Instead of Table 6.5.2.4.4.1-1 → use Table 6.5.2.4E.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.5.2.4E.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	See Table 6.5.1.4.1-1			
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for EVM equalizer spectrum flatness testing	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	36	36
15MHz		QPSK	36	36
20MHz		QPSK	36	36
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.				

6.5.2.4E.4.2 Test procedure

Same test procedure as in clause 6.5.2.4.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard sub frame are not under test.

6.5.2.4E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.5.2.4E.5 Test requirement

Each of the 20 spectrum flatness functions, shall derive four ripple results in Annex E.4.4, The derived results shall not exceed the values in Figure 6.5.2.4E.5-1:

For normal conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2.4E.5-1 and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6.4 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 8.4 dB (see Figure 6.5.2.4E.5-1).

For extreme conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2.4E.5-2 and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 7.4 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 11.4 dB (see Figure 6.5.2.4E.5-1).

Table 6.5.2.4E.5-1: Test requirements for EVM equalizer spectrum flatness (normal conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 3$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 3$ MHz (Range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 3$ MHz or $F_{UL_High} - F_{UL_Meas} < 3$ MHz (Range 2)	9.4 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

Table 6.5.2.4E.5-2: Test requirements for spectrum flatness (extreme conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 5$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 5$ MHz (Range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 5$ MHz or $F_{UL_High} - F_{UL_Meas} < 5$ MHz (Range 2)	13.4 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

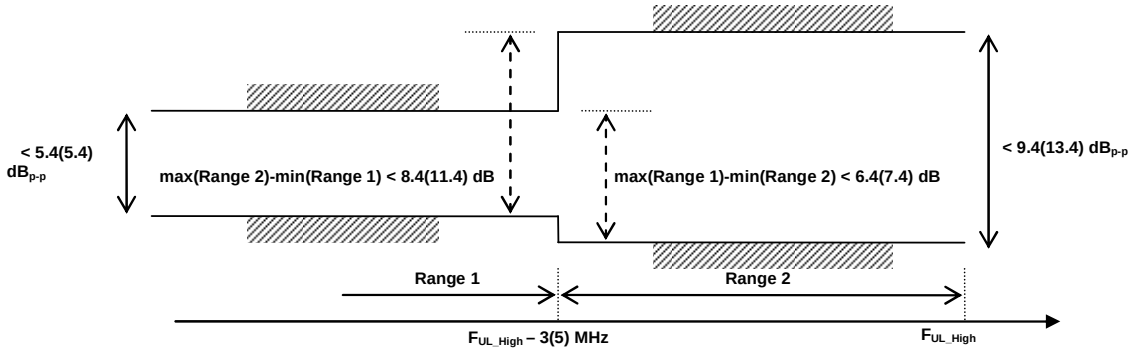


Figure 6.5.2.4E.5-1: The limits for EVM equalizer spectrum flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement within brackets)

6.5.2.4EA EVM equalizer spectrum flatness for UE category M1

6.5.2.4EA.1 Test Purpose

Same test purpose as in clause 6.5.2.4.1.

6.5.2.4EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.5.2.4EA.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.4.3.

6.5.2.4EA.4 Test description

6.5.2.4EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.4.2.4EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2

Table 6.5.2.4EA.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	See Table 6.5.1.4.1-1				
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	See Table 6.5.1.4.1-1				
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for EVM equalizer spectrum flatness testing	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
5MHz		QPSK	6	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2.4EA.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.5.2.4EA.4.3.

6.5.2.4EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.5.2.4EA.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure spectrum flatness using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods are not under test. Half-duplex guard sub frame are not under test.

6.5.2.4EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA.

6.5.2.4EA.5 Test requirement

Each of the 20 spectrum flatness functions, shall derive four ripple results in Annex E.4.4, The derived results shall not exceed the values in Figure 6.5.2.4EA.5-1:

For normal conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2.4EA.5-1 and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6.4 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 8.4 dB (see Figure 6.5.2.4EA.5-1).

For extreme conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2.4EA.5-2 and the following additional requirement: the relative difference between the maximum coefficient in

Range 1 and the minimum coefficient in Range 2 must not be larger than 7.4 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 11.4 dB (see Figure 6.5.2.4EA.5-1).

Table 6.5.2.4EA.5-1: Test requirements for EVM equalizer spectrum flatness (normal conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 3$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 3$ MHz (Range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 3$ MHz or $F_{UL_High} - F_{UL_Meas} < 3$ MHz (Range 2)	9.4 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

Table 6.5.2.4EA.5-2: Test requirements for spectrum flatness (extreme conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 5$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 5$ MHz (Range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 5$ MHz or $F_{UL_High} - F_{UL_Meas} < 5$ MHz (Range 2)	13.4 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

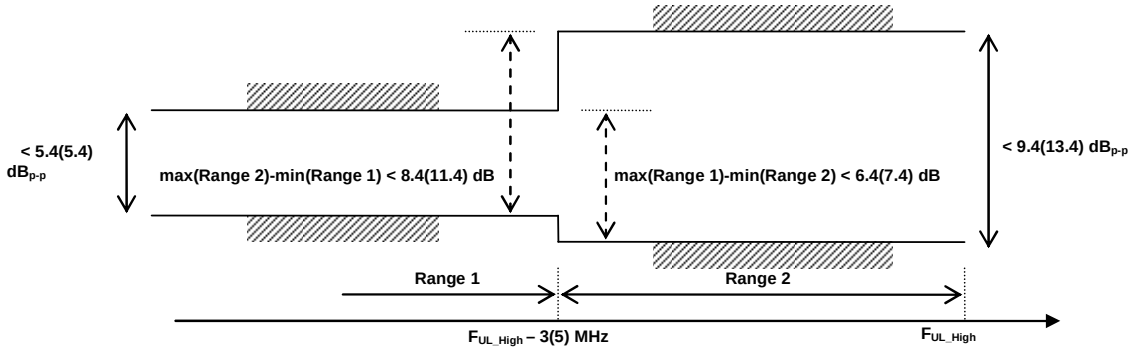


Figure 6.5.2.4EA.5-1: The limits for EVM equalizer spectrum flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement within brackets)

6.5.2.4G EVM equalizer spectrum flatness for V2X transmission

6.5.2.4G.1 Spectrum Emission Mask for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The test tolerance is left FFS for carrier frequency operating on band 47 f > 5GHz
- The test mode of Side link [5A-V2X] is FFS;

6.5.2.4G.1.1 Test Purpose

The zero-forcing equalizer correction applied in the EVM measurement process (as described in Annex E) must meet a spectrum flatness requirement for the EVM measurement to be valid. The EVM equalizer spectrum flatness is defined in terms of the maximum peak-to-peak ripple of the equalizer coefficients (dB) across the V2X sidelink allocated block variation in dB of the equalizer coefficients generated by the EVM measurement process. The EVM equalizer spectrum flatness requirement does not limit the correction applied to the signal in the EVM measurement process but for the EVM result to be valid, the equalizer correction that was applied must meet the EVM equalizer spectrum flatness minimum requirements. The basic measurement interval is the same as for EVM.

6.5.2.4G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that supports V2X communication.

6.5.2.4G.1.3 Minimum conformance requirements

The peak-to-peak variation of the EVM equalizer coefficients contained within the frequency range of the V2X sidelink allocation shall not exceed the maximum ripple. The EVM equalizer spectrum flatness shall not exceed the values specified in Table 6.5.2.4G.1.3-1 for normal conditions. For V2X sidelink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 5 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 7 dB (see Figure 6.5.2.4G.1.3-1).

The EVM equalizer spectrum flatness shall not exceed the values specified in Table 6.5.2.4G.1.3-2 for extreme conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 10 dB (see Figure 6.5.2.4G.1.3-1).

For intra-band contiguous multi-carrier operation the above EVM equalizer spectrum flatness requirement shall apply for each component carrier.

Table 6.5.2.4G.1.3-1: Minimum requirements for EVM equalizer spectrum flatness (normal conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 3$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 3$ MHz (Range 1)	4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 3$ MHz or $F_{UL_High} - F_{UL_Meas} < 3$ MHz (Range 2)	8 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2G-1	

Table 6.5.2.4G.1.3-2: Minimum requirements for EVM equalizer spectrum flatness (extreme conditions)

$F_{UL_Meas} - F_{UL_Low} \geq 5$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 5$ MHz (Range 1)	4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 5$ MHz or $F_{UL_High} - F_{UL_Meas} < 5$ MHz (Range 2)	12 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2G-1	

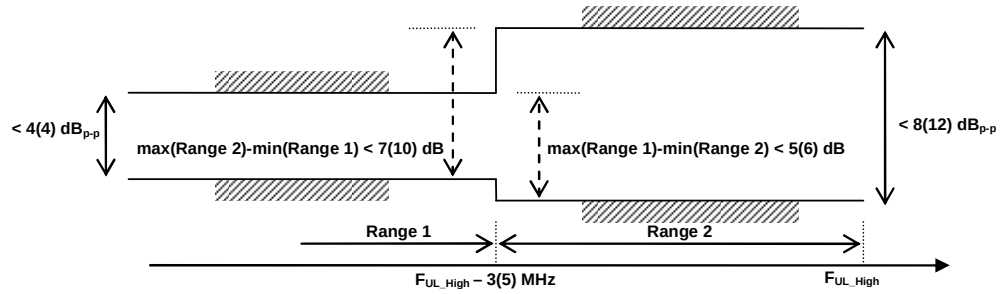


Figure 6.5.2.4G.1.3-1: The limits for EVM equalizer spectrum flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement within brackets)

The normative reference for this requirement is TS 36.101 clause 6.5.2.4.1.

6.5.2.4G.1.4 Test description

6.5.2.4G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.4G.1.4.1-1 the details of the sidelink reference measurement channels (RMCs) are specified in A.8.3 and reference GNSS configuration as defined in Table C.2-8.

Table 6.5.2.4G.1.4.1-1: Test Configuration Table for PSSCH and PSCCH

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		Low range, Mid range, High range
Test Channel Bandwidths (as specified in subclause 5.4.2G)		Lowest, Mid, Highest
Test Parameters for Channel Bandwidths		
	V2X sidelink transmission	
Ch BW	Mod'n	RB Allocation
10MHz	QPSK	48
20MHz	QPSK	96
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in specified in subclause 5.4.2G.		

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.67.

2. Propagation conditions are set according to Annex B.0;

3. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to SL-V2X-Preconfiguration in TS36.508 [7] subclause Table 6.8.2.1-1 with the exception specified in table 6.5.2.4G.1.4.3-1;

4. Ensure the UE is in Side link State [5A-V2X], according to TS 36.508 [7] clause [4.5.9];

6.5.2.4G.1.4.2 Test procedure

1. The V2X UE schedules the V2X RMC with transmission power at P_{UMAX} level according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.5.2.4G.1.4.1-1;

2. Measure spectrum flatness using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2.4G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause Table 6.8.2.1-1with the following exceptions:

Table 6.5.2.4G.1.4.3-1: SL-V2X-PreconfigFreqInfo-r14-DEFAULT

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-Preconfiguration-r14 ::= SEQUENCE {			
v2x-PreconfigFreqList-r14 SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE {	One entry of v2x-PreconfigFreqInfo		
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
maxTxPower-r12	23		Power class3
	26		Power class2
sl-bandwidth-r12	n50	10Mhz	
	n100	20Mhz	
}			
}			
v2x-CommPreconfigSync-r14 SEQUENCE {		SL-PreconfigSync-r12	
syncOffsetIndicators-r14 SEQUENCE {			
syncOffsetIndicator1-r14	Not Present	Double synchronization signal transmission	
}			
}			
v2x-CommRxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-RxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {	1 entry		
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.5.2.4G.1.4.3-2		
}			
v2x-CommTxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-TxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {			
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.5.2.4G.1.4.3-2		
}			
}			

Table 6.5.2.4G.1.4.3-2: SL-V2X-PreconfigCommPool-r14-DEFAULT

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-CommResroucePoolV2X-r14-DEFAULT ::= SEQUENCE {			
sl-Subframe-r14 CHOICE {			
bs20-r14	11111111111111111111		BITMAP_6
}			
sizeSubchannel-r14	N48		BW10
	N96		BW20
numSubchannel-r14	n1		
dataTxParameters-r14 SEQUENCE {			
p0-r12	31	It's set to the maximum value to disable its effect on transmission power.	
}			
}			

6.5.2.4G.1.5 Test requirement

Each of the 20 spectrum flatness functions, shall derive four ripple results in Annex E.4.4, The derived results shall not exceed the values in Figure 6.5.2.4G.5-1:

For normal conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2.4G.5-1and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 5+TT dB [TBD], and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 7+TT [TBD] dB (see Figure 6.5.2.4G.5-1).

For extreme conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2.4G.1.5-2 and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6+TT dB [TBD], and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 10+TT dB [TBD](see Figure 6.5.2.4G.1.5-1).

Table 6.5.2.4G.5-1: Test requirements for EVM equalizer spectrum flatness (normal conditions)

Frequency Range	**Maximum Ripple [dB]**
$F_{UL_Meas} - F_{UL_Low} \geq 3$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 3$ MHz (Range 1)	4+TT (p-p)
$F_{UL_Meas} - F_{UL_Low} < 3$ MHz or $F_{UL_High} - F_{UL_Meas} < 3$ MHz (Range 2)	8+TT (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

Table 6.5.2.4G.5-2: Test requirements for spectrum flatness (extreme conditions)

Frequency Range	**Maximum Ripple [dB]**
$F_{UL_Meas} - F_{UL_Low} \geq 5$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 5$ MHz (Range 1)	4+TT (p-p)
$F_{UL_Meas} - F_{UL_Low} < 5$ MHz or $F_{UL_High} - F_{UL_Meas} < 5$ MHz (Range 2)	12+TT (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

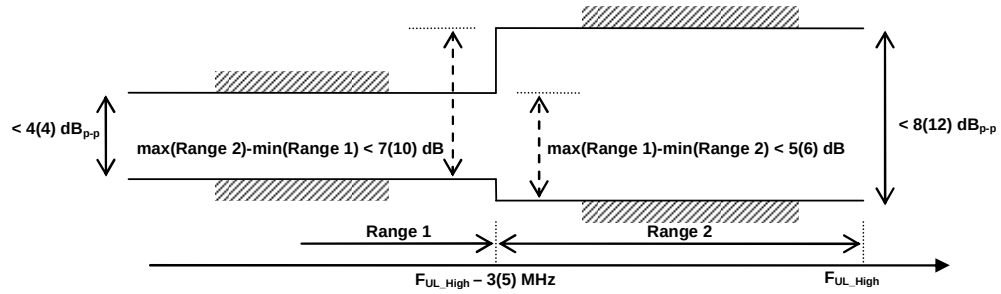


Figure 6.5.2.4G.5-1 [TT TBD]: The limits for EVM equalizer spectrum flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement within brackets)

6.5.2A Transmit modulation for CA

The requirements in this clause apply with PCC and SCC in the UL configured and activated: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

6.5.2A.1 Error Vector Magnitude (EVM) for CA

6.5.2A.1.0 Minimum conformance requirements

For inter-band carrier aggregation, EVM measurements are evaluated for each component carrier, and for the different modulations schemes, the EVM requirements shall not exceed the values specified in Table 6.5.2.1.3-1, if CA is configured in uplink.

For the intra-band non-contiguous carrier aggregation, EVM measurements are evaluated for each component carrier, and for the different modulations schemes, the EVM requirements shall not exceed the values specified in Table 6.5.2A.1.0-1, if CA is configured in uplink.

For the intra-band contiguous carrier aggregation, EVM measurements are evaluated for each component carrier, and for the different modulations schemes, the EVM requirements shall not exceed the values specified in Table 6.5.2A.1.0-1, if CA is configured in uplink.

Table 6.5.2A.1.0-1: Minimum requirements for Error Vector Magnitude

Parameter	Unit	Average EVM Level per CC	Reference Signal EVM Level
QPSK or BPSK	%	17.5	17.5
16QAM	%	12.5	12.5

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2A.1.

6.5.2A.1.1 Error Vector Magnitude (EVM) for CA (intra-band contiguous DL CA and UL CA)

6.5.2A.1.1.1 Test Purpose

For the intra-band contiguous carrier aggregation, the Error Vector Magnitude requirement should be defined for each component carrier. Requirement applies for the allocated component carrier, when all other component carriers are activated, but not allocated.

Similar transmitter impairment removal procedures are applied for CA waveform before EVM calculation as is specified for non-CA waveform in sub-section 6.5.2.1.

6.5.2A.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.5.2A.1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.1.0.

6.5.2A.1.1.4 Test description

6.5.2A.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.1.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1					NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes. PCC and SCC mapped onto component carriers CC according to the notation: PCC-SCC: CCi-CCj, which means PCC on CCi and SCC on CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous CA band in TS36.508 [7] as above.					See Table 6.5.1A.1.4.1-1: PCC-SCC: CC1-CC2 and CC2-CC1				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration					See Table 6.5.1A.1.4.1-1:				
Test Parameters for CA Configurations									
Config ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB} Note 1	**SCCs N_{RB} Note 1**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	50	50		QPSK	50	P_50@0	S_0@0	-	-
2	50	50		QPSK	12	P_12@0	S_0@0	-	-
3	50	50		QPSK	12	P_12@38	S_0@0	-	-
4	50	50		16QAM	50	P_50@0	S_0@0	-	-
5	50	50		16QAM	12	P_12@0	S_0@0	-	-
6	50	50		16QAM	12	P_12@38	S_0@0	-	-
7	50	25		QPSK	50	P_50@0	S_0@0	-	-
8	50	25		QPSK	25	P_25@0	S_0@0	-	-
9	50	25		QPSK	25	P_25@25	S_0@0	-	-
10	50	25		QPSK	8	P_8@0	S_0@0	-	-
11	50	25		QPSK	8	P_8@42	S_0@0	-	-
12	50	25		16QAM	50	P_50@0	S_0@0	-	-
13	50	25		16QAM	25	P_25@0	S_0@0	-	-
14	50	25		16QAM	25	P_25@25	S_0@0	-	-
15	50	25		16QAM	8	P_8@0	S_0@0	-	-
16	50	25		16QAM	8	P_8@42	S_0@0	-	-
17	25	50		QPSK	25	P_25@0	S_0@0	-	-
18	25	50		QPSK	12	P_12@0	S_0@0	-	-
19	25	50		QPSK	12	P_12@13	S_0@0	-	-
20	25	50		16QAM	25	P_25@0	S_0@0	-	-
21	25	50		16QAM	12	P_12@0	S_0@0	-	-

22	25	50		16QAM	12	P_12@13	S_0@0	-	-
23	75	75		QPSK	75	P_75@0	S_0@0	-	-
24	75	75		QPSK	16	P_16@0	S_0@0	-	-
25	75	75		QPSK	16	P_16@59	S_0@0	-	-
26	75	75		16QAM	75	P_75@0	S_0@0	-	-
27	75	75		16QAM	16	P_16@0	S_0@0	-	-
28	75	75		16QAM	16	P_16@59	S_0@0	-	-
29	100	25		QPSK	100	P_100@0	S_0@0	-	-
30	100	25		QPSK	25	P_25@0	S_0@0	-	-
31	100	25		QPSK	25	P_25@75	S_0@0	-	-
320	100	25		QPSK	8	P_8@0	S_0@0	-	-
33	100	25		QPSK	8	P_8@92	S_0@0	-	-
34	100	25		16QAM	100	P_100@0	S_0@0	-	-
35	100	25		16QAM	25	P_25@0	S_0@0	-	-
36	100	25		16QAM	25	P_25@75	S_0@0	-	-
37	100	25		16QAM	8	P_8@0	S_0@0	-	-
38	100	25		16QAM	8	P_8@92	S_0@0	-	-
39	25	100		QPSK	25	P_25@0	S_0@0	-	-
40	25	100		QPSK	8	P_8@0	S_0@0	-	-
41	25	100		QPSK	8	P_8@17	S_0@0	-	-
42	25	100		16QAM	25	P_25@0	S_0@0	-	-
43	25	100		16QAM	8	P_8@0	S_0@0	-	-
44	25	100		16QAM	8	P_8@17	S_0@0	-	-
453	100	50		QPSK	100	P_100@0	S_0@0	-	-
46	100	50		QPSK	50	P_50@0	S_0@0	-	-
47	100	50		QPSK	50	P_50@50	S_0@0	-	-
48	100	50		QPSK	12	P_12@0	S_0@0	-	-
49	100	50		QPSK	12	P_12@88	S_0@0	-	-
50	100	50		16QAM	100	P_100@0	S_0@0	-	-
51	100	50		16QAM	50	P_50@0	S_0@0	-	-
52	100	50		16QAM	50	P_50@50	S_0@0	-	-
53	100	50	N.A.	16QAM	12	P_12@0	S_0@0	-	-
54	100	50		16QAM	12	P_12@88	S_0@0	-	-
55	50	100		QPSK	50	P_50@0	S_0@0	-	-
56	50	100		QPSK	12	P_12@0	S_0@0	-	-
57	50	100		QPSK	12	P_12@38	S_0@0	-	-
58	50	100		16QAM	50	P_50@0	S_0@0	-	-
59	50	100		16QAM	12	P_12@0	S_0@0	-	-
60	50	100		16QAM	12	P_12@38	S_0@0	-	-
61	100	75		QPSK	100	P_100@0	S_0@0	-	-
62	100	75		QPSK	75	P_75@0	S_0@0	-	-
63	100	75		QPSK	75	P_75@25	S_0@0	-	-
64	100	75		QPSK	16	P_16@0	S_0@0	-	-
65	100	75		QPSK	16	P_16@84	S_0@0	-	-
66	100	75		16QAM	100	P_100@0	S_0@0	-	-
67	100	75		16QAM	75	P_75@0	S_0@0	-	-
68	100	75		16QAM	75	P_75@25	S_0@0	-	-
69	100	75		16QAM	16	P_16@0	S_0@0	-	-
70	100	75		16QAM	16	P_16@84	S_0@0	-	-
71	75	100		QPSK	75	P_75@0	S_0@0	-	-
72	75	100		QPSK	16	P_16@0	S_0@0	-	-
73	75	100		QPSK	16	P_16@59	S_0@0	-	-
74	75	100		16QAM	75	P_75@0	S_0@0	-	-
75	75	100		16QAM	16	P_16@0	S_0@0	-	-
76	75	100		16QAM	16	P_16@59	S_0@0	-	-
77	100	100		QPSK	100	P_100@0	S_0@0	-	-
78	100	100		QPSK	18	P_18@0	S_0@0	-	-
79	100	100		QPSK	18	P_18@82	S_0@0	-	-
80	100	100		16QAM	100	P_100@0	S_0@0	-	-
81	100	100		16QAM	18	P_18@0	S_0@0	-	-
82	100	100		16QAM	18	P_18@82	S_0@0	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.5.2A.1.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause [5.2A.2]. Message contents are defined in clause 6.5.2A.1.1.4.3.

6.5.2A.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.1.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at $P_{UMAX\ level}$.
6. Measure the EVM and $\overline{EVM}_{DMRS}$ on PCC using Global In-Channel Tx-Test (Annex E).
7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is –36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
8. Measure the EVM and $\overline{EVM}_{DMRS}$ on PCC using Global In-Channel Tx-Test (Annex E).

6.5.2A.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.1.1.5 Test requirement

The PUSCH EVM derived in E.4.2 shall not exceed 17,5 % for QPSK and BPSK, 12,5% for 16 QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in E.4.6.2 shall not exceed 17,5 % when embedded with data symbols of QPSK and BPSK, 12,5% for 16 QAM.

6.5.2A.1.1_1 EVM for CA (intra-band contiguous DL CA and UL CA) with UL 64QAM

6.5.2A.1.1_1.1 Test Purpose

Same test purpose as in clause 6.5.2A.1.1.1

6.5.2A.1.1_1.2 Test applicability

This test applies to E-UTRA UE from release 13 and forward that support intra-band contiguous DL CA and UL CA and UL 64QAM.

6.5.2A.1.1_1.3 Minimum conformance requirements

The EVM requirement for 64QAM is according to Table 6.5.2A.1.1_1.3-1 if CA is configured in uplink.

Table 6.5.2A.1.1_1.3-1: Minimum requirements for Error Vector Magnitude

Parameter	Unit	Average EVM Level per CC	Reference Signal EVM Level
64QAM	%	8	8

6.5.2A.1.1_1.4 Test description

6.5.2A.1.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.1.1_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.1.1_1.4.1-1: Test Configuration Table

<table>
<tr><th colspan="7">Initial Conditions</th></tr>
<tr><td colspan="4">Test Environment as specified in TS 36.508[7] subclause 4.1</td><td colspan="3">NC</td></tr>
<tr><td colspan="4">Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.
PCC and SCC mapped onto component carriers CC according to the notation: PCC-SCC: CCi-CCj, which means PCC on CCi and SCC on CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous CA band in TS36.508 [7] as above.</td><td colspan="3">See Table 6.5.1A.1.4.1-1:
PCC-SCC: CC1-CC2 and CC2-CC1</td></tr>
<tr><td colspan="4">Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration</td><td colspan="3">See Table 6.5.1A.1.4.1-1:</td></tr>
<tr><th colspan="7">Test Parameters for CA Configurations</th></tr>
<tr><th rowspan="2">Config ID</th><th colspan="2">CA Configuration / N_{RB_agg}</th><th rowspan="2">DL Allocation (PDCCH on PCC)</th><th rowspan="2">CC MOD</th><th colspan="2">UL Allocation</th></tr>
<tr><th>PCC N_{RB} Note 1</th><th>SCCs N_{RB} Note 1</th><th>N_{RB_alloc}</th><th>PCC & SCC RB allocations (L_{CRB} @ RB_{start})</th></tr>
</table>

1	50	50		64QAM	50	P_50@0	S_0@0		
2	50	50		64QAM	12	P_12@0	S_0@0		
3	50	50		64QAM	12	P_12@38	S_0@0		
4	50	25		64QAM	50	P_50@0	S_0@0		
5	50	25		64QAM	25	P_25@0	S_0@0		
6	50	25		64QAM	25	P_25@25	S_0@0		
7	50	25		64QAM	8	P_8@0	S_0@0		
8	50	25		64QAM	8	P_8@42	S_0@0		
9	25	50		64QAM	25	P_25@0	S_0@0		
10	25	50		64QAM	12	P_12@0	S_0@0		
11	25	50		64QAM	12	P_12@13	S_0@0		
12	50	75		64QAM	75	P_75@0	S_0@0	-	-
13	50	75		64QAM	16	P_16@0	S_0@0	-	-
14	50	75		64QAM	16	P_16@59	S_0@0	-	-
15	50	25		64QAM	100	P_100@0	S_0@0	-	-
16	50	25		64QAM	25	P_25@0	S_0@0	-	-
17	50	25		64QAM	25	P_25@75	S_0@0	-	-
18	50	25		64QAM	8	P_8@0	S_0@0	-	-
19	50	25		64QAM	8	P_8@92	S_0@0	-	-
20	25	100		64QAM	25	P_25@0	S_0@0	-	-
21	25	100		64QAM	8	P_8@0	S_0@0	-	-
22	25	100		64QAM	8	P_8@17	S_0@0	-	-
23	75	50		64QAM	100	P_100@0	S_0@0	-	-
24	100	50		64QAM	50	P_50@0	S_0@0	-	-
25	100	50		64QAM	50	P_50@50	S_0@0	-	-
26	100	50		64QAM	12	P_12@0	S_0@0	-	-
27	100	50		64QAM	12	P_12@88	S_0@0	-	-
28	50	100		64QAM	50	P_50@0	S_0@0	-	-
29	50	100		64QAM	12	P_12@0	S_0@0	-	-
30	50	100		64QAM	12	P_12@38	S_0@0	-	-
31	100	75		64QAM	100	P_100@0	S_0@0	-	-
32	100	75		64QAM	75	P_75@0	S_0@0	-	-
33	100	75		64QAM	75	P_75@25	S_0@0	-	-
34	100	75		64QAM	16	P_16@0	S_0@0	-	-
35	100	75		64QAM	16	P_16@84	S_0@0	-	-
36	75	100		64QAM	75	P_75@0	S_0@0	-	-
37	75	100		64QAM	16	P_16@0	S_0@0	-	-
38	75	100		64QAM	16	P_16@59	S_0@0	-	-
39	100	100		64QAM	100	P_100@0	S_0@0	-	-
40	100	100		64QAM	18	P_18@0	S_0@0	-	-
41	100	100		64QAM	18	P_18@82	S_0@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.5.2A.1.1_1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause [5.2A.2]. Message contents are defined in clause 6.5.2A.1.1_1.4.3.

6.5.2A.1.1_1.4.2 Test procedure

Same test procedure as in clause 6.5.2A.1.1.4.2

6.5.2A.1.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. For SCC configuration there are no additional message contents.

6.5.2A.1.1_1.5 Test requirement

The PUSCH EVM derived in E.4.2 shall not exceed 8% for 64QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in E.4.6.2 shall not exceed [8%] for 64QAM.

6.5.2A.1.2 Error Vector Magnitude (EVM) for CA (inter-band DL CA and UL CA)

6.5.2A.1.2.1 Test Purpose

For the inter-band carrier aggregation, the Error Vector Magnitude requirement should be defined for each component carrier. Requirement applies for the allocated component carrier, when all other component carriers are activated, but not allocated.

Similar transmitter impairment removal procedures are applied for CA waveform before EVM calculation as is specified for non-CA waveform in sub-section 6.5.2.1.

6.5.2A.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE Release 11 and forward that support inter-band DL CA and UL CA.

6.5.2A.1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.1.0.

6.5.2A.1.2.4 Test description

6.5.2A.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.1.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.1.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.			Low range for PCC and SCC High range for PCC and SCC			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC			
Test Parameters for CA Configurations						
Config ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**	
	PCC N_{RB} Note 1	**SCCs N_{RB} Note 1**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**

1	6	25		QPSK	1	P_1@0	S_0@0	-	-
2	6	25		QPSK	1	P_1@5	S_0@0	-	-
3	6	25		QPSK	6	P_6@0	S_0@0	-	-
4	6	25		16QAM	1	P_1@0	S_0@0	-	-
5	6	25		16QAM	1	P_1@5	S_0@0	-	-
6	6	25		16QAM	6	P_6@0	S_0@0	-	-
7	6	50		QPSK	1	P_1@0	S_0@0	-	-
8	6	50		QPSK	1	P_1@5	S_0@0	-	-
9	6	50		QPSK	6	P_6@0	S_0@0	-	-
10	6	50		16QAM	1	P_1@0	S_0@0	-	-
11	6	50		16QAM	1	P_1@5	S_0@0	-	-
12	6	50		16QAM	6	P_6@0	S_0@0	-	-
13	15	25		QPSK	4	P_4@0	S_0@0	-	-
14	15	25		QPSK	4	P_4@11	S_0@0	-	-
15	15	25		QPSK	15	P_15@0	S_0@0	-	-
16	15	25		16QAM	4	P_4@0	S_0@0	-	-
17	15	25		16QAM	4	P_4@11	S_0@0	-	-
18	15	25		16QAM	15	P_15@0	S_0@0	-	-
19	25	6		QPSK	8	P_8@0	S_0@0	-	-
20	25	6		QPSK	8	P_8@17	S_0@0	-	-
21	25	6		QPSK	25	P_25@0	S_0@0	-	-
22	25	6		16QAM	8	P_8@0	S_0@0	-	-
23	25	6		16QAM	8	P_8@17	S_0@0	-	-
24	25	6		16QAM	25	P_25@0	S_0@0	-	-
25	25	15		QPSK	8	P_8@0	S_0@0	-	-
26	25	15		QPSK	8	P_8@17	S_0@0	-	-
27	25	15		QPSK	25	P_25@0	S_0@0	-	-
28	25	15		16QAM	8	P_8@0	S_0@0	-	-
29	25	15		16QAM	8	P_8@17	S_0@0	-	-
30	25	15		16QAM	25	P_25@0	S_0@0	-	-
31	25	25		QPSK	8	P_8@0	S_0@0	-	-
32	25	25		QPSK	8	P_8@17	S_0@0	-	-
33	25	25	N.A.	QPSK	25	P_25@0	S_0@0	-	-
34	25	25		16QAM	8	P_8@0	S_0@0	-	-
35	25	25		16QAM	8	P_8@17	S_0@0	-	-
36	25	25		16QAM	25	P_25@0	S_0@0	-	-
37	25	50		QPSK	8	P_8@0	S_0@0	-	-
38	25	50		QPSK	8	P_8@17	S_0@0	-	-
39	25	50		QPSK	25	P_25@0	S_0@0	-	-
40	25	50		16QAM	8	P_8@0	S_0@0	-	-
41	25	50		16QAM	8	P_8@17	S_0@0	-	-
42	25	50		16QAM	25	P_25@0	S_0@0	-	-
43	50	6		QPSK	12	P_12@0	S_0@0	-	-
44	50	6		QPSK	12	P_12@38	S_0@0	-	-
45	50	6		QPSK	50	P_50@0	S_0@0	-	-
46	50	6		16QAM	12	P_12@0	S_0@0	-	-
47	50	6		16QAM	12	P_12@38	S_0@0	-	-
48	50	6		16QAM	50	P_50@0	S_0@0	-	-
49	50	25		QPSK	12	P_12@0	S_0@0	-	-
50	50	25		QPSK	12	P_12@38	S_0@0	-	-
51	50	25		QPSK	50	P_50@0	S_0@0	-	-
52	50	25		16QAM	12	P_12@0	S_0@0	-	-
53	50	25		16QAM	12	P_12@38	S_0@0	-	-
54	50	25		16QAM	50	P_50@0	S_0@0	-	-
55	50	50		QPSK	12	P_12@0	S_0@0	-	-
56	50	50		QPSK	12	P_12@38	S_0@0	-	-
57	50	50		QPSK	50	P_50@0	S_0@0	-	-
58	50	50		16QAM	12	P_12@0	S_0@0	-	-
59	50	50		16QAM	12	P_12@38	S_0@0	-	-
60	50	50		16QAM	50	P_50@0	S_0@0	-	-
61	50	100		QPSK	12	P_12@0	S_0@0	-	-
62	50	100		QPSK	12	P_12@38	S_0@0	-	-
63	50	100		QPSK	50	P_50@0	S_0@0	-	-
64	50	100		16QAM	12	P_12@0	S_0@0	-	-
65	50	100		16QAM	12	P_12@38	S_0@0	-	-

66	50	100		16QAM	50	P_50@0	S_0@0	-	-
67	75	75		QPSK	16	P_16@0	S_0@0	-	-
68	75	75		QPSK	16	P_16@59	S_0@0	-	-
69	75	75		QPSK	75	P_75@0	S_0@0	-	-
70	75	75		16QAM	16	P_16@0	S_0@0	-	-
71	75	75		16QAM	16	P_16@59	S_0@0	-	-
72	75	75		16QAM	75	P_75@0	S_0@0	-	-
73	75	100		QPSK	16	P_16@0	S_0@0	-	-
74	75	100		QPSK	16	P_16@59	S_0@0	-	-
75	75	100		QPSK	75	P_75@0	S_0@0	-	-
76	75	100		16QAM	16	P_16@0	S_0@0	-	-
77	75	100		16QAM	16	P_16@59	S_0@0	-	-
78	75	100		16QAM	75	P_75@0	S_0@0	-	-
79	100	50		QPSK	18	P_18@0	S_0@0	-	-
80	100	50		QPSK	18	P_18@82	S_0@0	-	-
81	100	50		QPSK	100	P_100@0	S_0@0	-	-
82	100	50		16QAM	18	P_18@0	S_0@0	-	-
83	100	50		16QAM	18	P_18@82	S_0@0	-	-
84	100	50		16QAM	100	P_100@0	S_50@0	-	-
85	100	75		QPSK	18	P_18@0	S_0@0	-	-
86	100	75		QPSK	18	P_18@82	S_0@0	-	-
87	100	75		QPSK	100	P_100@0	S_0@0	-	-
88	100	75		16QAM	18	P_18@0	S_0@0	-	-
89	100	75		16QAM	18	P_18@82	S_0@0	-	-
90	100	75		16QAM	100	P_100@0	S_0@0	-	-
91	100	100		QPSK	18	P_18@0	S_0@0	-	-
92	100	100		QPSK	18	P_18@82	S_0@0	-	-
93	100	100		QPSK	100	P_100@0	S_0@0	-	-
94	100	100		16QAM	18	P_18@0	S_0@0	-	-
95	100	100		16QAM	18	P_18@82	S_0@0	-	-
96	100	100		16QAM	100	P_100@0	S_0@0	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: The frequencies of PCC and SCC shall be switched and tested in each configuration.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL RMC is set according to Table 6.5.2A.1.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.1.2.4.3.

6.5.2A.1.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.1.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at $P_{UMAX\ level}$.

6. Measure the EVM and $\overline{EVM}_{DMRS}$ on PCC using Global In-Channel Tx-Test (Annex E).

7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is –36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

8. Measure the EVM and $\overline{EVM}_{DMRS}$ on PCC using Global In-Channel Tx-Test (Annex E).

6.5.2A.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.1.2.5 Test requirement

The PUSCH EVM derived in Annex E.4.2 shall not exceed 17,5 % for QPSK and BPSK, 12,5% for 16 QAM. The PUSCH $\overline{EVM}_{DMRS}$ derived in Annex E.4.6.2 shall not exceed 17,5 % when embedded with data symbols of QPSK and BPSK, 12,5% for 16 QAM.

6.5.2A.1.2_1 Error Vector Magnitude (EVM) for CA (inter-band DL CA and UL CA) for UL 64QAM

6.5.2A.1.2_1.1 Test Purpose

For the inter-band carrier aggregation, the Error Vector Magnitude requirement should be defined for each component carrier. Requirement applies for the allocated component carrier, when all other component carriers are activated, but not allocated.

Similar transmitter impairment removal procedures are applied for CA waveform before EVM calculation as is specified for non-CA waveform in sub-section 6.5.2.1.

6.5.2A.1.2_1.2 Test applicability

This test case applies to all types of E-UTRA UE Release 13 and forward that support inter-band DL CA and UL CA and UL 64QAM.

6.5.2A.1.2_1.3 Minimum conformance requirements

The EVM requirement for 64QAM is according to Table 6.5.2A.1.1_1.3-1 if CA is configured in uplink.

Table 6.5.2A.1.2_1.3-1: Minimum requirements for Error Vector Magnitude

Parameter	Unit	Average EVM Level	Reference Signal EVM Level
64QAM	%	8	8

6.5.2A.1.2_1.4 Test description

6.5.2A.1.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.1.2_1.4.1-1. The details of the uplink reference

measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.1.2_1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508 [7] subclause 4.1			NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.			Mid range for PCC and SCC						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC						
Test Parameters for CA Configurations									
Config ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB} Note 1	**SCCs N_{RB} Note 1**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	6	25	N/A for this test	64QAM	1	P_1@0	S_0@0	-	-
2	6	25		64QAM	1	P_1@5	S_0@0	-	-
3	6	25		64QAM	6	P_6@0	S_0@0	-	-
4	6	50		64QAM	1	P_1@0	S_0@0	-	-
5	6	50		64QAM	1	P_1@5	S_0@0	-	-
6	6	50		64QAM	6	P_6@0	S_0@0	-	-
7	15	25		64QAM	4	P_4@0	S_0@0	-	-
8	15	25		64QAM	4	P_4@11	S_0@0	-	-
9	15	25		64QAM	15	P_15@0	S_0@0	-	-
10	25	6		64QAM	8	P_8@0	S_0@0	-	-
11	25	6		64QAM	8	P_8@17	S_0@0	-	-
12	25	6		64QAM	25	P_25@0	S_0@0	-	-
13	25	15		64QAM	8	P_8@0	S_0@0	-	-
14	25	15		64QAM	8	P_8@17	S_0@0	-	-
15	25	15		64QAM	25	P_25@0	S_0@0	-	-
16	25	25		64QAM	8	P_8@0	S_0@0	-	-
17	25	25		64QAM	8	P_8@17	S_0@0	-	-
18	25	25		64QAM	25	P_25@0	S_0@0	-	-
19	25	50		64QAM	8	P_8@0	S_0@0	-	-
20	25	50		64QAM	8	P_8@17	S_0@0	-	-
21	25	50		64QAM	25	P_25@0	S_0@0	-	-
22	50	6		64QAM	12	P_12@0	S_0@0	-	-
23	50	6		64QAM	12	P_12@38	S_0@0	-	-
24	50	6		64QAM	50	P_50@0	S_0@0	-	-
25	50	25		64QAM	12	P_12@0	S_0@0	-	-
26	50	25		64QAM	12	P_12@38	S_0@0	-	-
27	50	25		64QAM	50	P_50@0	S_0@0	-	-
28	50	50		64QAM	12	P_12@0	S_0@0	-	-
29	50	50		64QAM	12	P_12@38	S_0@0	-	-
30	50	50		64QAM	50	P_50@0	S_0@0	-	-
31	50	100		64QAM	12	P_12@0	S_0@0	-	-
32	50	100		64QAM	12	P_12@38	S_0@0	-	-
33	50	100		64QAM	50	P_50@0	S_0@0	-	-
34	75	75		64QAM	16	P_16@0	S_0@0	-	-
35	75	75		64QAM	16	P_16@59	S_0@0	-	-
36	75	75		64QAM	75	P_75@0	S_0@0	-	-
37	75	100		64QAM	16	P_16@0	S_0@0	-	-
38	75	100		64QAM	16	P_16@59	S_0@0	-	-
39	75	100		64QAM	75	P_75@0	S_0@0	-	-
40	100	50		64QAM	18	P_18@0	S_0@0	-	-
41	100	50		64QAM	18	P_18@82	S_0@0	-	-
42	100	50		64QAM	100	P_100@0	S_0@0	-	-
43	100	75		64QAM	18	P_18@0	S_0@0	-	-
44	100	75		64QAM	18	P_18@82	S_0@0	-	-

45	100	75		64QAM	100	P_100@0	S_0@0	-	-
46	100	100		64QAM	18	P_18@0	S_0@0	-	-
47	100	100		64QAM	18	P_18@82	S_0@0	-	-
48	100	100		64QAM	100	P_100@0	S_0@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: The frequencies of PCC and SCC shall be switched and tested in each configuration.									

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL RMC is set according to Table 6.5.2A.1.2_1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.1.2_1.4.3.

6.5.2A.1.2_1.4.2 Test procedure

Same test procedure as in clause 6.5.2A.1.2.4.2.

6.5.2A.1.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.1.2_1.5 Test requirement

The PUSCH EVM derived in Annex E.4.2 shall not exceed 8% for 64QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in Annex E.4.6.2 shall not exceed 8% when embedded with data symbols of 64QAM.

6.5.2A.1.3 Error Vector Magnitude (EVM) for CA (intra-band non-contiguous DL CA and UL CA)

6.5.2A.1.3.1 Test Purpose

For the intra-band non-contiguous carrier aggregation, the Error Vector Magnitude requirement should be defined for each component carrier. Requirement applies for the allocated component carrier, when all other component carriers are activated, but not allocated.

Similar transmitter impairment removal procedures are applied for CA waveform before EVM calculation as is specified for non-CA waveform in sub-section 6.5.2.1.

6.5.2A.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE Release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.5.2A.1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.1.0.

6.5.2A.1.3.4 Test description

6.5.2A.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.1.3.4.1-1: Test Configuration

Table Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Low Range for CC1; High Range for CC2 PCC-SCC: CC1-CC2 and CC2-CC1
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC

Test Parameters for CA Configurations									
ID	CA Configuration / N_{RB_agg}		W_{gap} [MHz]	DL Allocation		UL Allocation			
	PCC N_{RB}	SCCs N_{RB}		CC MOD	PCC & SCC RB allocation	CC MOD	PCC N_{RB_alloc} (L_{CRB} @ RB_{start})	CC MOD	SCC N_{RB_alloc} (L_{CRB} @ RB_{start})
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	QPSK	N/A	QPSK	P_8@0	QPSK	S_0@0
2	25	25	35	QPSK		QPSK	P_8@17	QPSK	S_0@0
3	25	25	35	QPSK		QPSK	P_25@0	QPSK	S_0@0
4	25	25	35	16QAM		16QAM	P_8@0	16QAM	S_0@0
5	25	25	35	16QAM		16QAM	P_8@17	16QAM	S_0@0
6	25	25	35	16QAM		16QAM	P_25@0	16QAM	S_0@0
7	50	50	25	QPSK		QPSK	P_12@0	QPSK	S_0@0
8	50	50	25	QPSK		QPSK	P_12@38	QPSK	S_0@0
9	50	50	25	QPSK		QPSK	P_50@0	QPSK	S_0@0
10	50	50	25	16QAM		16QAM	P_12@0	16QAM	S_0@0
11	50	50	25	16QAM		16QAM	P_12@38	16QAM	S_0@0
12	50	50	25	16QAM		16QAM	P_50@0	16QAM	S_0@0
13	75	75	15	QPSK		QPSK	P_16@0	QPSK	S_0@0
14	75	75	15	QPSK		QPSK	P_16@59	QPSK	S_0@0
15	75	75	15	QPSK		QPSK	P_75@0	QPSK	S_0@0
16	75	75	15	16QAM		16QAM	P_16@0	16QAM	S_0@0
17	75	75	15	16QAM		16QAM	P_16@59	16QAM	S_0@0
18	75	75	15	16QAM		16QAM	P_75@0	16QAM	S_0@0
19	100	100	5	QPSK		QPSK	P_18@0	QPSK	S_0@0
20	100	100	5	QPSK		QPSK	P_18@82	QPSK	S_0@0
21	100	100	5	QPSK		QPSK	P_100@0	QPSK	S_0@0
22	100	100	5	16QAM		16QAM	P_18@0	16QAM	S_0@0
23	100	100	5	16QAM		16QAM	P_18@82	16QAM	S_0@0
24	100	100	5	16QAM		16QAM	P_100@0	16QAM	S_0@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL RMC is set according to Table 6.5.2A.1.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.1.3.4.3.

6.5.2A.1.3.4.2 Test procedure

Test procedures should be as follows:

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.1.3.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at $P_{UMAX\ level}$.
6. Measure the EVM and $\overline{EVM}_{DMRS}$ on PCC using Global In-Channel Tx-Test (Annex E).
7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is –36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
8. Measure the EVM and $\overline{EVM}_{DMRS}$ on PCC using Global In-Channel Tx-Test (Annex E).

6.5.2A.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.1.3.5 Test requirement

The PUSCH EVM derived in Annex E.4.2 shall not exceed 17,5 % for QPSK and BPSK, 12,5% for 16 QAM. The PUSCH $\overline{EVM}_{DMRS}$ derived in Annex E.4.6.2 shall not exceed 17,5 % when embedded with data symbols of QPSK and BPSK, 12,5% for 16 QAM.

6.5.2A.1.3_1 Error Vector Magnitude (EVM) for CA (intra-band non-contiguous DL CA and UL CA) for UL 64QAM

6.5.2A.1.3_1.1 Test Purpose

For the intra-band non-contiguous carrier aggregation, the Error Vector Magnitude requirement should be defined for each component carrier. Requirement applies for the allocated component carrier, when all other component carriers are activated, but not allocated.

Similar transmitter impairment removal procedures are applied for CA waveform before EVM calculation as is specified for non-CA waveform in sub-section 6.5.2.1.

6.5.2A.1.3_1.2 Test applicability

This test case applies to all types of E-UTRA UE Release 13 and forward that support intra-band non-contiguous DL CA and UL CA and UL 64QAM.

6.5.2A.1.3_1.3 Minimum conformance requirements

The EVM requirement for 64QAM is according to Table 6.5.2A.1.1_1.3-1 if CA is configured in uplink.

Table 6.5.2A.1.1_1.3-1: Minimum requirements for Error Vector Magnitude

Parameter	Unit	Average EVM Level per CC	Reference Signal EVM Level
64QAM	%	8	8

6.5.2A.1.3_1.4 Test description

6.5.2A.1.3_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.1.3_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.1.3_1.4.1-1: Test Configuration

Table Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Low Range for CC1; High Range for CC2 PCC-SCC: CC1-CC2 and CC2-CC1
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC

Test Parameters for CA Configurations

ID	CA Configuration / N_{RB_agg}		W_{gap} [MHz]	DL Allocation		UL Allocation			
	PCC N_{RB}	SCCs N_{RB}		CC MOD	PCC & SCC RB allocation	CC MOD	PCC N_{RB_alloc} (L_{CRB} @ RB_{start})	CC MOD	SCC N_{RB_alloc} (L_{CRB} @ RB_{start})
1	25	25	35	64QAM	N/A	64QAM	P_8@0	64QAM	S_0@0
2	25	25	35	64QAM		64QAM	P_8@17	64QAM	S_0@0
3	25	25	35	64QAM		64QAM	P_25@0	64QAM	S_0@0
4	50	50	25	64QAM		64QAM	P_12@0	64QAM	S_0@0
5	50	50	25	64QAM		64QAM	P_12@38	64QAM	S_0@0
6	50	50	25	64QAM		64QAM	P_50@0	64QAM	S_0@0
7	75	75	15	64QAM		64QAM	P_16@0	64QAM	S_0@0
8	75	75	15	64QAM		64QAM	P_16@59	64QAM	S_0@0
9	75	75	15	64QAM		64QAM	P_75@0	64QAM	S_0@0
10	100	100	5	64QAM		64QAM	P_18@0	64QAM	S_0@0
11	100	100	5	64QAM		64QAM	P_18@82	64QAM	S_0@0
12	100	100	5	64QAM		64QAM	P_100@0	64QAM	S_0@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL RMC is set according to Table 6.5.2A.1.3_1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.1.3_1.4.3.

6.5.2A.1.3_1.4.2 Test procedure

Same test procedure as in clause 6.5.2A.1.3.4.2.

6.5.2A.1.3_1.4.3 Message contents

Same message contents as in clause 6.5.2A.1.3.4.3.

6.5.2A.1.3_1.5 Test requirement

The PUSCH EVM derived in Annex E.4.2 shall not exceed 8 % for 64QAM. The PUSCH $\overline{EVM}_{DMRS}$ derived in Annex E.4.6.2 shall not exceed 8 % when embedded with data symbols of 64QAM.

6.5.2A.1.4 Error Vector Magnitude (EVM) for CA (3UL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- The test applicability is TBD

- Test Configuration Table is TBD

- Part 2 spec needs to be added

6.5.2A.1.4.1 Test Purpose

The Error Vector Magnitude requirement should be defined for each component carrier. Requirement applies for the allocated component carrier, when all other component carriers are activated, but not allocated.

Similar transmitter impairment removal procedures are applied for CA waveform before EVM calculation as is specified for non-CA waveform in sub-section 6.5.2.1.

6.5.2A.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support 3DL and 3UL with Intra-band contiguous CA or with Intra-band contiguous and Inter-band CA.

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6.5.2A.1.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.1.0.

6.5.2A.1.4.4 Test description

6.5.2A.1.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2 for CA configurations with two bands. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.1.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.1.4.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes. PCC and SCC mapped onto component carriers CC according to the notation: PCC-SCC: CCi-CCj, which means PCC on CCi and SCC on CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous CA band in TS36.508 [7] as above.	See Table 6.5.1A.1.4.1-1: PCC-SCC: CC1-CC2 and CC2-CC1[TBD]
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	See Table 6.5.1A.1.4.1-1:[TBD]
Test Parameters for CA Configurations	
FFS	

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A, Figure A.55 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.5.2A.1.4.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.1.4.4.3.

6.5.2A.1.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.1.4.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.1.4.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at $P_{UMAX\ level}$.
6. Measure the EVM and $\overline{EVM}_{DMRS}$ on PCC using Global In-Channel Tx-Test (Annex E).
7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is –36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
8. Measure the EVM and $\overline{EVM}_{DMRS}$ on PCC using Global In-Channel Tx-Test (Annex E).

6.5.2A.1.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

6.5.2A.1.4.5 Test requirement

The PUSCH EVM derived in E.4.2 shall not exceed 17,5 % for QPSK and BPSK, 12,5% for 16 QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in E.4.6.2 shall not exceed 17,5 % when embedded with data symbols of QPSK and BPSK, 12,5% for 16 QAM.

6.5.2A.2 Carrier leakage for CA

6.5.2A.2.0 Minimum conformance requirements

For inter-band carrier aggregation, the relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.5.2A.2.0-1.

For the intra-band non-contiguous carrier aggregation, the relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.5.2A.2.0-1.

For the intra-band contiguous carrier aggregation, the relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.5.2A.2.0-1.

Table 6.5.2A.2.0-1: Minimum requirements for Relative Carrier Leakage Power

Carrier Leakage	Parameters	Relative Limit (dBc)
	Output power >0 dBm	-25
	-30 dBm ≤ Output power ≤0 dBm	-20
	-40 dBm ≤ Output power < -30 dBm	-10

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2A.2.

6.5.2A.2.1 Carrier leakage for CA (intra-band contiguous DL CA and UL CA)

6.5.2A.2.1.1 Test Purpose

Carrier leakage is an additive sinusoid waveform that is confined within the aggregated transmission bandwidth configuration. The carrier leakage requirement is defined for each component carrier and is measured on the component carrier with PRBs allocated. The measurement interval is one slot in the time domain.

6.5.2A.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.5.2A.2.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.2.0

6.5.2A.2.1.4 Test description

6.5.2A.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.2.1.4.1-1. The details of the uplink reference

measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.2.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC						
Test Frequencies as specified in TS36.508 [7] subclause [4.3.1] for different CA bandwidth classes. PCC and SCC mapped onto component carriers CC according to the notation: PCC-SCC: CCi-CCj, which means PCC on CCi and SCC on CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous CA band in TS36.508 [7] as above.			See Table 6.5.1A.1.4.1-1: PCC-SCC: CC1-CC2 and CC2-CC1						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			See Table 6.5.1A.1.4.1-1:						
Test Parameters for CA Configurations									
Config ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB} Note 1	**SCCs N_{RB} Note 1**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	50	50		QPSK	12	P_12@0	S_0@0		
2	50	50		QPSK	12	P_12@38	S_0@0		
3	50	25		QPSK	8	P_8@0	S_0@0		
4	50	25		QPSK	8	P_8@42	S_0@0		
5	25	50		QPSK	8	P_8@0	S_0@0		
6	25	50		QPSK	8	P_8@17	S_0@0		
7	75	75	NA	QPSK	16	P_16@0	S_0@0	-	-
8	75	75		QPSK	16	P_16@59	S_0@0	-	-
9	100	25		QPSK	8	P_8@0	S_0@0	-	-
10	100	25		QPSK	8	P_8@92	S_0@0	-	-
11	25	100		QPSK	8	P_8@0	S_0@0	-	-
12	25	100		QPSK	8	P_8@17	S_0@0	-	-
13	100	50		QPSK	12	P_12@0	S_0@0	-	-
14	100	50		QPSK	12	P_12@88	S_0@0	-	-
15	50	100		QPSK	12	P_12@0	S_0@0	-	-
16	50	100		QPSK	12	P_12@38	S_0@0	-	-
17	100	75		QPSK	16	P_16@0	S_0@0	-	-
18	100	75		QPSK	16	P_16@84	S_0@0	-	-
19	75	100		QPSK	16	P_16@0	S_0@0	-	-
20	75	100		QPSK	16	P_16@59	S_0@0	-	-
21	100	100		QPSK	18	P_18@0	S_0@0	-	-
22	100	100		QPSK	18	P_18@82	S_0@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.									

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to in Table 6.5.2A.2.1.4.1-1.

5. Propagation conditions are set according to Annex B.0

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.2.1.4.3.

6.5.2A.2.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.2.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.2.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
6. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.
7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
8. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.
9. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
10. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2A.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.2.1.5 Test requirement

Each of the 20 carrier leakage results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2A.2.1.5-1.

Table 6.5.2A.2.1.5-1: Test requirements for Relative Carrier Leakage Power

Carrier Leakage	Parameters	Relative Limit (dBc)
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	-24.2
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	-19.2
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	-9.2

6.5.2A.2.2 Carrier leakage for CA (inter-band DL CA and UL CA)

6.5.2A.2.2.1 Test Purpose

Carrier leakage is an additive sinusoid waveform that is confined within the aggregated transmission bandwidth configuration. The carrier leakage requirement is defined for each component carrier and is measured on the component carrier with PRBs allocated. The measurement interval is one slot in the time domain.

6.5.2A.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE Release 11 and forward that support inter-band DL CA and UL CA.

6.5.2A.2.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.2.0.

6.5.2A.2.2.4 Test description

6.5.2A.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.2.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.2.2.4.1-1: Test Configuration Table

<table>
<tr><th colspan="7">Initial Conditions</th></tr>
<tr><td colspan="4">Test Environment as specified in TS 36.508 [7] subclause 4.1</td><td colspan="3">NC</td></tr>
<tr><td colspan="4">Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.</td><td colspan="3">Low range for PCC and SCC
High range for PCC and SCC</td></tr>
<tr><td colspan="4">Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration</td><td colspan="3">Lowest N_{RB} for PCC and SCC
Highest N_{RB} for PCC and SCC</td></tr>
<tr><th colspan="7">Test Parameters for CA Configurations</th></tr>
<tr><th rowspan="2">Config ID</th><th colspan="2">CA Configuration / N_{RB_agg}</th><th rowspan="2">DL Allocation (PDCCH on PCC)</th><th rowspan="2">CC MOD</th><th colspan="2">UL Allocation</th></tr>
<tr><th>PCC N_{RB} Note 1</th><th>SCCs N_{RB} Note 1</th><th>N_{RB_alloc}</th><th>PCC & SCC RB allocations (L_{CRB} @ RB_{start})</th></tr>
</table>

1	6	25		QPSK	5	P_5@0	S_0@0	-	-
2	6	25		QPSK	1	P_1@0	S_0@0	-	-
3	6	25		QPSK	1	P_1@5	S_0@0	-	-
4	15	25		QPSK	4	P_4@0	S_0@0	-	-
5	15	25		QPSK	4	P_4@11	S_0@0	-	-
6	15	50		QPSK	4	P_4@0	S_0@0	-	-
7	15	50		QPSK	4	P_4@11	S_0@0	-	-
8	25	6		QPSK	8	P_8@0	S_0@0	-	-
9	25	6		QPSK	8	P_8@17	S_0@0	-	-
10	25	15		QPSK	8	P_8@0	S_0@0	-	-
11	25	15		QPSK	8	P_8@17	S_0@0	-	-
12	25	25		QPSK	8	P_8@0	S_0@0	-	-
13	25	25		QPSK	8	P_8@17	S_0@0	-	-
14	25	50		QPSK	8	P_8@0	S_0@0	-	-
15	25	50	NA	QPSK	8	P_8@17	S_0@0	-	-
16	50	15		QPSK	12	P_12@0	S_0@0	-	-
17	50	15		QPSK	12	P_12@38	S_0@0	-	-
180	50	25		QPSK	12	P_12@0	S_0@0	-	-
19	50	25		QPSK	12	P_12@38	S_0@0	-	-
20	50	50		QPSK	12	P_12@0	S_0@0	-	-
21	50	50		QPSK	12	P_12@38	S_0@0	-	-
22	50	100		QPSK	12	P_12@0	S_0@0	-	-
23	50	100		QPSK	12	P_12@38	S_0@0	-	-
24	75	75		QPSK	16	P_16@0	S_0@0		
25	75	75		QPSK	16	P_16@59	S_0@0	-	-
26	100	50		QPSK	18	P_18@0	S_0@0	-	-
27	100	50		QPSK	18	P_18@82	S_0@0	-	-
28	100	100		QPSK	18	P_18@0	S_0@0	-	-
29	100	100		QPSK	18	P_18@82	S_0@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.									
Note 2: The frequencies of PCC and SCC shall be switched and tested in each configuration.									

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL RMCs are set according to in Table 6.5.2A.2.2.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.2.2.4.3.

6.5.2A.2.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.2.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

6. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

8. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

9. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

10. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2A.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.2.2.5 Test requirement

Each of the 20 carrier leakage results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2A.2.2.5-1.

Table 6.5.2A.2.2.5-1: Test requirements for Relative Carrier Leakage Power

Carrier Leakage	Parameters	Relative Limit (dBc)
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	-24.2
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	-19.2
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	-9.2

6.5.2A.2.3 Carrier leakage for CA (intra-band non-contiguous DL CA and UL CA)

6.5.2A.2.3.1 Test Purpose

Carrier leakage is an additive sinusoid waveform that is confined within the aggregated transmission bandwidth configuration. The carrier leakage requirement is defined for each component carrier and is measured on the component carrier with PRBs allocated. The measurement interval is one slot in the time domain.

6.5.2A.2.3.2 Test applicability

This test case applies to all types of E-UTRA UE Release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.5.2A.2.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.2.0.

6.5.2A.2.3.4 Test description

6.5.2A.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.2.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.2.3.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Low Range for CC1; High Range for CC2 PCC-SCC: CC1-CC2 and CC2-CC1
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	QPSK	N/A	QPSK	P_8@0	QPSK	S_0@0
2	25	25	35	QPSK		QPSK	P_8@17	QPSK	S_0@0
3	50	50	25	QPSK		QPSK	P_12@0	QPSK	S_0@0
4	50	50	25	QPSK		QPSK	P_12@38	QPSK	S_0@0
5	75	75	15	QPSK		QPSK	P_16@0	QPSK	S_0@0
6	75	75	15	QPSK		QPSK	P_16@59	QPSK	S_0@0
7	100	100	5	QPSK		QPSK	P_18@0	QPSK	S_0@0
8	100	100	5	QPSK		QPSK	P_18@82	QPSK	S_0@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.									

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL RMCs are set according to in Table 6.5.2A.2.3.4.1-1.

5. Propagation conditions are set according to Annex B.0

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.2.3.4.3.

6.5.2A.2.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.2.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.2.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

5. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

7. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

8. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

9. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2A.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.2.3.5 Test requirement

Each of the 20 carrier leakage results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2A.2.3.5-1.

Table 6.5.2A.2.3.5-1: Test requirements for Relative Carrier Leakage Power

Carrier Leakage	Parameters	Relative Limit (dBc)
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	-24.2
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	-19.2
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	-9.2

6.5.2A.2.4 Carrier leakage for CA (3UL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- The applicability is TBD

- Test Configuration Table is TBD

- Part 2 spec needs to be added

6.5.2A.2.4.1 Test Purpose

Carrier leakage is an additive sinusoid waveform that is confined within the aggregated transmission bandwidth configuration. The carrier leakage requirement is defined for each component carrier and is measured on the component carrier with PRBs allocated. The measurement interval is one slot in the time domain.

6.5.2A.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support 3DL and 3UL with Intra-band contiguous CA or with Intra-band contiguous and Inter-band CA.

...

6.5.2A.2.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.2.0.

6.5.2A.2.4.4 Test description

6.5.2A.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2 for CA configurations with two bands. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.2.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.2.4.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes. PCC and SCC mapped onto component carriers CC according to the notation: PCC-SCC: CCi-CCj, which means PCC on CCi and SCC on CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous CA band in TS36.508 [7] as above.	See Table 6.5.1A.1.4.1-1: PCC-SCC: CC1-CC2 and CC2-CC1[TBD]
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	See Table 6.5.1A.1.4.1-1:[TBD]
Test Parameters for CA Configurations	
FFS	

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A, Figure A.55 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.5.2A.2.4.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.2.4.4.3.

6.5.2A.2.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.2.4.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.2.4.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
6. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.
7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
8. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.
9. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.
10. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2A.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

6.5.2A.2.4.5 Test requirement

Each of the 20 carrier leakage results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2A.2.3.5-1.

Table 6.5.2A.2.4.5-1: Test requirements for Relative Carrier Leakage Power

Carrier Leakage	Parameters	Relative Limit (dBc)
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	-24.2
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	-19.2
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm	-9.2

	±3.5dB	

6.5.2A.3 In-band emissions for non allocated RB for CA

6.5.2A.3.0 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the requirements shall apply on each component carrier as defined in clause 6.5.2 with all component carriers active. If two contiguous component carriers are assigned to one E-UTRA band, the requirements in subclauses 6.5.2A.1, 6.5.2A.2, and 6.5.2A.3 apply for those component carriers.

The requirements in this clause apply with PCC and SCC in the UL configured and activated: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

For intra-band contiguous carrier aggregation bandwidth class B and C, the requirements in Table 6.5.2A.3.0-1 and 6.5.2A.3.0-2 apply within the aggregated transmission bandwidth configuration with both component carrier (s) active and one single contiguous PRB allocation of bandwidth L_{CRB} at the edge of the aggregated transmission bandwidth configuration.

The inband emission is defined as the interference falling into the non allocated resource blocks for all component carriers. The measurement method for the inband emissions in the component carrier with PRB allocation is specified in annex F. For a non allocated component carrier a spectral measurement is specified.

For intra-band non-contiguous carrier aggregation the requirements for in-band emissions should be defined for each component carrier. Requirements only apply with PRB allocation in one of the component carriers according to Table 6.5.2.3.3.

Table 6.5.2A.3.0-1: Minimum requirements for in-band emissions (allocated component carrier)

Parameter	Unit	Limit		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},$ $-57\ dBm / 180\ kHz - P_{RB}\}$		Any non-allocated (NOTE 2)
IQ Image	dB	-25		Exception for IQ image (NOTE 3)
Carrier leakage	dBc	-25	Output power > 0 dBm	Exception for Carrier frequency (NOTE 4)
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 9. The limit is evaluated in each non-allocated RB.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs

NOTE 3: Exceptions to the general limit are allowed for up to L_{CRBs} +1 RBs within a contiguous width of L_{CRBs} +1 non-allocated RBs. The measurement bandwidth is 1 RB.

NOTE 4: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in the non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: L_{CRB} is the Transmission Bandwidth (see Figure 5.4.2-1) not exceeding $\lfloor N_{RB} / 2 - 1 \rfloor$

NOTE 6: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1) of the component carrier with RBs allocated.

NOTE 7: EVM is the limit specified in Table 6.5.2.1.3-1 for the modulation format used in the allocated RBs.

NOTE 8: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth).

NOTE 9: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

Table 6.5.2A.3.0-2: Minimum requirements for in-band emissions (not allocated component carrier)

Para-meter	Unit	Meas BW NOTE 1	Limit		remark	Applicable Frequencies
General	dB	BW of 1 RB (180KHz rectangular)	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRB}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRB},$ $-57\ dBm\ /\ 180\ kHz - P_{RB}\}$		The reference value is the average power per allocated RB in the allocated component carrier	Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
IQ Image	dB	BW of 1 RB (180KHz rectangular)	-25 (NOTE 2)		The reference value is the average power per allocated RB in the allocated component carrier	The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
Carrier leakage	dBc	BW of 1 RB (180KHz rectangular)	NOTE 3		The reference value is the total power of the allocated RBs in the allocated component carrier	The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
			-25	Output power > 0 dBm		
			-20	-30 dBm ≤ Output power ≤ 0 dBm		
			-10	-40 dBm ≤ Output power < -30 dBm		

NOTE1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.

NOTE 2: Exceptions to the general limit are allowed for up to L_{CRB} +1 RBs within a contiguous width of L_{CRB} +1 non-allocated RBs.

NOTE 3: Two Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs

NOTE 4: NOTES 1, 5, 6, 7, 8, 9 from Table 6.5.2A.3.0-1 apply for Table 6.5.2A.3.0-2 as well.

NOTE 5: Δ_{RB} for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.

The normative reference for this requirement is TS 36.101[2] clause 6.5.2A.3.

6.5.2A.3.1 In-band emissions for non allocated RB for CA (intra-band contiguous DL CA and UL CA)

6.5.2A.3.1.1 Test Purpose

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks.

For an allocated component carrier, the in-band emission is defined as the average across 12 sub-carrier and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non–allocated RB to the UE output power in an allocated RB. The basic in-band emissions measurement interval is defined over one slot in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one SC-FDMA symbol, accordingly.

For a non allocated component carrier a spectral measurement is specified.

6.5.2A.3.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.5.2A.3.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.3.0.

6.5.2A.3.1.4 Test description

6.5.2A.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.2A.3.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2A.3.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes. PCC and SCC mapped onto component carriers CC according to the notation: PCC-SCC: CCi-CCj, which means PCC on CCi and SCC on CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous CA band in TS36.508 [7] as above.			See Table 6.5.1A.1.4.1-1: PCC-SCC: CC1-CC2, CC2-CC1						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			See Table 6.5.1A.1.4.1-1:						
Test Parameters for CA Configurations									
Config ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCC N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1 Note 2	75	75	N.A.	QPSK	16	P_16@0	S_0@0	-	-
2 Note 3	75	75		QPSK	16	P_16@59	S_0@0	-	-
3 Note 2	100	25		QPSK	8	P_8@0	S_0@0	-	-
4 Note 3	100	25		QPSK	8	P_8@92	S_0@0	-	-
5 Note 2	25	100		QPSK	8	P_8@0	S_0@0	-	-
6 Note 3	25	100		QPSK	8	P_8@17	S_0@0	-	-
7 Note 2	100	50		QPSK	12	P_12@0	S_0@0	-	-
8 Note 3	100	50		QPSK	12	P_12@88	S_0@0	-	-
9 Note 2	50	100		QPSK	12	P_12@0	S_0@0	-	-
10 Note 3	50	100		QPSK	12	P_12@38	S_0@0	-	-
11 Note 2	100	75		QPSK	16	P_16@0	S_0@0	-	-
12 Note 3	100	75		QPSK	16	P_16@84	S_0@0	-	-
13 Note 2	75	100		QPSK	16	P_16@0	S_0@0	-	-
14 Note 3	75	100		QPSK	16	P_16@59	S_0@0	-	-
15 Note 2	100	100		QPSK	18	P_18@0	S_0@0	-	-
16 Note 3	100	100		QPSK	18	P_18@82	S_0@0	-	-
17 Note 2	50	50		QPSK	12	P_12@0	S_0@0	-	-
18 Note 3	50	50		QPSK	12	P_12@38	S_0@0	-	-
19 Note 2	25	50		QPSK	8	P_8@0	S_0@0	-	-
20 Note 3	25	50		QPSK	8	P_8@17	S_0@0	-	-
21 Note 2	50	25		QPSK	8	P_8@0	S_0@0	-	-
22 Note 3	50	25		QPSK	8	P_8@42	S_0@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Note 2:	Applicable only for PCC-SCC: CC1-CC2.
Note 3:	Applicable only for PCC-SCC: CC2-CC1.
Note 4:	If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, only the first of those is tested, according to the order on the Test Configuration Table list.

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2A.3.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2A.3.1.4.3.

6.5.2A.3.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.3.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < $f \leq$ 4.2GHz.
6. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on the SCC. For TDD slots with transient periods are not under test.
7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < $f \leq$ 4.2GHz.
8. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on the SCC. For TDD slots with transient periods are not under test.
9. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < $f \leq$ 4.2GHz.
10. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on the SCC. For TDD slots with transient periods are not under test.

6.5.2A.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.3.1.5 Test requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.5.2A.3.1.5-1.

Table 6.5.2A.3.1.5-1: Test requirements for in-band emissions (allocated component carrier)

Parameter Description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs},$ $-57\ dBm\ /180\ kHz - P_{RB}\}$ +0.8		Any non-allocated (Note 2)
IQ Image	dB	-24.2		Image frequencies (Notes 2, 3)
Carrier leakage	dBc	-24.2	Output power f ≤ 3.0GHz: 3.2dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	LO frequency (Notes 4, 5)
		-19.2	Output power f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	
		-9.2	Output power f ≤ 3.0GHz: -36.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	

Note 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the test requirement is calculated as the higher of $P_{RB} - 29.2$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

Note 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

Note 3: The applicable frequencies for this limit are not known due to unknown LO frequency. See Note 3 in Table 6.5.2A.3.0-1.

Note 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

Note 5: The applicable frequencies for this limit are not known due to unknown LO frequency. See Note 4 in Table 6.5.2A.3.0-1.

Note 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.4.2-1).

Note 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1) of the component carrier with RBs allocated.

Note 8: EVM is the limit specified in Table 6.5.2.1.3-1 for the modulation format used in the allocated RBs.

Note 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth).

Note 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

The in-band emissions results, measured with the spectral test shall not exceed the corresponding values in Table 6.5.2A.3.1.5-2

Table 6.5.2A.3.1.5-2: Test requirements for in-band emissions (not allocated component carrier)

Para-meter	Unit	Meas BW Note 1	Limit		remark	Applicable Frequencies
General	dB	BW of 1 RB (180KHz rectangular)	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs}$ $-57\ dBm\ /180\ kHz - P_{RB}\}$		The reference value is the average power per allocated RB in the allocated component carrier	Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
IQ Image	dB	BW of 1 RB (180KHz rectangular)	-24.2 Note 2		The reference value is the average power per allocated RB in the allocated component carrier	The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
Carrier leakage	dBc	BW of 1 RB (180KHz rectangular)	Note 3		The reference value is the total power of the allocated RBs in the allocated component carrier	The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
			-24.2	Output power > 0 dBm		
			-19.2	-30 dBm ≤ Output power ≤ 0 dBm		
			-9.2	-40 dBm ≤ Output power < -30 dBm		

Note1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.

Note 2: Exceptions to the general limit are allowed for up to L_{CRB} +1 RBs within a contiguous width of L_{CRB} +1 non-allocated RBs.

Note 3: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs.

Note 4: Note s1, 6, 7, 8, 9, 10 from Table 6.5.2A.3.0-1 apply for Table 6.5.2A.3.0-2 as well.

Note 5: Δ_{RB} for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.

6.5.2A.3.2 In-band emissions for non allocated RB for CA (inter-band DL CA and UL CA)

6.5.2A.3.2.1 Test Purpose

Same test purpose as in clause 6.5.2A.3.1.1.

6.5.2A.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.5.2A.3.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.3.0.

6.5.2A.3.2.4 Test description

6.5.2A.3.2.4.1 Initial conditions

Same as in clause 6.5.2A.3.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.5.2A.3.1.4.1-1 → use Table 6.5.2A.3.2.4.1-1.
- Instead of clause 6.5.2A.3.1.4.3 → use clause 6.5.2A.3.2.4.3.

Table 6.5.2A.3.2.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1		NC							
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Low range for PCC and SCC High range for PCC and SCC							
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)							
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**					
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**				
6	25	N/A for this test	QPSK	1	P_1@0	S_0@0	-	-	
6	25		QPSK	1	P_1@5	S_0@0	-	-	
6	50		QPSK	1	P_1@0	S_0@0	-	-	
6	50		QPSK	1	P_1@5	S_0@0	-	-	
15	25		QPSK	4	P_4@0	S_0@0	-	-	
15	25		QPSK	4	P_4@11	S_0@0	-	-	
25	6		QPSK	8	P_8@0	S_0@0	-	-	
25	6		QPSK	8	P_8@17	S_0@0	-	-	
25	15		QPSK	8	P_8@0	S_0@0	-	-	
25	15		QPSK	8	P_8@17	S_0@0	-	-	
25	25		QPSK	8	P_8@0	S_0@0	-	-	
25	25		QPSK	8	P_8@17	S_0@0	-	-	
25	50		QPSK	8	P_8@0	S_0@0	-	-	
25	50		QPSK	8	P_8@17	S_0@0	-	-	
50	6		QPSK	12	P_12@38	S_0@0	-	-	
50	25		QPSK	12	P_12@0	S_0@0	-	-	
50	25		QPSK	12	P_12@38	S_0@0	-	-	
50	50		QPSK	12	P_12@0	S_0@0	-	-	
50	50		QPSK	12	P_12@38	S_0@0	-	-	
50	100		QPSK	12	P_12@0	S_0@0	-	-	
50	100		QPSK	12	P_12@38	S_0@0	-	-	
75	75		QPSK	16	P_16@0	S_0@0	-	-	
75	75		QPSK	16	P_16@59	S_0@0	-	-	
75	100		QPSK	16	P_16@0	S_0@0	-	-	
75	100		QPSK	16	P_16@59	S_0@0	-	-	
100	50		QPSK	18	P_18@0	S_0@0	-	-	
100	50		QPSK	18	P_18@82	S_0@0	-	-	
100	75		QPSK	16	P_16@0	S_0@0	-	-	
100	75		QPSK	16	P_16@59	S_0@0	-	-	

100	100		QPSK	18	P_18@0	S_0@0	-	-
100	100		QPSK	18	P_18@82	S_0@0	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, only the first of those is tested, according to the order on the Test Configuration Table list.
Note 3: The frequencies of PCC and SCC shall be switched and tested in each configuration.

6.5.2A.3.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2 The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.2.4.3.

3 SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.3.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

6. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

8. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

9. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

10. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2A.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.3.2.5 Test requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.5.2A.3.2.5-1.

Table 6.5.2A.3.2.5-1: Test requirements for in-band emissions

Parameter description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs}$, $-57\ dBm\ /180\ kHz - P_{RB}\}$ +0.8		Any non-allocated (Note 2)
IQ Image	dB	-27.2	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (Notes 2, 3)
		-24.2	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-24.2	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-27.2	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (Notes 4, 5)
		-24.2	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-24.2	0 dBm ≤ Output power ≤10 dBm	
		-19.2	-30 dBm ≤ Output power ≤ 0 dBm	
		-9.2	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 29.2 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

NOTE 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.4.2-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.3-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

6.5.2A.3.3 In-band emissions for non allocated RB for CA (intra-band non-contiguous DL CA and UL CA)

6.5.2A.3.3.1 Test Purpose

Same test purpose as in clause 6.5.2A.3.1.1.

6.5.2A.3.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.5.2A.3.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.3.0.

6.5.2A.3.3.4 Test description

6.5.2A.3.3.4.1 Initial conditions

Same as in clause 6.5.2A.3.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-3 for CA configurations.
- Instead of Table 6.5.2A.3.1.4.1-1 → use Table 6.5.2A.3.3.4.1-1.
- Instead of clause 6.5.2A.3.1.4.3 → use clause 6.5.2A.3.3.4.3.

Table 6.5.2A.3.3.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1				Normal					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.				Refer to test points A: N/A (Range is not relevant), Maximum Wgap					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC					
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A		QPSK	P_8@0	QPSK	S_0@0
2	25	25	35			QPSK	P_8@17	QPSK	S_0@0
3	50	50	25			QPSK	P_12@0	QPSK	S_0@0
4	50	50	25			QPSK	P_12@38	QPSK	S_0@0
5	100	100	5			QPSK	P_18@0	QPSK	S_0@0
6	100	100	5			QPSK	P_18@82	QPSK	S_0@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.									

6.5.2A.3.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.3.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.3.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

6. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

8. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

9. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

10. Measure In-band emission on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2A.3.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.5.2A.3.3.5 Test requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.5.2A.3.3.5-1.

Table 6.5.2A.3.3.5-1: Test requirements for in-band emissions

Parameter description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs}$, +0.8 $-57\ dBm\ /180\ kHz - P_{RB}\}$		Any non-allocated (Note 2)
IQ Image	dB	-27.2	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (Notes 2, 3)
		-24.2	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-24.2	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-27.2	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (Notes 4, 5)
		-24.2	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-24.2	0 dBm ≤ Output power ≤10 dBm	
		-19.2	-30 dBm ≤ Output power ≤ 0 dBm	
		-9.2	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 29.2 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

NOTE 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.4.2-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.3-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

6.5.2A.3.4 In-band emissions for non allocated RB for CA (3UL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- The applicability is TBD

- Test Configuration Table is TBD

- Part 2 spec needs to be added

6.5.2A.3.4.1 Test Purpose

Same test purpose as in clause 6.5.2A.3.1.1.

6.5.2A.3.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support 3DL and 3UL with Intra-band contiguous CA or with Intra-band contiguous and Inter-band CA.

[TBD]

6.5.2A.3.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.5.2A.3.0.

6.5.2A.3.4.4 Test description

6.5.2A.3.4.4.1 Initial conditions

Same as in clause 6.5.2A.3.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.5.2A.3.1.4.1-1 → use Table 6.5.2A.3.4.4.1-1.
- Instead of clause 6.5.2A.3.1.4.3 → use clause 6.5.2A.3.4.4.3

Table 6.5.2A.3.4.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes. PCC and SCC mapped onto component carriers CC according to the notation: PCC-SCC: CCi-CCj, which means PCC on CCi and SCC on CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous CA band in TS36.508 [7] as above.	See Table 6.5.1A.1.4.1-1: PCC-SCC: CC1-CC2 and CC2-CC1[TBD]
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	See Table 6.5.1A.1.4.1-1:[TBD]
Test Parameters for CA Configurations	
FFS	

6.5.2A.3.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.5.2A.3.4.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5.2A.3.4.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < $f \leq$ 4.2GHz.
6. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.
7. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < $f \leq$ 4.2GHz.
8. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

9. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

10. Measure carrier leakage on PCC using Global In-Channel Tx-Test (Annex E). For TDD slots with transient periods are not under test.

6.5.2A.3.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

6.5.2A.3.4.5 Test requirement

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.5.2A.3.4.5-1.

Table 6.5.2A.3.4.5-1: Test requirements for in-band emissions (allocated component carrier) – intra-band contiguous CA

Parameter description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs},$ $-57\ dBm\ /\ 180\ kHz - P_{RB}\}$	+0.8	Any non-allocated (Note 2)
IQ Image	dB	-24.2		Image frequencies (Notes 2, 3)
Carrier leakage	dBc	-24.2	Output power f ≤ 3.0GHz: 3.2dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	Carrier frequency (Notes 4, 5)
		-19.2	Output power f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	
		-9.2	Output power f ≤ 3.0GHz: -36.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	

Note 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the test requirement is calculated as the higher of $P_{RB} - 29.2$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

Note 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

Note 3: The applicable frequencies for this limit are not known due to unknown LO frequency. See Note 3 in Table 6.5.2A.3.0-1.

Note 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

Note 5: The applicable frequencies for this limit are not known due to unknown LO frequency. See Note 4 in Table 6.5.2A.3.0-1.

Note 6: L_{CRB} is the Transmission Bandwidth (see Figure 5.4.2-1).

Note 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1) of the component carrier with RBs allocated.

Note 8: EVM is the limit specified in Table 6.5.2.1.3-1 for the modulation format used in the allocated RBs.

Note 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth).

Note 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

Table 6.5.2A.3.4.5-2: Test requirements for in-band emissions (not allocated component carrier) – intra-band contiguous CA

Para-meter	Unit	Meas BW Note 1	Limit		remark	Applicable Frequencies
General	dB	BW of 1 RB (180KHz rectangular)	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs}$ $-57\ dBm\ /180\ kHz - P_{RB}\}$		The reference value is the average power per allocated RB in the allocated component carrier	Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
IQ Image	dB	BW of 1 RB (180KHz rectangular)	-24.2 Note 2		The reference value is the average power per allocated RB in the allocated component carrier	The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
Carrier leakage	dBc	BW of 1 RB (180KHz rectangular)	Note 3		The reference value is the total power of the allocated RBs in the allocated component carrier	The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
			-24.2	Output power > 0 dBm		
			-19.2	-30 dBm ≤ Output power ≤ 0 dBm		
			-9.2	-40 dBm ≤ Output power < -30 dBm		

Note1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.

Note 2: Exceptions to the general limit are allowed for up to L_{CRB} +1 RBs within a contiguous width of L_{CRB} +1 non-allocated RBs.

Note 3: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs.

Note 4: Note s1, 6, 7, 8, 9, 10 from Table 6.5.2A.3.0-1 apply for Table 6.5.2A.3.0-2 as well.

Note 5: Δ_{RB} for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.

Table 6.5.2A.3.4.5-3: Test requirements for in-band emissions – inter-band CA

Parameter description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs}$, +0.8 $-57\ dBm\ /180\ kHz - P_{RB}\}$		Any non-allocated (Note 2)
IQ Image	dB	-27.2	Image frequencies when carrier centre frequency < 1 GHz and Output power > 10 dBm	Image frequencies (Notes 2, 3)
		-24.2	Image frequencies when carrier centre frequency < 1 GHz and Output power ≤ 10 dBm	
		-24.2	Image frequencies when carrier centre frequency ≥ 1 GHz	
Carrier leakage	dBc	-27.2	Output power > 10 dBm and carrier centre frequency < 1 GHz	Carrier frequency (Notes 4, 5)
		-24.2	Output power > 10 dBm and carrier centre frequency ≥ 1 GHz	
		-24.2	0 dBm ≤ Output power ≤10 dBm	
		-19.2	-30 dBm ≤ Output power ≤ 0 dBm	
		-9.2	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 29.2 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

NOTE 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.4.2-1).

NOTE 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

NOTE 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

NOTE 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

6.5.2B Transmit modulation for UL- MIMO

6.5.2B.1 Error Vector Magnitude (EVM) for UL- MIMO

6.5.2B.1.1 Test Purpose

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Before calculating the EVM the measured waveform is corrected by the sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM.

The measured waveform is further modified by selecting the absolute phase and absolute amplitude of the Tx chain. The EVM result is defined after the front-end IDFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %.

When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the EVM measurement interval is reduced by one symbol, accordingly. The PUSCH or PUCCH EVM measurement interval is also reduced

when the mean power, modulation or allocation between slots is expected to change. In the case of PUSCH transmission, the measurement interval is reduced by a time interval equal to the sum of 5 μs and the applicable exclusion period defined in subclause 6.3.4, adjacent to the boundary where the power change is expected to occur. The PUSCH exclusion period is applied to the signal obtained after the front-end IDFT. In the case of PUCCH transmission, the PUCCH EVM measurement interval is reduced by one symbol adjacent to the slot boundary.

6.5.2B.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.5.2B.1.3 Minimum conformance requirements

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the Error Vector Magnitude requirements specified in Table 6.5.2.1.1-1 which is defined in sub-clause 6.5.2.1 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B-2.

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2B.1.1.

6.5.2B.1.4 Test description

6.5.2B.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2B.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2B.1.4.1-1: Test Configuration Table for PUSCH

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC		
Test Frequencies **(as specified in TS36.508 [7] subclause 4.3.1)**		See Table 6.5.1.4.1-1		
Test Channel Bandwidths **(as specified in TS 36.508 [7] subclause 4.3.1)**		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for PUSCH EVM testing	Mod'n	RB allocation	
			FDD	TDD

1.4MHz		QPSK	6	6
1.4MHz		QPSK	1	1
1.4MHz		16QAM	6	6
1.4MHz		16QAM	1	1
3MHz		QPSK	15	15
3MHz		QPSK	4	4
3MHz		16QAM	15	15
3MHz		16QAM	4	4
5MHz		QPSK	25	25
5MHz		QPSK	8	8
5MHz		16QAM	25	25
5MHz		16QAM	8	8
10MHz		QPSK	50	50
10MHz		QPSK	12	12
10MHz		16QAM	50 (Note 3)	50 (Note 3)
10MHz		16QAM	12	12
15MHz		QPSK	75	75
15MHz		QPSK	16	16
15MHz		16QAM	75 (Note 3)	75 (Note 3)
15MHz		16QAM	16	16
20MHz		QPSK	100	100
20MHz		QPSK	18	18
20MHz		16QAM	100 (Note 3)	100 (Note 3)
20MHz		16QAM	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories [FFS].

Table 6.5.2B.1.4.1-2: Test Configuration Table for PUCCH

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1			NC	
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**			See Table 6.5.1.4.1-1	
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**			See Table 6.5.1.4.1-1	
Test Parameters for Channel Bandwidths				
	Downlink Configuration			**Uplink Configuration**
Ch BW	Mod'n	RB allocation		FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a / 1b
		FDD	TDD	
1.4MHz	QPSK	3	3	
3MHz	QPSK	4	4	
5MHz	QPSK	8	8	
10MHz	QPSK	16	16	
15MHz	QPSK	25	25	
20MHz	QPSK	30	30	

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2B.1.4.1-1.

5. Propagation conditions are set according to Annex B.0

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2B.1.4.3.

6.5.2B.1.4.2 Test procedure

Test procedure for PUSCH:

1.1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.5.2B.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

1.2 Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at $P_{UMAX\ level}$.

1.3 Measure the EVM and $\overline{EVM}_{DMRS}$ using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE.

1.4 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is –36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.5 Measure the EVM and $\overline{EVM}_{DMRS}$ using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE.

Test procedure for PUCCH:

2.1 PUCCH are set according to Table 6.5.2B.1.4.1-2.

2.2 SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.5.2B.1.4.1-2. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH. There is no PUSCH transmission.

2.3 SS send appropriate TPC commands for PUCCH to the UE until the UE transmit PUCCH at P_{UMAX} level.

2.4 Measure PUCCH EVM using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE.

2.5 Send the appropriate TPC commands for PUCCH to the UE until the UE transmits PUCCH at -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.6 Measure PUCCH EVM using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE.

6.5.2B.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.5.2B.1.4.3-1: PUCCH-ConfigDedicated-v1020-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-9A: PUCCH-ConfigDedicated-v1020-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {			
twoAntennaPortActivatedPUCCH-Format1a1b-r10	true		
}			

6.5.2B.1.5 Test requirement

The requirements apply to each transmit antenna connector.

The PUSCH EVM derived in E.4.2 shall not exceed 17.5 % for QPSK and BPSK, 12.5% for 16 QAM.

The PUSCH $\overline{EVM}_{DMRS}$ derived in E.4.6.2 shall not exceed [17.5 %] when embedded with data symbols of QPSK and BPSK, [12,5%] for 16 QAM.

The PUCCH EVM and derived in E.5.9.2 shall not exceed 17.5 %.

6.5.2B.2 Carrier leakage for UL-MIMO

6.5.2B.2.1 Test Purpose

The purpose of this test is to exercise the transmitter of UE that support UL-MIMO to verify its modulation quality in terms of carrier leakage for UL-MIMO.

6.5.2B.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.5.2B.2.3 Minimum conformance requirements

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the Relative Carrier Leakage Power requirements specified in Table 6.5.2.2.3-1 which is defined in subclause 6.5.2.2 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

The normative reference for this requirement is TS 36.101 clause 6.5.2B.2

6.5.2B.2.4 Test description

6.5.2B.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2.2B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2.2B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		See Table 6.5.1.4.1-1		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for carrier leakage testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: For partial RB allocation, the RB_{start} shall be RB #0 and RB# (max +1- RB allocation) of the channel bandwidth.				

1. Connect the SS to the UE to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508[7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to in Table 6.5.2B.2.4.1-1.

5. Propagation conditions are set according to Annex B.0

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2B.2.4.3.

6.5.2B.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.5.2B.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC

2. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

3. Measure carrier leakage using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE. For TDD slots with transient periods are not under test.

4. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

5. Measure carrier leakage using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE. For TDD slots with transient periods are not under test.

6. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -36.8dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

7. Measure carrier leakage using Global In-Channel Tx-Test (Annex E) for each of transmit antenna of the UE. For TDD slots with transient periods are not under test

6.5.2B.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

6.5.2B.2.5 Test requirement

The requirements apply to each transmit antenna connector.

Each of the 20 carrier leakage results, derived in Annex E.3.1, shall not exceed the values in table 6.5.2B.2.5-1

Table 6.5.2B.2.5-1: Test requirements for Relative Carrier Leakage Power

LO Leakage	Parameters	Relative Limit (dBc)
	f ≤ 3.0GHz: 3.2 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: 3.5 dBm ±3.5dB	24.2
	f ≤ 3.0GHz: -26.8 dBm ±3.2dB 3.0GHz < f ≤ 4.2GHz: -26.5 dBm ±3.5dB	19.2
	f ≤ 3.0GHz: -36.8dBm±3.2dB 3.0GHz < f ≤ 4.2GHz: -36.5 dBm ±3.5dB	9.2

6.5.2B.3 In-band emissions for non allocated RB for UL-MIMO

6.5.2B.3.1 Test Purpose

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks.

The in-band emission is defined as the average across 12 sub-carrier and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission for UL-MIMO is measured as the ratio of the output power of UE that support UL-MIMO in a non–allocated RB to the output power of UE that support UL-MIMO in an allocated RB. The basic in-band emissions measurement interval is defined over one slot in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one SC-FDMA symbol, accordingly.

6.5.2B.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.5.2B.3.3 Minimum conformance requirements

The relative in-band emission shall not exceed the values specified in Table 6.5.2B.3.3-1.

Table 6.5.2B.3.3-1: Minimum requirements for in-band emissions

Parameter Description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs},$ $-57\ dBm/180\ kHz - P_{RB}\}$		Any non-allocated (Note 2)
IQ Image	dB	-25		Image frequencies (Notes 2, 3)
Carrier leakage	dBc	-25	Output power > 0 dBm	LO frequency (Notes 4, 5)
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

Note 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

Note 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

Note 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

Note 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

Note 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

Note 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.4.2-1).

Note 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

Note 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

Note 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

Note 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

The normative reference for this requirement is TS 36.101 [2] clause 6.5.2B.3.

The in-band emission is defined as the average across 12 sub-carrier and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non–allocated RB to the UE output power in an allocated RB. The basic in-band emissions measurement interval is defined over one slot in the time domain.

6.5.2B.3.4 Test description

6.5.2B.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2B.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2B.3.4.1-1: Test Configuration Table for PUSCH

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		See Table 6.5.1.4.1-1		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for in-band emissions testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: For partial RB allocation, the starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the channel bandwidth.				

Table 6.5.2B.3.4.1-2: Test Configuration Table for PUCCH

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	See Table 6.5.1.4.1-1			
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**	See Table 6.5.1.4.1-1			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	See Table 6.5.1.4.1-1			
Test Parameters for Channel Bandwidths				
	Downlink Configuration			**Uplink Configuration**
Ch BW	Mod'n	RB allocation		FDD: PUCCH format = Format 1a TDD: PUCCH format = Format 1a / 1b
		FDD	TDD	
1.4MHz	QPSK	3	3	
3MHz	QPSK	4	4	
5MHz	QPSK	8	8	
10MHz	QPSK	16	16	
15MHz	QPSK	25	25	
20MHz	QPSK	30	30	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2B.3.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2B.3.4.3.

6.5.2B.3.4.2 Test procedure

Test procedure for PUSCH:

1.1 SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.5.2B.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

1.2 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.3 Measure In-band emission using Global In-Channel Tx-Test (Annex E) for each of transmit antennas of the UE.

1.4 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1.5 Measure In-band emission using Global In-Channel Tx-Test (Annex E) for each of transmit antennas of the UE. For TDD slots with transient periods are not under test.

1.6 Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

1,7 Measure In-band emission using Global In-Channel Tx-Test (Annex E) for each of transmit antennas of the UE. For TDD slots with transient periods are not under test.

Test procedure for PUCCH:

2.1 PUCCH is set according to Table 6.5.2B.3.4.1-2. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 6.5.2B.3.4.1-2. The SS sends downlink MAC padding bits on the DL RMC. The transmission of PDSCH will make the UE send uplink ACK/NACK using PUCCH.

2.2 Send the appropriate TPC commands in the uplink scheduling information for PUCCH to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.3 Measure In-band emission using Global In-Channel Tx-Test (Annex E) for each of transmit antennas of the UE.

2.4 Send the appropriate TPC commands for PUCCH in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.5 Measure In-band emission using Global In-Channel Tx-Test (Annex E) for each of transmit antennas of the UE.

2.6 Send the appropriate TPC commands for PUCCH in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz.

2.7 Measure In-band emission using Global In-Channel Tx-Test (Annex E) for each of transmit antennas of the UE.

6.5.2B.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 6.5.2B.3.4.3-1: PUCCH-ConfigDedicated-v1020-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-9A: PUCCH-ConfigDedicated-v1020-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {			
twoAntennaPortActivatedPUCCH-Format1a1b-r10	true		
}			

6.5.2B.3.5 Test requirement

The requirements apply to each transmit antenna connector.

Each of the 20 In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.5.2B.3.5-1.

Table 6.5.2B.3.5-1: Test requirements for in-band emissions

Parameter Description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max\{ -25 - 10 \cdot \log_{10}(N_{RB} / L_{CRBs}),$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot (\lvert\Delta_{RB}\rvert - 1) / L_{CRBs}$, $-57\ dBm\ /180\ kHz - P_{RB}\}$	+0.8	Any non-allocated (Note 2)
IQ Image	dB	-24.2		Image frequencies (Notes 2, 3)
Carrier leakage	dBc	-24.2	Output power > 0 dBm	LO frequency (Notes 4, 5)
		-19.2	-30 dBm ≤ Output power ≤ 0 dBm	
		-9.2	-40 dBm ≤ Output power < -30 dBm	

Note 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 29.2 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10.

Note 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.

Note 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.

Note 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.

Note 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.

Note 6: L_{CRBs} is the Transmission Bandwidth (see Figure 5.4.2-1).

Note 7: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.4.2-1).

Note 8: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

Note 9: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB outside of the allocated bandwidth.

Note 10: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

6.5.2B.4 EVM equalizer spectrum flatness for UL-MIMO

6.5.2B.4.1 Test Purpose

The zero-forcing equalizer correction applied in the EVM measurement process (as described in Annex E) must meet a spectrum flatness requirement for the EVM measurement to be valid. The EVM equalizer spectrum flatness is defined in terms of the maximum peak-to-peak ripple of the equalizer coefficients (dB) across the allocated uplink block variation in dB of the equalizer coefficients generated by the EVM measurement process. The EVM equalizer spectrum flatness requirement does not limit the correction applied to the signal in the EVM measurement process but for the EVM result to be valid, the equalizer correction that was applied must meet the EVM equalizer spectrum flatness minimum requirements. The basic measurement interval is the same as for EVM.

6.5.2B.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.5.2B.4.3 Minimum conformance requirements

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the EVM Equalizer Spectrum Flatness requirements specified in Table 6.5.2B.4.3-1 and Table 6.5.2B.4.3-2 which are defined in sub-clause 6.5.2B.4 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

The normative reference for this requirement is TS 36.101 clause 6.5.2B.4.

6.5.2B.4.4 Test description

6.5.2B.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.5.2B.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5.2B.4.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		See Table 6.5.1.4.1-1		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		See Table 6.5.1.4.1-1		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for EVM equalizer spectrum flatness testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to in Table 6.5.2B.4.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.5.2B.4.4.3.

6.5.2B.4.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.5.2B.4.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure spectrum flatness using Global In-Channel Tx-Test (Annex E) for each of transmit antennas of the UE. For TDD slots with transient periods are not under test.

6.5.2B.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

6.5.2B.4.5 Test requirement

The requirements apply to each transmit antenna connector.

Each of the 20 spectrum flatness functions, shall derive four ripple results in Annex E.4.4, The derived results shall not exceed the values in Figure 6.5.2B.4.5-1:

For normal conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2B.4.5-1 and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6.4 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 8.4 dB (see Figure 6.5.2B.4.5-1).

For extreme conditions, the maximum ripple in Range 1 and Range 2 shall not exceed the values specified in Table 6.5.2B.4.5-2 and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 7.4 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 11.4 dB (see Figure 6.5.2B.4.5-1).

Table 6.5.2B.4.5-1: Test requirements for EVM equalizer spectrum flatness (normal conditions)

Frequency Range	Maximum Ripple [dB]
$F_{UL_Meas} - F_{UL_Low} \geq 3$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 3$ MHz (Range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 3$ MHz or $F_{UL_High} - F_{UL_Meas} < 3$ MHz (Range 2)	9.4 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

Table 6.5.2B.4.5-2: Test requirements for spectrum flatness (extreme conditions)

$F_{UL_Meas} - F_{UL_Low} \geq 5$ MHz and $F_{UL_High} - F_{UL_Meas} \geq 5$ MHz (Range 1)	5.4 (p-p)
$F_{UL_Meas} - F_{UL_Low} < 5$ MHz or $F_{UL_High} - F_{UL_Meas} < 5$ MHz (Range 2)	13.4 (p-p)
Note 1: F_{UL_Meas} refers to the sub-carrier frequency for which the equalizer coefficient is evaluated Note 2: F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency band specified in Table 5.2-1	

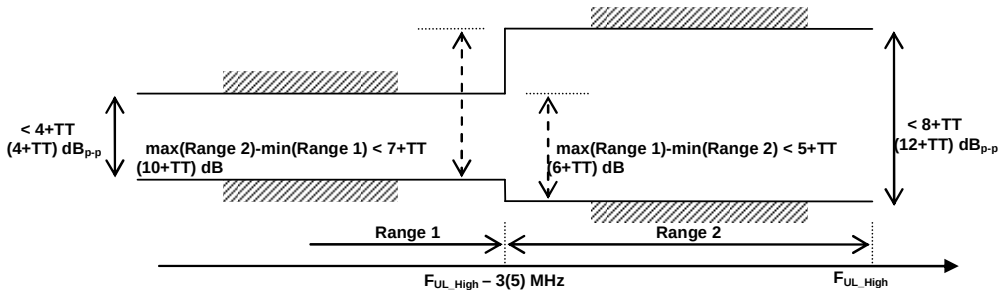


Figure 6.5.2B.4.5-1: The limits for EVM equalizer spectrum flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement within brackets)

6.6 Output RF spectrum emissions

Unwanted emissions are divided into "Out-of-band emission" and "Spurious emissions" in 3GPP RF specifications. This notation is in line with ITU-R recommendations such as SM.329 [2] and the Radio Regulations [3].

ITU defines:

Out-of-band emission = Emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions.

Spurious emission = Emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions.

Unwanted emissions = Consist of spurious emissions and out-of-band emissions.

The UE transmitter spectrum emission consists of the three components; the occupied bandwidth (channel bandwidth), the Out Of Band (OOB) emissions and the far out spurious emission domain.

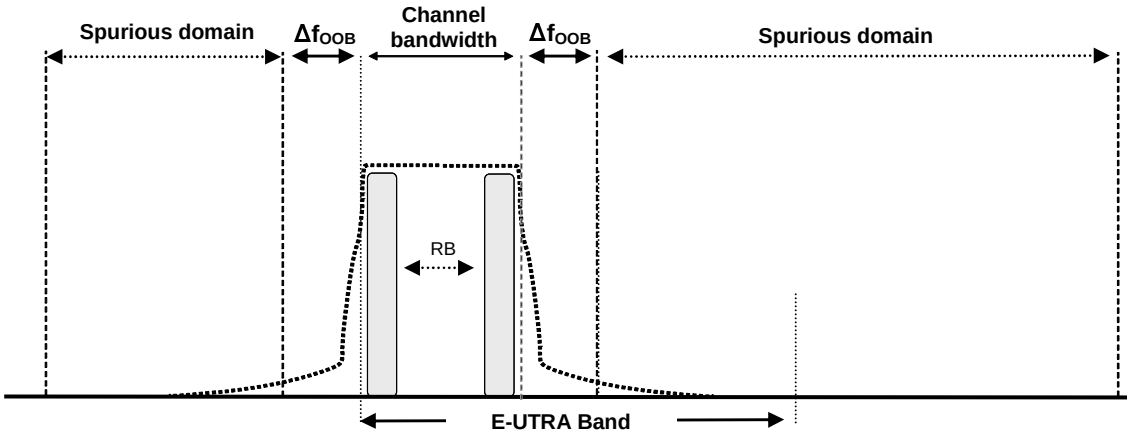


Figure 6.6-1: Transmitter RF spectrum

6.6.1 Occupied bandwidth

6.6.1.1 Test purpose

To verify that the UE occupied bandwidth for all transmission bandwidth configurations supported by the UE are less than their specific limits

6.6.1.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

6.6.1.2 Minimum conformance requirements

Occupied bandwidth is a measure of the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel. The occupied channel bandwidth for all transmission bandwidth configurations (Resources Blocks) should be less than the channel bandwidth specified in Table 6.6.1.2-1

Table 6.6.1.2-1: Occupied channel bandwidth

	Occupied channel bandwidth / channel bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz

Channel bandwidth [MHz]	1.4	3	5	10	15	20

The normative reference for this requirement is TS 36.101 [2] clause 6.6.1.

6.6.1.4 Test description

6.6.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal			
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**	Mid range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	All			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Occupied bandwidth	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.1.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.1.4.3

6.6.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously power control "up" commands to the UE until the UE transmits at P_{UMAX} level.

3. Measure the power spectrum distribution within two times or more range over the requirement for Occupied Bandwidth specification centring on the current carrier frequency. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test.

4. Calculate the total power within the range of all frequencies measured in '3)' and save this value as "Total Power".

5. Sum up the power upward from the lower boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency".

6. Sum up the power downward from the upper boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency".

7. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '5)' and '6)'.

6.6.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6

6.6.1.5 Test requirement

The measured Occupied Bandwidth shall not exceed values in Table 6.6.1.5-1.

Table 6.6.1.5-1: Occupied channel bandwidth

	Occupied channel bandwidth / channel bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Channel bandwidth [MHz]	1.4	3	5	10	15	20

6.6.1A Occupied bandwidth for CA

6.6.1A.0 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands the occupied bandwidth is defined per component carrier. Occupied bandwidth is the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on assigned channel bandwidth on the component carrier. The occupied bandwidth shall be less than the channel bandwidth specified in Table 6.6.1.2-1.

For intra-band contiguous carrier aggregation the occupied bandwidth is a measure of the bandwidth containing 99 % of the total integrated power of the transmitted spectrum. The OBW shall be less than the aggregated channel bandwidth defined in subclause 5.4.2A.

For intra-band non-contiguous carrier aggregation sub-block occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the sub-block. In case the sub-block consist of one component carrier the occupied bandwidth of the sub-block shall be less than the channel bandwidth specified in Table 6.6.1.2-1.

The normative reference for this requirement is TS 36.101[2] clause 6.6.1A.

6.6.1A.1 Occupied bandwidth for CA (intra-band contiguous DL CA and UL CA)

6.6.1A.1.1 Test purpose

To verify that the UE occupied bandwidth for intra-band contiguous CA for all transmission bandwidth configurations supported by the UE are less than their specific limits

6.6.1A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.6.1A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.1A.0.

6.6.1A.1.4 Test description

6.6.1A.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA configuration, and are shown in table 6.6.1A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.1A.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.		Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration		All						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50	N/A for this test	QPSK	75	P_25@0	P_50@0		
25	100		QPSK	125	P_25@0	S_100@0	-	-
50	50		QPSK	100	P_50@0	P_50@0		
50	75		QPSK	125	P_50@0	S_75@0	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	50		QPSK	125	P_75@0	S_50@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
75	100		QPSK	175	P_75@0	S_100@0	-	-
100	25		QPSK	125	P_100@0	S_25@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.6.1A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.1A.1.4.3.

6.6.1A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.1A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.1A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands to the UE until the UE transmits at P_{UMAX} level.

6. Measure the power spectrum distribution over all component carriers within two times or more range over the requirement for Occupied Bandwidth for CA specification centring on the current carrier frequency in CA configuration. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test.

7. Calculate the total power for the total integrated power of the transmitted spectrum within the range of all frequencies measured in '6)' and save this values as "Total Power".

8. Sum up the power upward from the lower boundary of the measured frequency range in '6)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency".

9. Sum up the power downward from the upper boundary of the measured frequency range in '6)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency".

10. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '8)' and '9)'.

6.6.1A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.1A.1.5 Test Requirements

The measured Occupied Bandwidth shall not exceed values of aggregated channel bandwidth as defined in section 5.4.2A for intra-band contiguous carrier aggregation.

6.6.1A.2 Occupied bandwidth for CA (inter-band DL CA and UL CA)

6.6.1A.2.1 Test purpose

To verify that the UE occupied bandwidth for inter-band CA for all transmission bandwidth configurations supported by the UE are less than their specific limits

6.6.1A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band CA and UL CA.

6.6.1A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.1A.0.

6.6.1A.2.4 Test description

6.6.1A.2.4.1 Initial condition

Same as in clause 6.6.1A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.

- Instead of Table 6.6.1A.1.4.1-1 → use Table 6.6.1A.2.4.1-1.

- Instead of clause 6.6.1A.1.4.3 use clause 6.6.1A.2.4.3.

Table 6.6.1A.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Mid range for PCC and SCC						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/Afor this test	QPSK	31	P_6@0	S_25@0	-	-
6	50		QPSK	56	P_6@0	S_50@0	-	-
15	25		QPSK	40	P_15@0	S_25@0	-	-
25	25		QPSK	50	P_25@0	S_25@0	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
75	100		QPSK	175	P_75@0	S_100@0	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.								

6.6.1A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.1A.2.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.1A.2.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands to the UE until the UE transmits at P_{UMAX} level.

6. Measure the power spectrum distribution of both PCC and SCC within two times or more range over the requirement for Occupied Bandwidth specification centring on the current carrier frequencies respectively. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test.

7. Calculate the total power for the total integrated power of the transmitted spectrum within the range of all frequencies measured in '6)' and save this values as "Total Power" for both PCC and SCC.

8. Sum up the power upward from the lower boundary of the measured frequency range in '6)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency" for both PCC and SCC.

9. Sum up the power downward from the upper boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency" for both PCC and SCC.

10. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '8)' and '9)' for both PCC and SCC.

6.6.1A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.1A.2.5 Test Requirements

The measured Occupied Bandwidth for each component carrier shall not exceed values in Table 6.6.1A.2.5-1.

Table 6.6.1A.2.5-1: Occupied channel bandwidth

	Occupied channel bandwidth / channel bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Channel bandwidth [MHz]	1.4	3	5	10	15	20

6.6.1A.3 Occupied bandwidth for CA (intra-band non-contiguous DL CA and UL CA)

6.6.1A.3.1 Test purpose

To verify that the UE occupied bandwidth for intra-band non-contiguous CA for all transmission bandwidth configurations supported by the UE are less than their specific limits

6.6.1A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.6.1A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.1A.0.

6.6.1A.3.4 Test description

6.6.1A.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each CA configuration, and are shown in table 6.6.1A.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.1A.3.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: Low Wgap, Maximum Wgap
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test points All PCC N_{RB} = SCC N_{RB} test points

Test Parameters for CA Configurations								
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**	**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations								
1	25	25	5	NA	QPSK	P_25@0	QPSK	S_25@0
2	50	50	25		QPSK	P_50@0	QPSK	S_50@0
3	75	75	15		QPSK	P_75@0	QPSK	S_100@0
4	100	100	5		QPSK	P_100@0	QPSK	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.6.1A.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.1A.3.4.3.

6.6.1A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.1A.3.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.1A.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands to the UE until the UE transmits at P_{UMAX} level.

6. Measure the power spectrum distribution of each sub-block over all component carriers within the requirement for Occupied Bandwidth for CA specification + 5MHz, centring on the carrier frequency of each sub-block in CA configuration. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test.

7. Calculate the total power for the total integrated power of the transmitted spectrum within the range of all frequencies measured for each sub-block in '6)' and save this values as "Total Power".

8. Sum up the power upward from the lower boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency".

9. Sum up the power downward from the upper boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency".

10. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '8)' and '9')' for each sub-block.

6.6.1A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.1A.3.5 Test Requirements

The measured Occupied Bandwidth shall not exceed values of channel bandwidth as defined in section 5.4.2A for intra-band non-contiguous carrier aggregation.

6.6.1A.4 Occupied bandwidth for CA (3DL CA and 3UL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

-Test Configuration Table is incomplete

-The test applicability needs to be added to TS36.521-2

6.6.1A.4.1 Test purpose

To verify that the UE occupied bandwidth for CA in all transmission bandwidth configurations supported by the UE are less than their specific limits

6.6.1A.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support 3DL CA and 3UL CA.

6.6.1A.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.1A.0.

6.6.1A.4.4 Test description

6.6.1A.4.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E UTRA CA configurations specified in table 5.4.2A.1-1, 5.4.2A.1-2 and 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 6.5.1A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.1A.4.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.		Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration		All						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
TBD	TBD	N/A for this test	TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1, 5.4.2A.1-2 and 5.4.2A.1-2a.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.6.1A.4.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.1A.4.1.4.3.

6.6.1A.4.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.1A.4.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.1A.4.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands to the UE until the UE transmits at P_{UMAX} level.
6. Measure the power spectrum distribution over all component carriers within two times or more range over the requirement for Occupied Bandwidth for CA specification centring on the current carrier frequency in CA configuration. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test.
7. Calculate the total power for the total integrated power of the transmitted spectrum within the range of all frequencies measured in '6)' and save this value as "Total Power".
8. Sum up the power upward from the lower boundary of the measured frequency range in '6)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency".
9. Sum up the power downward from the upper boundary of the measured frequency range in '6)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency".
10. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '8)' and '9)'.

6.6.1A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.1A.4.5 Test Requirements

The measured Occupied Bandwidth shall not exceed values of aggregated channel bandwidth as defined in section 5.4.2A.

6.6.1B Occupied bandwidth for UL-MIMO

6.6.1B.1 Test purpose

To verify that the UE occupied bandwidth for all transmission bandwidth configurations supported by each of transmit antenna of the UE are less than their specific limits.

6.6.1B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.6.1B.3 Minimum conformance requirements

For UE with multiple transmit antenna connectors, the requirements for occupied bandwidth is specified at each transmit antenna connector. The occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel at each transmit antenna connector.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the occupied bandwidth at each transmitter antenna shall be less than the channel bandwidth specified in Table 6.6.1B.3-1 with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

Table 6.6.1B.3-1: Occupied channel bandwidth

	Occupied channel bandwidth / Channel bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Channel bandwidth (MHz)	1.4	3	5	10	15	20

The normative reference for this requirement is TS 36.101 [2] clause 6.6.1B.

6.6.1B.4 Test description

6.6.1B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.1B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.1B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal			
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**	Mid range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	All			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Occupied bandwidth	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.1B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.1B.4.3.

6.6.1B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.6.1B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously power control "up" commands to the UE until the UE transmits at P_{UMAX} level.
3. Measure the power spectrum distribution within two times or more range over the requirement for Occupied Bandwidth specification centring on the current carrier frequency. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test.
4. Calculate the total power within the range of all frequencies measured in '3)' and save this value as "Total Power".
5. Sum up the power upward from the lower boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency".
6. Sum up the power downward from the upper boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency".
7. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '5)' and '6)'.
8. Repeat step 3) until 7) for each of transmit antenna of the UE.

6.6.1B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.6.6.1B.5 Test requirement

The measured Occupied Bandwidth at each transmit antenna of UE shall not exceed values in Table 6.6.1B.5-1.

Table 6.6.1B.5-1: Occupied channel bandwidth

	Occupied channel bandwidth / channel bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Channel bandwidth [MHz]	1.4	3	5	10	15	20

6.6.1E Occupied bandwidth for UE category 0

6.6.1E.1 Test purpose

Same test purpose as in clause 6.6.1.1.

6.6.1E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.6.1E.2 Minimum conformance requirements

Occupied bandwidth is a measure of the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel. The occupied channel bandwidth for all transmission bandwidth configurations (Resources Blocks) should be less than the channel bandwidth specified in Table 6.6.1E.2-1

Table 6.6.1E.2-1: Occupied channel bandwidth

	Occupied channel bandwidth / channel bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Channel bandwidth [MHz]	1.4	3	5	10	15	20

The normative reference for this requirement is TS 36.101 [2] clause 6.6.1.

6.6.1E.4 Test description

6.6.1E.4.1 Initial conditions

Same initial conditions as in clause 6.6.1.4.1 with the following exceptions:

- Instead of Table 6.6.1.4.1-1 → use Table 6.6.1E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.6.1E.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal			
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**	Mid range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	All			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Occupied bandwidth	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

6.6.1E.4.2 Test procedure

Same test procedure as in clause 6.6.1.4.2 with the following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframes are not under test.

6.6.1E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6

6.6.1E.5 Test requirement

The measured Occupied Bandwidth shall not exceed values in Table 6.6.1E.5-1.

Table 6.6.1E.5-1: Occupied channel bandwidth

	Occupied channel bandwidth / channel bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Channel bandwidth [MHz]	1.4	3	5	NA	NA	NA

6.6.1EA Occupied bandwidth for UE category M1

6.6.1EA.1 Test purpose

Same test purpose as in clause 6.6.1.1.

6.6.1EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.6.1EA.2 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.1.2.

6.6.1EA.4 Test description

6.6.1E.4A.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.1EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.6.1EA.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] subclause 4.1	Normal				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5 MHz				
Test Parameters for Channel Bandwidths					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for Occupied bandwidth	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
5MHz		QPSK	6	6	0
Note 1: Denote where in the channel bandwidth the narrowband shall be placed. Narrowband and narrowband index are defined in TS 36.211, 5.2.4.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.6.1EA.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.6.1EA.4.3.

6.6.1EA.4.2 Test procedure

1. The SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.6.1EA.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously power control "up" commands to the UE until the UE transmits at P_{UMAX} level.
3. Measure the power spectrum distribution within two times or more range over the requirement for Occupied Bandwidth specification centring on the current carrier frequency. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.
4. Calculate the total power within the range of all frequencies measured in '3)' and save this value as "Total Power".
5. Sum up the power upward from the lower boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency".
6. Sum up the power downward from the upper boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency".
7. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '5)' and '6)'.

6.6.1EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA.

6.6.1EA.5 Test requirement

The measured Occupied Bandwidth shall not exceed values in Table 6.6.1EA.5-1.

Table 6.6.1EA.5-1: Occupied channel bandwidth

	Occupied channel bandwidth / channel bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Channel bandwidth [MHz]	N/A	N/A	1.4	N/A	N/A	N/A

6.6.1F Occupied bandwidth for category NB1

6.6.1F.1 Test purpose

To verify that the UE occupied bandwidth for all transmission bandwidth configurations supported by the UE are less than their specific limits.

6.6.1F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.6.1F.3 Minimum conformance requirements

The occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel at the transmit antenna connector. Occupied bandwidth shall be less than the channel bandwidth of category NB1 that is 200 kHz.

The normative reference for this requirement is TS 36.101[2] clause 6.6.1F.

6.6.1F.4 Test description

6.6.1F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters shown in table 6.6.1F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.6.1F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1		QPSK	1@0	3.75kHz
2		QPSK	1@0	15kHz
3 (Note 1)		QPSK	12@0	15kHz
Note 1: Applicable to UE supporting UL multi-tone transmissions				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.4.0.
4. The UL Reference Measurement channels are set according to Table 6.6.1F.4.1-1.
5. Propagation conditions are set according to Annex B.0
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.6.1F.4.3

6.6.1F.4.2 Test procedure

1. SS sends uplink scheduling information via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.6.1F.4.1-1. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC. (UE should be already transmitting P_{UMAX} after Initial Conditions setting).
2. Measure the power spectrum distribution within two times or more range over the requirement for Occupied Bandwidth specification centring on the current carrier frequency. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measurement duration is at least one sub-frame **(**1ms) for 15 KHz channel spacing, and at least a 2ms slot (excluding the 2304Ts gap when UE is not transmitting) respectively for the 3.75 KHz channel spacing.

3. Calculate the total power within the range of all frequencies measured in '2)' and save this value as "Total Power".

4. Sum up the power upward from the lower boundary of the measured frequency range in '2)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency".

5. Sum up the power downward from the upper boundary of the measured frequency range in '2)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency".

6. Calculate the difference ("Upper Frequency " – "Lower Frequency" = "Occupied Bandwidth") using the limit frequencies obtained in '4)' or '5)'.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.6.1F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.6.1F.5 Test requirement

The measured Occupied Bandwidth shall not exceed 200kHz.

6.6.1G Occupied bandwidth for V2X Communication

6.6.1G.1 Occupied bandwidth for V2X Communication / Non-concurrent with E-UTRA uplink transmission

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- RB allocation

- The UE test mode is FFS

-Message Content is FFS

- Applicability spec

6.6.1G.1.1 Test purpose

Same test purpose as in clause 6.6.1.1.

6.6.1G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X communication.

6.6.1G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.5G-1, the requirements in subclause 6.6.1 apply for E-UTRA V2X sidelink transmission.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.1G.

6.6.1G.1.4 Test description

6.6.1G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.1G.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annexes A.8.3 and reference GNSS configuration as defined in Table C.2-8 in Annex C.2.

Table 6.6.1G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	All	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.89.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 6.6.1G.1.4.3.
3. The V2X reference measurement channel is set according to Table 6.6.1G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode - FFS.

6.6.1G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Measure the power spectrum distribution within two times or more range over the requirement for Occupied Bandwidth specification centring on the current carrier frequency. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test.
3. Calculate the total power within the range of all frequencies measured in '2)' and save this value as "Total Power".
4. Sum up the power upward from the lower boundary of the measured frequency range in '2)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency".
5. Sum up the power downward from the upper boundary of the measured frequency range in '2)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency".
6. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '4)' and '5)'.

6.6.1G.1.4.3 Message contents

FFS

6.6.1G.1.5 Test requirements

The measured Occupied Bandwidth shall not exceed values in Table 6.6.1G.1.5-1.

Table 6.6.1G.1.5-1: Occupied channel bandwidth for EUTRA band 47

	Occupied channel bandwidth / channel bandwidth	
	10 MHz	**20 MHz**
Channel bandwidth [MHz]	10	20

6.6.1G.2 Occupied bandwidth for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- RB allocation

- Connection diagram- Applicability spec

6.6.1G.2.1 Test purpose

Same test purpose as in clause 6.6.1.1.

6.6.1G.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X communication.

6.6.1G.2.3 Minimum conformance requirements

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 6.6.1 apply for V2X sidelink transmission and the E-UTRA uplink transmission.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.1G.

6.6.1G.2.4 Test description

6.6.1G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.2.2G.2.4.1-1. The details of the uplink and V2X reference measurement channels (RMCs) are specified in Annexes A.2 and A.8.3 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.1G.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Mid range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		All				
Test Parameters for Channel Bandwidths						
	Downlink	**Uplink Configuration**		**V2X Configuration**		
Ch BW	N/A for Occupied bandwidth	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz		QPSK	6	10 MHz	QPSK	[48]
3 MHz		QPSK	15	20 MHz	QPSK	[96]
5 MHz		QPSK	25			
10 MHz		QPSK	50			
15 MHz		QPSK	75			
20 MHz		QPSK	100			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 6.6.1G.2.4.1-1
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 6.6.1G.2.4.3.

6.6.1G.2.4.2 Test procedure

1. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 6.6.1G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.
2. Send continuously power control "up" commands to the UE until the UE transmits at P_{UMAX} level. Configure the UE to transmit PSCCH and PSSCH with the P_{UMAX} level of each test points.
3. Measure the power spectrum distribution of both concurrent bands within two times or more range over the requirement for Occupied Bandwidth specification centring on the current carrier frequency. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is one active uplink subframe. For TDD slots with transient periods are not under test.
4. Calculate the total power within the range of all frequencies measured in '3)' and save this value as "Total Power" for both concurrent bands.
5. Sum up the power upward from the lower boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Lower Frequency" for both concurrent bands.
6. Sum up the power downward from the upper boundary of the measured frequency range in '3)' and seek the limit frequency point by which this sum becomes 0,5 % of "Total Power" and save this point as "Upper Frequency" for both concurrent bands.
7. Calculate the difference ("Upper Frequency" – "Lower Frequency" = "Occupied Bandwidth") between two limit frequencies obtained in '5)' and '6)' for both concurrent bands.

6.6.1G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.1G.2.5 Test requirements

The measured Occupied Bandwidth for both concurrent bands shall not exceed values in Table 6.6.1G.2.5-1.

Table 6.6.1G.2.5-1: Occupied channel bandwidth

	Occupied channel bandwidth / channel bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Channel bandwidth [MHz]	1.4	3	5	10	15	20

6.6.2 Out of band emission

Out of band emissions are unwanted emissions immediately outside the nominal channel resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a Spectrum Emission Mask and Adjacent Channel Leakage power Ratio.

6.6.2.1 Spectrum Emission Mask

6.6.2.1.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth.

6.6.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.6.2.1.3 Minimum conformance requirements

The spectrum emission mask of the UE applies to frequencies (Δf_{OOB}) starting from the edge of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δf_{OOB}) as specified in Table 6.6.2.1.3-1 the spurious requirements in clause 6.6.3 are applicable.

The power of any UE emission shall not exceed the levels specified in Table 6.6.2.1.3-1 for the specified channel bandwidth.

Table 6.6.2.1.3-1: General E-UTRA spectrum emission mask

Spectrum emission limit (dBm)/ Channel bandwidth							
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz
± 1-2.5	-10	-10	-10	-10	-10	-10	1 MHz
± 2.5-2.8	-25	-10	-10	-10	-10	-10	1 MHz
± 2.8-5		-10	-10	-10	-10	-10	1 MHz
± 5-6		-25	-13	-13	-13	-13	1 MHz
± 6-10			-25	-13	-13	-13	1 MHz
± 10-15				-25	-13	-13	1 MHz
± 15-20					-25	-13	1 MHz
± 20-25						-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2.1.

6.6.2.1.4 Test description

6.6.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for SEM testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
1.4MHz		QPSK	5	5
1.4MHz		16QAM	5	5
1.4MHz		16QAM	6	6
3MHz		QPSK	15	15
3MHz		QPSK	4	4
3MHz		16QAM	4	4
3MHz		16QAM	15	15
5MHz		QPSK	25	25
5MHz		QPSK	8	8
5MHz		16QAM	8	8
5MHz		16QAM	25	25
10MHz		QPSK	50	50
10MHz		QPSK	12	12
10MHz		16QAM	12	12
10MHz		16QAM	50 (Note 4)	50 (Note 4)
15MHz		QPSK	75	75
15MHz		QPSK	16	16
15MHz		16QAM	16	16
15MHz		16QAM	75 (Note 4)	75 (Note 4)
20MHz		QPSK	100	100
20MHz		QPSK	18	18
20MHz		16QAM	18	18
20MHz		16QAM	100 (Note 4)	100 (Note 4)

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The allowed MPR for maximum output power UE might apply is described in clause 6.2.3.3.
Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max+1 – RB allocation) of the channel bandwidth.
Note 4: Applies only for UE-Categories ≥2

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.1.4.3.

6.6.2.1.4.2 Test procedure

SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3.5-1 for Power Class 3 UEs or in 6.2.3_1.5-1 for HPUE (Power Class 1 or Power Class 2 UEs). The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.1.5-1 or 6.6.2.1.5-2, as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.1.5 Test requirements

The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3.5-1 as appropriate, and the power of any UE emission shall fulfil requirements in Table.6.6.2.1.5-1 or Table.6.6.2.1.5-2, as applicable.

Table 6.6.2.1.5-1: General E-UTRA spectrum emission mask, E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-11.5	-11.5	-11.5	-11.5	1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

Table 6.6.2.1.5-2: General E-UTRA spectrum emission mask, 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth

Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-8.2	-8.2	-8.2	-8.2	-8.2	-8.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2	-11.2	-11.2	-11.2	-11.2	1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1_1 Spectrum Emission Mask for Multi-Cluster PUSCH

6.6.2.1_1.1 Test purpose

To verify that the power of any UE emission shall not exceed specified level for the specified channel bandwidth for Multi-Cluster PUSCH transmission.

6.6.2.1_1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support multi cluster PUSCH within a component carrier for the tested band.

6.6.2.1_1.3 Minimum conformance requirements

The spectrum emission mask of the UE applies to frequencies (Δf_{OOB}) starting from the edge of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δf_{OOB}) as specified in Table 6.6.2.1_1.3-1 the spurious requirements in clause 6.6.3 are applicable.

The power of any UE emission shall not exceed the levels specified in Table 6.6.2.1_1.3-1 for the specified channel bandwidth.

Table 6.6.2.1_1.3-1: General E-UTRA spectrum emission mask

Spectrum emission limit (dBm)/ Channel bandwidth							
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz
± 1-2.5	-10	-10	-10	-10	-10	-10	1 MHz
± 2.5-2.8	-25	-10	-10	-10	-10	-10	1 MHz
± 2.8-5		-10	-10	-10	-10	-10	1 MHz
± 5-6		-25	-13	-13	-13	-13	1 MHz
± 6-10			-25	-13	-13	-13	1 MHz
± 10-15				-25	-13	-13	1 MHz
± 15-20					-25	-13	1 MHz
± 20-25						-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2.1.

6.6.2.1_1.4 Test description

6.6.2.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.1_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.1_1.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1			Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			Highest		
Test Parameters for Channel Bandwidths					
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Ch BW	N/A for SEM testing	Mod'n	Cluster1 RB allocations (L_{CRB} @ RB_{start})	Cluster2 RB allocations (L_{CRB} @ RB_{start})
1	5MHz		16QAM	2@0	1@24
2	5MHz		16QAM	18@0	2@22
3	5MHz		16QAM	2@0	18@6
4	10MHz		16QAM	3@0	2@48
5	10MHz		16QAM	42@0	3@45
6	10MHz		16QAM	3@0	42@6
7	15MHz		16QAM	8@0	7@68
8	15MHz		16QAM	60@0	4@68
9	15MHz		16QAM	4@0	60@12
10	20MHz		16QAM	4@0	4@96
11	20MHz		16QAM	92@0	4@96
12	20MHz		16QAM	4@0	92@8
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.6.2.1_1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.1.4.3.

6.6.2.1_1.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.1_1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3_2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.1_1.5-1 or 6.6.2.1_1.5-2, as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.1_1.5 Test requirements

The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3_2.5-1 as appropriate, and the power of any UE emission shall fulfil requirements in Table 6.6.2.1_1.5-1 or Table 6.6.2.1_1.5-2, as applicable.

Table 6.6.2.1_1.5-1: General E-UTRA spectrum emission mask, E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-11.5	-11.5	-11.5	-11.5	1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

Table 6.6.2.1_1.5-2: General E-UTRA spectrum emission mask, 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-8.2	-8.2	-8.2	-8.2	-8.2	-8.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2	-11.2	-11.2	-11.2	-11.2	1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1A Spectrum emission mask for CA

6.6.2.1A.0 Minimum conformance requirements

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the spectrum emission mask of the UE is defined per component carrier while both component carriers are active and the requirements are specified in subclauses 6.6.2.1.3 and 6.6.2.2.3. If for some frequency spectrum emission masks of component carriers overlap then spectrum emission mask allowing higher power spectral density applies for that frequency. If for some frequency a component carrier spectrum emission mask overlaps with the channel bandwidth of another component carrier, then the emission mask does not apply for that frequency.

For intra-band contiguous carrier aggregation the spectrum emission mask of the UE applies to frequencies (Δf_{OOB}) starting from the ± edge of the aggregated channel bandwidth (Table 5.4.2A-1) For intra-band contiguous carrier aggregation the bandwidth class B and C, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.1A.0-1 and Table 6.6.2.1A.0-2 for the specified channel bandwidth.

Table 6.6.2.1A.0-1: General E-UTRA CA spectrum emission mask for Bandwidth Class B

Spectrum emission limit [dBm]/$BW_{Channel_CA}$			
Δf_{OOB} (MHz)	25RB+50RB (14.95 MHz)	50RB+50RB (19.9 MHz)	Measurement bandwidth
± 0-1	-20	-21	30 kHz
± 1-5	-10	-10	1 MHz
± 5-14.95	-13	-13	1 MHz
± 14.95-19.90	-25	-13	1 MHz
± 19.90-19.95	-25	-25	1 MHz
± 19.95-24.90		-25	1 MHz

Table 6.6.2.1A.0-2: General E-UTRA CA spectrum emission mask for Bandwidth Class C

Spectrum emission limit [dBm]/$BW_{Channel_CA}$						
Δf_{OOB} (MHz)	25RB+100RB (24.95MHz)	50RB+100RB (29.9 MHz)	75RB+75RB (30 MHz)	75RB+100RB (34.85 MHz)	100RB+100RB (39.8 MHz)	Measurement bandwidth
± 0-1	-22	-22.5	-22.5	-23.5	-24	30 kHz
± 1-5	-10	-10	-10	-10	-10	1 MHz
± 5-24.95	-13	-13	-13	-13	-13	1 MHz
± 24.95-29.9	-25	-13	-13	-13	-13	1 MHz
± 29.9-29.95	-25	-25	-13	-13	-13	1 MHz
± 29.95-30		-25	-13	-13	-13	1 MHz
± 30-34.85		-25	-25	-13	-13	1 MHz
± 34.85-34.9		-25	-25	-25	-13	1 MHz
± 34.9-35			-25	-25	-13	1 MHz
± 35-39.8				-25	-13	1 MHz
± 39.8-39.85				-25	-25	1 MHz
± 39.85-44.8					-25	1 MHz

For intra-band non-contiguous carrier aggregation transmission the spectrum emission mask requirement is defined as a composite spectrum emissions mask. Composite spectrum emission mask applies to frequencies up to ± Δf_{OOB} starting from the edges of the sub-blocks. Composite spectrum emission mask is defined as follows

a) Composite spectrum emission mask is a combination of individual sub-block spectrum emissions masks

b) In case the sub-block consist of one component carrier the sub-lock general spectrum emission mask is defined in subclause 6.6.2.1.3

c) If for some frequency sub-block spectrum emission masks overlap then spectrum emission mask allowing higher power spectral density applies for that frequency

d) If for some frequency a sub-block spectrum emission mask overlaps with the sub-block bandwidth of another sub-block, then the emission mask does not apply for that frequency.

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.2.1A.

6.6.2.1A.1 Spectrum emission mask for CA (intra-band contiguous DL CA and UL CA)

6.6.2.1A.1.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth for CA.

6.6.2.1A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.6.2.1A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.1A.0.

6.6.2.1A.1.4 Test description

6.6.2.1A.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.1A.1.4.1-1. The details of the uplink reference

measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.1A.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low and High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}			**DL Allocation**	**CC MOD**	**UL Allocation**				
ID	**PCC N_{RB}**	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	100	25		QPSK	8	P_8@0	S_0@0		
2	100	25		QPSK	25	P_25@0	S_0@0		
3	100	25		QPSK	125	P_100@0	S_25@0		
4	100	25		16QAM	8	P_8@0	S_0@0		
5	100	25		16QAM	25	P_25@0	S_0@0		
6	100	25		16QAM	125	P_100@0	S_25@0		
7	100	25		QPSK	2	P_1@0	S_1@24		
8	75	75		QPSK	16	P_16@0	S_0@0		
9	75	75		QPSK	75	P_75@0	S_0@0		
10	75	75		QPSK	150	P_75@0	S_75@0		
11	75	75		16QAM	16	P_16@0	S_0@0		
12	75	75		16QAM	75	P_75@0	S_0@0		
13	75	75		16QAM	150	P_75@0	S_75@0		
14	75	75		QPSK	2	P_1@0	S_1@74		
15	100	50		QPSK	12	P_12@0	S_0@0		
16	100	50		QPSK	50	P_50@0	S_0@0		
17	100	50		QPSK	150	P_100@0	S_50@0		
18	100	50		16QAM	12	P_12@0	S_0@0		
19	100	50		16QAM	50	P_50@0	S_0@0		
20	100	50		16QAM	150	P_100@0	S_50@0		
21	100	50		QPSK	2	P_1@0	S_1@49		
22	100	75		QPSK	16	P_16@0	S_0@0		
23	100	75		QPSK	75	P_75@0	S_0@0		
24	100	75		QPSK	175	P_100@0	S_75@0		
25	100	75		16QAM	16	P_16@0	S_0@0		
26	100	75		16QAM	75	P_75@0	S_0@0		
27	100	75		16QAM	175	P_100@0	S_75@0		
28	100	75		QPSK	2	P_1@0	S_1@74		
29	100	100		QPSK	18	P_18@0	S_0@0		
30	100	100		QPSK	100	P_100@0	S_0@0		
31	100	100		QPSK	200	P_100@0	S_100@0		

32	100	100		16QAM	18	P_18@0	S_0@0		
33	100	100		16QAM	100	P_100@0	S_0@0		
34	100	100		16QAM	200	P_100@0	S_100@0		
35	100	100		QPSK	2	P_1@0	S_1@99		
36	25	50		QPSK	8	P_8@0	S_0@0		
37	25	50		QPSK	25	P_25@0	S_0@0		
38	25	50		QPSK	75	P_25@0	S_50@0		
39	25	50		16QAM	8	P_8@0	S_0@0		
40	25	50		16QAM	25	P_25@0	S_0@0		
41	25	50		16QAM	75	P_25@0	S_50@0		
42	25	50		QPSK	2	P_1@0	S_1@49		
43	50	50		QPSK	12	P_12@0	S_0@0		
44	50	50		QPSK	50	P_50@0	S_0@0		
45	50	50		QPSK	100	P_50@0	S_50@0		
46	50	50		16QAM	12	P_12@0	S_0@0		
47	50	50		16QAM	50	P_50@0	S_0@0		
48	50	50		16QAM	100	P_50@0	S_50@0		
49	50	50		QPSK	2	P_1@0	S_1@49		

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.1A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.1A.1.4.3.

6.6.2.1A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.1A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the mean power over all component carriers in the CA configuration of the radio access mode, which shall meet the requirements described in Table 6.2.3A.1.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

7. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.1A.1.5-1 or 6.6.2.1A.1.5-2, as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.2.1A.1.5 Test Requirements

The measured UE mean power with the aggregated channel bandwidth as specified in clause 5.4.2A, derived in step 6, shall fulfil requirements in Table 6.2.3A.1.5-1 as appropriate,

and

the power of any UE emission shall fulfil requirements in Table.6.6.2.1A.1.5-1 or Table.6.6.2.1A.1.5-2 for Bandwidth Class C and Table.6.6.2.1A.1.5-3 or Table.6.6.2.1A.1.5-4 for Bandwidth Class B, as applicable.

Table 6.6.2.1A.1.5-1: General E-UTRA spectrum emission mask for CA Bandwidth Class C, E-UTRA bands ≤ 3GHz

<table>
<tr><th></th><th colspan="6">Spectrum emission limit [dBm]/BWChannel_CA</th></tr>
<tr><th>Δf_{OOB} (MHz)</th><th>25RB+100RB (24.95 MHz)</th><th>50RB+100RB (29.9 MHz)</th><th>75RB+75RB (30 MHz)</th><th>75RB+100RB (34.85 MHz)</th><th>100RB+100RB (39.8 MHz)</th><th>Measurement bandwidth</th></tr>
<tr><td>± 0-1</td><td>-20.5</td><td>-21</td><td>-21</td><td>-22</td><td>-22.5</td><td>30 kHz</td></tr>
<tr><td>± 1-5</td><td>-8.5</td><td>-8.5</td><td>-8.5</td><td>-8.5</td><td>-8.5</td><td>1 MHz</td></tr>
<tr><td>± 5-24.95</td><td>-11.5</td><td rowspan="2">-11.5</td><td rowspan="4">-11.5</td><td rowspan="5">-11.5</td><td rowspan="10">-11.5</td><td>1 MHz</td></tr>
<tr><td>± 24.95-29.9</td><td rowspan="2">-23.5</td><td>1 MHz</td></tr>
<tr><td>± 29.9-29.95</td><td rowspan="5">-23.5</td><td>1 MHz</td></tr>
<tr><td>± 29.95-30</td><td></td><td>1 MHz</td></tr>
<tr><td>± 30-34.85</td><td></td><td rowspan="3">-23.5</td><td>1 MHz</td></tr>
<tr><td>± 34.85-34.9</td><td></td><td rowspan="4">-23.5</td><td>1 MHz</td></tr>
<tr><td>± 34.9-35</td><td></td><td></td><td>1 MHz</td></tr>
<tr><td>± 35-39.8</td><td></td><td></td><td></td><td>1 MHz</td></tr>
<tr><td>±39.8-39.85</td><td></td><td></td><td></td><td rowspan="2">-23.5</td><td>1 MHz</td></tr>
<tr><td>± 39.85-44.8</td><td></td><td></td><td></td><td></td><td>1 MHz</td></tr>
<tr><td colspan="7">Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the aggregated channel bandwidth and below the lower edge of the aggregated channel bandwidth.</td></tr>
</table>

Table 6.6.2.1A.1.5-2: General E-UTRA spectrum emission mask for CA Bandwidth Class C, 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit [dBm]/BWChannel_CA					
Δf_{OOB} (MHz)	**25RB+100RB (24.95 MHz)**	**50RB+100RB (29.9 MHz)**	**75RB+75RB (30 MHz)**	**75RB+100RB (34.85 MHz)**	**100RB+100RB (39.8 MHz)**	**Measurement bandwidth**
± 0-1	-20.2	-20.7	-20.7	-21.7	-22.2	30 kHz
± 1-5	-8.2	-8.2	-8.2	-8.2	-8.2	1 MHz
± 5-24.95	-11.2	-11.2	-11.2	-11.2	-11.2	1 MHz
± 24.95-29.9	-23.2					1 MHz
± 29.9-29.95		-23.2				1 MHz
± 29.95-30						1 MHz
± 30-34.85			-23.2			1 MHz
± 34.85-34.9				-23.2		1 MHz
± 34.9-35						1 MHz
± 35-39.8						1 MHz
±39.8-39.85					-23.2	1 MHz
± 39.85-44.8						1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.						
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.						
Note 3: The measurements are to be performed above the upper edge of the aggregated channel bandwidth and below the lower edge of the aggregated channel bandwidth.						

Table 6.6.2.1A.1.5-3: General E-UTRA spectrum emission mask for CA Bandwidth Class B, E-UTRA bands ≤ 3GHz

Spectrum emission limit [dBm]/$BW_{Channel_CA}$			
Δf_{OOB} (MHz)	**25RB+50RB (14.95 MHz)**	**50RB+50RB (19.9 MHz)**	**Measurement bandwidth**
± 0-1	-20	-21	30 kHz
± 1-5	-10	-10	1 MHz
± 5-14.95	-13	-13	1 MHz
± 14.95-19.90	-25	-13	1 MHz
± 19.90-19.95	-25	-25	1 MHz
± 19.95-24.90		-25	1 MHz

Table 6.6.2.1A.1.5-4: General E-UTRA spectrum emission mask for CA Bandwidth Class B, 3GHz < E-UTRA bands ≤ 4.2GHz

Spectrum emission limit [dBm]/$BW_{Channel_CA}$			
Δf_{OOB} (MHz)	**25RB+50RB (14.95 MHz)**	**50RB+50RB (19.9 MHz)**	**Measurement bandwidth**
± 0-1	-20	-21	30 kHz
± 1-5	-10	-10	1 MHz
± 5-14.95	-13	-13	1 MHz
± 14.95-19.90	-25	-13	1 MHz
± 19.90-19.95	-25	-25	1 MHz
± 19.95-24.90		-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1A.2 Spectrum emission mask for CA (inter-band DL CA and UL CA)

6.6.2.1A.2.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth for CA.

6.6.2.1A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.6.2.1A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.1A.0.

6.6.2.1A.2.4 Test description

6.6.2.1A.2.4.1 Initial condition

Same as in clause 6.6.2.1A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.6.2.1A.1.4.1-1 → use Table 6.6.2.1A.2.4.1-1.
- Instead of clause 6.6.2.1A.1.4.3 use clause 6.6.2.1A.2.4.3.

Table 6.6.2.1A.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Low range for PCC and SCC High range for PCC and SCC						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/Afor this test	QPSK	2	P_1@0	S_1@0	-	-
6	25		QPSK	2	P_1@5	S_1@24	-	-
6	25		QPSK	13	P_5@0	S_8@0	-	-
6	25		QPSK	13	P_5@1	S_8@17	-	-
6	25		16QAM	2	P_1@0	S_1@0		
6	25		16QAM	2	P_1@5	S_1@24		
6	25		16QAM	13	P_5@0	S_8@0		
6	25		16QAM	13	P_5@1	S_8@17		
6	50		QPSK	2	P_1@0	S_1@0	-	-
6	50		QPSK	2	P_1@5	S_1@49	-	-
6	50		QPSK	17	P_5@0	S_12@0	-	-
6	50		QPSK	17	P_5@1	S_12@38	-	-
6	50		16QAM	2	P_1@0	S_1@0	-	-
6	50		16QAM	2	P_1@5	S_1@49	-	-
6	50		16QAM	17	P_5@0	S_12@0	-	-
6	50		16QAM	17	P_5@1	S_12@38	-	-
25	15		QPSK	2	P_1@0	S_1@0	-	-
25	15		QPSK	2	P_1@24	S_1@14	-	-
25	15		QPSK	12	P_8@0	S_4@0	-	-
25	15		QPSK	12	P_8@17	S_4@11	-	-
25	15		16QAM	2	P_1@0	S_1@0	-	-
25	15		16QAM	2	P_1@24	S_1@14	-	-
25	15		16QAM	12	P_8@0	S_4@0	-	-
25	15		16QAM	12	P_8@17	S_4@11	-	-
25	25		QPSK	2	P_1@0	S_1@0	-	-
25	25		QPSK	2	P_1@24	S_1@24	-	-
25	25		QPSK	16	P_8@0	S_8@0	-	-
25	25		QPSK	16	P_8@17	S_8@17	-	-
25	25		16QAM	2	P_1@0	S_1@0	-	-
25	25		16QAM	2	P_1@24	S_1@24	-	-
25	25		16QAM	16	P_8@0	S_8@0	-	-

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16QAM	16	P_8@17	S_8@17	-	-
QPSK	2	P_1@0	S_1@0	-	-
QPSK	2	P_1@24	S_1@49	-	-
QPSK	20	P_8@0	S_12@0	-	-
QPSK	20	P_8@17	S_12@38	-	-
16QAM	2	P_1@0	S_1@0	-	-
16QAM	2	P_1@24	S_1@49	-	-
16QAM	20	P_8@0	S_12@0	-	-
16QAM	20	P_8@17	S_12@38	-	-
QPSK	2	P_1@0	S_1@0	-	-
QPSK	2	P_1@49	S_1@49	-	-
QPSK	24	P_12@0	S_12@0	-	-
QPSK	24	P_12@38	S_12@38	-	-
16QAM	2	P_1@0	S_1@0	-	-
16QAM	2	P_1@49	S_1@49	-	-
16QAM	24	P_12@0	S_12@0	-	-
16QAM	24	P_12@38	S_12@38	-	-
QPSK	2	P_1@0	S_1@0	-	-
QPSK	2	P_1@49	S_1@99	-	-
QPSK	30	P_12@0	S_18@0	-	-
QPSK	30	P_12@38	S_18@82	-	-
16QAM	2	P_1@0	S_1@0	-	-
16QAM	2	P_1@49	S_1@99	-	-
16QAM	30	P_12@0	S_18@0	-	-
16QAM	30	P_12@38	S_18@82	-	-
QPSK	2	P_1@0	S_1@0	-	-
QPSK	2	P_1@74	S_1@74	-	-
QPSK	32	P_16@0	S_16@0	-	-
QPSK	32	P_16@59	S_16@59	-	-
16QAM	2	P_1@0	S_1@0	-	-
16QAM	2	P_1@74	S_1@74	-	-
16QAM	32	P_16@0	S_16@0	-	-
16QAM	32	P_16@59	S_16@59	-	-
QPSK	2	P_1@0	S_1@0		
QPSK	2	P_1@99	S_1@49		
QPSK	30	P_18@0	S_12@0		
QPSK	30	P_18@82	S_12@38		
16QAM	2	P_1@0	S_1@0		
16QAM	2	P_1@99	S_1@49		
16QAM	30	P_18@0	S_12@0		
16QAM	30	P_18@82	S_12@38		
QPSK	2	P_1@0	S_1@0	-	-
QPSK	2	P_1@99	S_1@74	-	-
QPSK	34	P_18@0	S_16@0	-	-
QPSK	34	P_18@82	S_16@59	-	-
16QAM	2	P_1@0	S_1@0	-	-

100	75		16QAM	2	P_1@99	S_1@74	-	-
100	75		16QAM	34	P_18@0	S_16@0	-	-
100	75		16QAM	34	P_18@82	S_16@59	-	-
100	100		QPSK	2	P_1@0	S_1@0	-	-
100	100		QPSK	2	P_1@99	S_1@99	-	-
100	100		QPSK	36	P_18@0	S_18@0	-	-
100	100		QPSK	36	P_18@82	S_18@82	-	-
100	100		16QAM	2	P_1@0	S_1@0	-	-
100	100		16QAM	2	P_1@99	S_1@99	-	-
100	100		16QAM	36	P_18@0	S_18@0	-	-
100	100		16QAM	36	P_18@82	S_18@82	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

6.6.2.1A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.1A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
6. Measure the mean power for each CC, which shall meet the requirements described in Table 6.2.3A.2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.
7. Measure the power of the transmitted signal for PCC with a measurement filter of bandwidths according to table 6.6.2.1A.2.5-1 or 6.6.2.1A.2.5-2, as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.
8. Measure the power of the transmitted signal for SCC with a measurement filter of bandwidths according to table 6.6.2.1A.2.5-1 or 6.6.2.1A.2.5-2, as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.2.1A.2.5 Test Requirements

Editor's note: Need further investigation for test requirements in case some frequency spectrum emission masks of component carriers overlap for future coming inter-band UL CA combinations

The measured UE mean power in the channel bandwidth for each CC, derived in step 6, shall fulfil requirements in Table 6.2.3A.2.5-1 as appropriate, and the power of any UE emission per component carrier derived in step 7 and 8 shall fulfil requirements in Table.6.6.2.1A.2.5-1 or Table.6.6.2.1A.2.5-2, as applicable.

Table 6.6.2.1A.2.5-1: General E-UTRA spectrum emission mask, E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-11.5	-11.5	-11.5	-11.5	1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

Table 6.6.2.1A.2.5-2: General E-UTRA spectrum emission mask, 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-8.2	-8.2	-8.2	-8.2	-8.2	-8.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2	-11.2	-11.2	-11.2	-11.2	1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1A.3 Spectrum emission mask for CA (intra-band non-contiguous DL CA and UL CA)

6.6.2.1A.3.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth for CA.

6.6.2.1A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.6.2.1A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.1A.0.

6.6.2.1A.3.4 Test description

6.6.2.1A.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.1A.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.1A.3.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: Low Wgap, Maximum Wgap
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	16QAM	P_1@0	16QAM	S_1@24
2	25	25	35	N/A	N/A	16QAM	P_25@0	16QAM	S_25@0
3	25	25	5	N/A	N/A	16QAM	P_1@0	16QAM	S_1@24
4	25	25	5	N/A	N/A	16QAM	P_25@0	16QAM	S_25@0
5	100	100	5	N/A	N/A	16QAM	P_1@0	16QAM	S_1@99
6	100	100	5	N/A	N/A	16QAM	P_25@0	16QAM	S_25@75
7	100	100	5	N/A	N/A	16QAM	P_100@0	16QAM	S_100@0

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.1A.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.1A.3.4.3.

6.6.2.1A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.1A.3.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
6. Measure the mean power over all component carriers in the CA configuration of the radio access mode, which shall meet the requirements described in Table 6.2.3A.1.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.
7. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.1A.3.5-1 or 6.6.2.1A.3.5-2, as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.2.1A.3.5 Test Requirements

The measured UE mean power with the aggregated channel bandwidth as specified in clause 5.4.2A, derived in step 6, shall fulfil requirements in Table 6.2.3A.1.5-1 as appropriate,

and

the power of any UE emission shall fulfil requirements in Table.6.6.2.1A.3.5-1.

Table 6.6.2.1A.3.5-1: E-UTRA spectrum emission mask for CA_4A-4A

Spectrum emission limit [dBm]/BWChannel_CA								
25RB+25RB (Max Gap)			25RB+25RB (Mid range)			100RB+100RB		
Frequency ranges[MHz]	Limit [dBm]	MBW [MHz]	Frequency ranges[MHz]	Limit [dBm]	MBW	Frequency ranges[MHz]	Limit [dBm]	MBW [MHz]
1700-1704	-23.5	1	1715-1719	-23.5	1	1685-1690	-23.5	1
1704-1705	-11.5	1	1719-1720	-11.5	1	1690-1705	-11.5	1
1705-1709	-8.5	1	1720-1724	-8.5	1	1705-1709	-8.5	1
1709-1710	-13.5	0.03	1724-1725	-13.5	0.03	1709-1710	-19.5	0.03
-	-	-	-	-	-	-	-	-
1715-1716	-13.5	0.03	1730-1731	-13.5	0.03	1730-1731	-19.5	0.03
1716-1720	-8.5	1	1732-1734	-8.5	1	1731-1734	-8.5	1
1720-1721	-11.5	1	1734-1735	-13.5	0.03	1734-1735	-19.5	0.03
1721-1725	-23.5	1	-	-	-	-	-	-
1740-1744	-23.5	1	1741-1745	-8.5	1	1756-1760	-8.5	1
1744-1745	-11.5	1	1745-1746	-11.5	1	1760-1775	-11.5	1
1745-1749	-8.5	1	1746-1750	-23.5	1	1775-1780	-23.5	1
1749-1750	-13.5	0.03						
-	-	-						
1755-1756	-13.5	0.03						
1756-1760	-8.5	1						
1760-1761	-11.5	1						
1761-1765	-23.5	1						

Note 1: At the boundary of spectrum emission limit, the first and last measurement position with a 30kHz filter is the inside of +0.015MHz and -0.015MHz, respectively.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: MBW denotes Measurement Bandwidth with which the requirement has to be met.

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1B Spectrum Emission Mask for UL-MIMO

6.6.2.1B.1 Test purpose

To verify that the power of any UE emission at each transmit antenna shall not exceed specified lever for the specified channel bandwidth.

6.6.2.1B.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.6.2.1B.3 Minimum conformance requirements

For UE with multiple transmit antenna connectors, the requirements for the spectrum emission mask are specified at each transmit antenna connector. The spectrum emission mask of the UE applies to frequencies (Δf_{OOB}) starting from the edge of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δf_{OOB}) as specified in Table 6.6.2.1B.3-1.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme , the requirements in Table 6.6.2.1B.3-1 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

Table 6.6.2.1B.3-1: General E-UTRA spectrum emission mask

Spectrum emission limit (dBm)/ Channel bandwidth							
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz
± 1-2.5	-10	-10	-10	-10	-10	-10	1 MHz
± 2.5-2.8	-25	-10	-10	-10	-10	-10	1 MHz
± 2.8-5		-10	-10	-10	-10	-10	1 MHz
± 5-6		-25	-13	-13	-13	-13	1 MHz
± 6-10			-25	-13	-13	-13	1 MHz
± 10-15				-25	-13	-13	1 MHz
± 15-20					-25	-13	1 MHz
± 20-25						-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101 clause 6.6.2B.

6.6.2.1B.4 Test description

6.6.2.1B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.1B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.1B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] clause 4.1)		NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)		Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)		Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths				
Downlink Configuration		**Uplink Configuration**		
Ch BW	N/A for SEM testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
1.4MHz		QPSK	5	5
1.4MHz		16QAM	5	5
1.4MHz		16QAM	6	6
3MHz		QPSK	15	15
3MHz		QPSK	4	4
3MHz		16QAM	4	4
3MHz		16QAM	15	15
5MHz		QPSK	25	25
5MHz		QPSK	8	8
5MHz		16QAM	8	8
5MHz		16QAM	25	25
10MHz		QPSK	50	50
10MHz		QPSK	12	12
10MHz		16QAM	12	12
10MHz		16QAM	50 (Note 4)	50 (Note 4)
15MHz		QPSK	75	75
15MHz		QPSK	16	16
15MHz		16QAM	16	16
15MHz		16QAM	75 (Note 4)	75 (Note 4)
20MHz		QPSK	100	100
20MHz		QPSK	18	18
20MHz		16QAM	18	18
20MHz		16QAM	100 (Note 4)	100 (Note 4)

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The allowed MPR for maximum output power UE might apply is described in clause 6.2.3B.3.
Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max+1 - RB allocation) of the channel bandwidth.
Note 4: Applies only for UE-Categories [FFS].

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.1B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.1B.4.3.

6.6.2.1B.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.6.2.1B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at PUMAX level.

3. Measure the sum of the mean power at each antenna connector of UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in clause 6.2.3B.5. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

4. Measure the power of the transmitted signal at each antenna connector of UE with a measurement filter of bandwidths according to table 6.6.2.1B.5-1 or 6.6.2.1B.5-2 as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1B.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.1B.5 Test requirements

The measured sum of mean power at each antenna connector of UE in the channel bandwidth, derived in step 3, shall fulfil requirements in clause 6.2.3B.5 as appropriate,

And the power of any UE emission at each transmit antenna connector shall fulfil requirements in Table.6.6.2.1B.5-1 or Table.6.6.2.1B.5-2 as applicable.

Table 6.6.2.1B.5-1: General E-UTRA spectrum emission mask, E UTRA bands ≤ 3GHz

Spectrum emission limit (dBm)/ Channel bandwidth							
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-11.5	-11.5	-11.5	-11.5	1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.1B.5-2: General E-UTRA spectrum emission mask, 3GHz < E UTRA bands ≤ 4.2GHz

Spectrum emission limit (dBm)/ Channel bandwidth							
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-8.2	-8.2	-8.2	-8.2	-8.2	-8.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2	-11.2	-11.2	-11.2	-11.2	1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1E Spectrum Emission Mask for UE category 0

6.6.2.1E.1 Test purpose

Same test purpose as in clause 6.6.2.1.1.

6.6.2.1E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.6.2.1E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.2.1.3.

6.6.2.1E.4 Test description

6.6.2.1E.4.1 Initial conditions

Same initial conditions as in clause 6.6.2.1.4.1 with following exceptions:

- Instead of Table 6.6.2.1.4.1-1 → use Table 6.6.2.1E.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.6.2.1E.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)		Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for SEM testing	Mod'n	RB allocation	
			FDD and HD-FDD	TDD
1.4MHz		QPSK	6	6
1.4MHz		QPSK	5	5
1.4MHz		16QAM	5	5
3MHz		QPSK	15	15
3MHz		QPSK	4	4
3MHz		16QAM	4	4
3MHz		16QAM	5	5
5MHz		QPSK	25	25
5MHz		QPSK	8	8
5MHz		16QAM	5	5
10MHz		QPSK	36	36
10MHz		QPSK	12	12
10MHz		16QAM	5	5
15MHz		QPSK	36	36
15MHz		QPSK	16	16
15MHz		16QAM	5	5
20MHz		QPSK	36	36
20MHz		QPSK	18	18
20MHz		16QAM	5	5
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.				
Note 2: The allowed MPR for maximum output power UE might apply is described in clause 6.2.3.3.				
Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max+1 – RB allocation) of the channel bandwidth.				

6.6.2.1E.4.2 Test procedure

Same test procedure as in clause 6.6.2.1.4.2 with following exception:

- Instead of Table 6.6.2.1.4.1-1 → use Table 6.6.2.1E.4.1-1.

6.6.2.1E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.1E.5 Test requirements

The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3E.5-1 as appropriate, and the power of any UE emission shall fulfil requirements in Table.6.6.2.1E.5-1 or Table.6.6.2.1E.5-2, as applicable.

Table 6.6.2.1E.5-1: General E-UTRA spectrum emission mask, E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth

Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-11.5	-11.5	-11.5	-11.5	1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.1E.5-2: General E-UTRA spectrum emission mask, 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-8.2	-8.2	-8.2	-8.2	-8.2	-8.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2	-11.2	-11.2	-11.2	-11.2	1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1EA Spectrum Emission Mask for UE category M1

6.6.2.1EA.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth.

6.6.2.1EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.6.2.1EA.3 Minimum conformance requirements

The spectrum emission mask of the UE applies to frequencies (Δf_{OOB}) starting from the edge of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δf_{OOB}) as specified in Table 6.6.2.1.3EA -1 the spurious requirements in clause 6.6.3EA are applicable.

The power of any UE emission shall not exceed the levels specified in Table 6.6.2.1.3EA -1 for the specified channel bandwidth.

Table 6.6.2.1EA.3-1: General E-UTRA spectrum emission mask

Spectrum emission limit (dBm)/ Channel bandwidth							
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz
± 1-2.5	-10	-10	-10	-10	-10	-10	1 MHz
± 2.5-2.8	-25	-10	-10	-10	-10	-10	1 MHz
± 2.8-5		-10	-10	-10	-10	-10	1 MHz
± 5-6		-25	-13	-13	-13	-13	1 MHz
± 6-10			-25	-13	-13	-13	1 MHz
± 10-15				-25	-13	-13	1 MHz
± 15-20					-25	-13	1 MHz
± 20-25						-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2.1.

6.6.2.1EA.4 Test description

6.6.2.1EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.1EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2 respectively. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.6.2.1EA.4.1-1: Test Configuration mask

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1	NC				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, 10MHz, 15 MHz				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index (Note 1)
Low range, Mid range					
1.4MHz		QPSK	2	2	0
1.4MHz		QPSK	5	5	0
1.4MHz		QPSK	6	6	0
1.4MHz		16QAM	2	2	0
1.4MHz		16QAM	5	5	0
3MHz		QPSK	2	2	0
3MHz		QPSK	5	5	0
3MHz		QPSK	6	6	0
3MHz		16QAM	2	2	0
3MHz		16QAM	5	5	0
5MHz		QPSK	6	6	0
5MHz (Note 4)		16QAM	1	1	0
5MHz		16QAM	3	3	0
5MHz		16QAM	5	5	0
10MHz (Note 4)		QPSK	4	4	0
10MHz		QPSK	6	6	0
10MHz (Note 4)		16QAM	3	3	0
10MHz		16QAM	5	5	0
15MHz		QPSK	6	6	0
15MHz		16QAM	5	5	0
High range					
1.4MHz		QPSK	2	2	0
1.4MHz		QPSK	5	5	0
1.4MHz		QPSK	6	6	0
1.4MHz		16QAM	2	2	0
1.4MHz		16QAM	5	5	0
3MHz		QPSK	2	2	1
3MHz		QPSK	5	5	1
3MHz		QPSK	6	6	1
3MHz		16QAM	2	2	1
3MHz		16QAM	5	5	1
5MHz		QPSK	6	6	3
5MHz (Note 4)		16QAM	1	1	3
5MHz		16QAM	3	3	3
5MHz		16QAM	5	5	3
10MHz (Note 4)		QPSK	4	4	7
10MHz		QPSK	6	6	7
10MHz (Note 4)		16QAM	3	3	7
10MHz		16QAM	5	5	7
15MHz		QPSK	6	6	11
15MHz		16QAM	5	5	11

Note 1:	Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4
Note 2:	Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 3:	The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.
Note 4:	Only for power class 3 UE.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.1EA.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.6.2.1EA.4.3.

6.6.2.1EA.4.2 Test procedure

1. SS sends uplink scheduling information via PDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.6.2.1EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Tables 6.2.3EA.5-1 to 6.2.3EA.5-3. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods are not under test. Half-duplex guard sub frame are not under test.
4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.1EA.5-1, as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA.

6.6.2.1EA.5 Test requirements

The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Tables 6.2.3EA.5-1 to 6.2.3EA.5-3 as appropriate, and the power of any UE emission shall fulfil requirements in Table.6.6.2.1EA.5-1, as applicable.

Table 6.6.2.1EA.5-1: General E-UTRA spectrum emission mask

	Spectrum emission limit (dBm)/ Channel bandwidth

Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-11.5	-11.5	-11.5	-11.5	1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1F Spectrum Emission Mask for category NB1

6.6.2.1F.1 Test purpose

To verify that the power of the category NB1 UE emission shall not exceed specified level for the specified channel bandwidth.

6.6.2.1F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.6.2.1F.3 Minimum conformance requirements

The spectrum emission mask of the category NB1 UE applies to frequencies (Δf_{OOB}) starting from the ± edge of the assigned category NB1 channel bandwidth. For frequencies greater than (Δf_{OOB}) as specified in Table 6.6.2.1F.3-1 the spurious requirements in subclause 6.6.3 are applicable.

The power of any category NB1 UE emission shall not exceed the levels specified in Table 6.6.2.1F.3-1.

Table 6.6.2.1F.3-1: category NB1 UE spectrum emission mask

Δf_{OOB} (kHz)	Emission limit (dBm)	Measurement bandwidth
± 0	26	30 kHz
± 100	-5	30 kHz
± 150	-8	30 kHz
± 300	-29	30 kHz
± 500-1700	-35	30 kHz

In addition to the spectrum emission mask requirement in Table 6.6.2.1F.3-1 a category NB1 UE shall also meet the applicable E-UTRA spectrum emission mask requirement in sub-clause 6.6.2. E-UTRA spectrum emission requirement applies for frequencies that are Foffset away from edge of NB1 channel edge as defined in Table 6.6.2.1F.3-2.

Table 6.6.2.1F.3-2: Foffset for category NB1 UE spectrum emission mask

Channel BW (MHz)	Foffset [kHz]
1.4	165
3	190
5	200
10	225
15	240
20	245

NOTE: Foffset in Table 6.6.2.1F.3-2 is used to guarantee co-existence for guard-band operation.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2F.1.

6.6.2.1F.4 Test description

6.6.2.1F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters shown in table 6.6.2.1F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.6.2.1F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.2		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1		QPSK	1@0	3.75kHz
2		QPSK	1@47	3.75kHz
3		QPSK	1@0	15kHz
4		QPSK	1@11	15kHz
5 (Note 1)		QPSK	3@0	15kHz
6 (Note 1)		QPSK	3@3	15kHz
7 (Note 1)		QPSK	3@9	15kHz
8 (Note 1)		QPSK	6@0	15kHz
9 (Note 1)		QPSK	6@6	15kHz
10 (Note 1)		QPSK	12@0	15kHz
Note 1: The allowed MPR for maximum output power UE might apply is described in clause [6.2.3F.3].				

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3 using only main Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1.1 and H.4.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.1F.4.1-1.
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.6.2.1F.4.3.

6.6.2.1F.4.2 Test procedure

1. SS sends uplink scheduling information via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.1F.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. (UE should be already transmitting P_{UMAX} after Initial Conditions setting).

2. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3F.5-1. The measurement duration is at least one sub-frame **(**1ms) for 15 KHz channel spacing, and at least a 2ms slot (excluding the 2304Ts gap when UE is not transmitting) respectively for the 3.75 KHz channel spacing.

3. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.1F.5-1 as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.6.2.1F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.6.2.1F.5 Test requirements

The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3F.5-1 as appropriate, and the power of any UE emission shall fulfil requirements in 6.6.2.1F.5-1 as applicable.

Table 6.6.2.1F.5-1: category NB1 UE spectrum emission mask, category NB1 bands ≤ 3GHz

Δf_{OOB} (kHz)	Spectrum emission limit (dBm)	Measurement bandwidth
0 -100	$(27.5 + (F - 0) \times \frac{-3.5 - 27.5}{100 - 0})$	30 kHz
100 - 150	$(-3.5 + (F - 100) \times \frac{-6.5 - (-3.5)}{150 - 100})$	30 kHz
150 - 300	$(-6.5 + (F - 150) \times \frac{-27.5 - (-6.5)}{300 - 150})$	30 kHz
300 - 500	$(-27.5 + (F - 300) \times \frac{-33.5 - (-27.5)}{500 - 300})$	30 kHz
500 - 1700	-33.5	30 kHz
Note 1: The limit shall be calculated for the measurement frequency F given in kHz, cantered in the measurement bandwidth. Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 30 kHz filter is the inside of +15 kHz and -15 kHz, respectively. The filter shall be stepped to cover the whole range.		

Table 6.6.2.1F.5-2: Void

NOTE 1: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 2: The minimum requirements in clause 6.6.2.1F.3 have been combined into table 6.6.2.1F.5-1 to reduce testing complexity and test time.

6.6.2.1G Spectrum Emission Mask for V2X Communication

6.6.2.1G.1 Spectrum Emission Mask for V2X Communication Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The test tolerance is left FFS
- The test mode of Side link [5A-V2X] is FFS

6.6.2.1G.1.1 Test purpose

To verify that the power of any UE emission shall not exceed specified level for the specified channel bandwidth when UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands.

6.6.2.1G.1.2 Test applicability

This test case applies to E-UTRA UE release 14 and forward which support V2X communication.

6.6.2.1G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.5G-1, the requirements in subclause 36.101[2] subclause 6.6.2 apply except for the ACLR requirements for power class 2 V2X UE.

The spectrum emission mask of the UE applies to frequencies (ΔfOOB) starting from the edge of the assigned E-UTRA channel bandwidth. The power of any UE emission shall not exceed the levels specified in Table 6.6.2.1G.1.3-1.

Table 6.6.2.1G.1.3-1: General E-UTRA spectrum emission mask

Spectrum emission limit (dBm)/ Channel bandwidth							
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz
± 1-2.5	-10	-10	-10	-10	-10	-10	1 MHz
± 2.5-2.8	-25	-10	-10	-10	-10	-10	1 MHz
± 2.8-5		-10	-10	-10	-10	-10	1 MHz
± 5-6		-25	-13	-13	-13	-13	1 MHz
± 6-10			-25	-13	-13	-13	1 MHz
± 10-15				-25	-13	-13	1 MHz
± 15-20					-25	-13	1 MHz
± 20-25						-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2G.

6.6.2.1G.1.4 Test description

6.6.2.1G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.1G.1.4.1-1 the details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3 and reference GNSS configuration as defined in Table C.2-8;

Table 6.6.2.1G.1.4.1-1: Test Configuration for V2X sidelink transmission

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		Low range, Mid range, High range
Test Channel Bandwidths (as specified in subclause 5.4.2G)		Lowest, Mid, Highest
Test Parameters for Channel Bandwidths		
	V2X sidelink transmission	
Ch BW	Mod'n	RB Allocation
10MHz	QPSK	12
10MHz	QPSK	48
10MHz	16QAM	12
10MHz	16QAM	48
20MHz	QPSK	18
20MHz	QPSK	96
20MHz	16QAM	18
20MHz	16QAM	96
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in specified in subclause 5.4.2G. Note 2: The allowed MPR for maximum output power UE might apply is described in clause 36.101[2] subclause 6.2.3G. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max+1 – RB allocation) of the channel bandwidth.		

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.67.

2. Propagation conditions are set according to Annex B.0;

3. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to SL-V2X-Preconfiguration in TS36.508 [7] subclause Table 6.8.2.1-1 with the exception specified in table 6.6.2.1G.1.4.3-1;

4. Ensure the UE is in Side link [5A-V2X], according to TS 36.508 [7] clause [4.5.9], Message contents are defined in clause 6.6.2.1G.1.4.3

6.6.2.1G.1.4.2 Test procedure

1. The V2X UE schedules the V2X RMC with transmission power at P_{UMAX} level according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.6.2.1G.1.4.1-1;

2. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3G.1.1.5-1for Power Class 3 UEs or in [6.2.3G.2.1.5-1] for Power Class 2 UEs. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

3. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.1G.1.5-1. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with following exceptions listed in the Table 6.6.2.1G.1.4.3-1 and Table 6.6.2.1G.1.4.3-2.

Table 6.6.2.1G.1.4.3-1: SL-V2X-Preconfiguration

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-Preconfiguration-r14 ::= SEQUENCE {			
v2x-PreconfigFreqList-r14 SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE {			
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
maxTxPower-r12	23		Power class3
	26		Power class2
sl-bandwidth-r12	n50	10Mhz	
	n100	20Mhz	
}			
}			
v2x-CommPreconfigSync-r14 SEQUENCE {		SL-PreconfigSync-r12	
syncOffsetIndicators-r14 SEQUENCE {			
syncOffsetIndicator1-r14	Not Present	Double synchronization signal transmission	
}			
}			
v2x-CommRxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-RxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {	1 entry		
SL-V2X-PreconfigCommPool-r14[1]	SL-CommResourcePoolV2X-r14-DEFAULT with exception listed in Table 6.6.2.1G.1.4.3-2		
}			
v2x-CommTxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-TxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {			
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT with exception listed in Table 6.6.2.1G.1.4.3-2		
}			
v2x-ResourceSelectionConfig	SL-CommTxPoolSensingConfig-r14-DEFAULT with exception listed in Table 6.6.2.1G.1.4.3-3		
}			

Table 6.6.2.1G.1.4.3-2: SL-V2X-PreconfigCommPool-r14-DEFAULT

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-CommResroucePoolV2X-r14-DEFAULT ::= SEQUENCE {			
sl-Subframe-r14 CHOICE {			
bs20-r14	11111111111111111111		BITMAP_6
}			
sizeSubchannel-r14	N12		BW10
	N48		BW10
	N18		BW20
	N96		BW20
numSubchannel-r14	n1		
dataTxParameters-r14 SEQUENCE {			
p0-r12	31	It's set to the maximum value to disable its effect on transmission power.	
}			
}			

Table 6.6.2.1G.1.4.3-2: SL-PSSCH-TxParameters-r14

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-PSSCH-TxParameters-r14 ::= SEQUENCE {			
minMCS-PSSCH-r14	0		QPSK
	11		16QAM
maxMCS-PSSCH-r14	10		QPSK
	19		16QAM
}			

6.6.2.1G.1.5 Test requirements

The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3G.1.1.5-1as appropriate, and the power of any UE emission shall fulfil requirements in Table.6.6.2.1G.1.5-1.

Table 6.6.2.1G.1.5-1: General E-UTRA spectrum emission mask, E-UTRA bands ≥ 5GHz

FFS

Spectrum emission limit (dBm)/ Channel bandwidth			
Δf_{OOB} (MHz)	**10 MHz**	**20 MHz**	**Measurement bandwidth**
± 0-1	-18+TT	-21+TT	30 kHz
± 1-2.5	-10+TT	-10+TT	1 MHz
± 2.5-2.8	-10+TT	-10+TT	1 MHz
± 2.8-5	-10+TT	-10+TT	1 MHz
± 5-6	-13+TT	-13+TT	1 MHz
± 6-10	-13+TT	-13+TT	1 MHz
± 10-15	-25+TT	-13+TT	1 MHz
± 15-20		-13+TT	1 MHz
± 20-25		-25+TT	1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at Δf_{OOB} equals to 0.015 MHz and 0.985 MHz. Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively. Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel			

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1G.2

6.6.2.1G.3 Spectrum Emission Mask for V2X Communication / Intra-band contiguous MCC operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The test tolerance is left FFS
- Test mode of side link test state [5A-V2X] in 36.508 is FFS.

6.6.2.1G.3.1 Test purpose

To verify that the power of any UE emission shall not exceed specified level for the specified channel bandwidth when UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands.

6.6.2.1G.3.2 Test Applicability

This test case applies to E-UTRA UE release 14 and forward which support V2X communication and support Intra-band contiguous MCC operation.

6.6.2.1G.3.3 Minimum conformance requirements

For intra-band contiguous multi-carrier operation, the general CA spectrum emission mask for Bandwidth Class B shall apply, which refers to the minimum conformance requirements defined in clause 6.6.2.1A.0.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2G.

6.6.2.1G.3.4 Test Description

6.6.2.1G.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.1G.3.4.1-1 the details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3 and reference GNSS configuration as defined in Table C.2-8.

Table 6.6.2.1G.3.4.1-1: Test Configuration Table for PSSCH and PSCCH

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1					Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1					Low range, Mid range , High range	
Test Channel Bandwidths as specified in subclause 5.4.2G					Lowest N_{RB_agg}, Highest N_{RB_agg}	
Test Parameters for V2X MCC Configuration						
V2X MCC Channel Bandwidth			**V2X Sidelink Configuration**			
Configuration ID	**CC1 N_{RB}**	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**N_{RB_alloc}**	**CC1 and CC2 RB Allocation (LCRB @ RBstart)**	
1	50	50	QPSK	12	CC1_12@0	CC2_0@0
1a	50	50	QPSK	12	CC1_0@0	CC2_12@38
2	50	50	QPSK	48	CC1_48@0	CC2_0@0
2a	50	50	QPSK	48	CC1_0@0	CC2_48@2
3	50	50	QPSK	96	CC1_48@0	CC2_48@2
4	50	50	16QAM	12	CC1_12@0	CC2_0@0
4a	50	50	16QAM	12	CC1_0@0	CC2_12@38
5	50	50	16QAM	48	CC1_48@0	CC2_0@0
5a	50	50	16QAM	48	CC1_0@0	CC2_48@2
6	50	50	16QAM	96	CC1_48@0	CC2_48@2
7	50	50	QPSK	2	CC1_1@0	CC2_1@49
Note1: The starting resource block shall be RB #0 and RB# (max+1 - RB allocation) of the aggregated channel bandwidth, each correspond to configuration ID n or na, n = 1,2,4,5.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.89a.
2. Propagation conditions are set according to Annex B.0
3. Ensure the UE is in test state [5A-V2X], according to TS 36.508 [7] clause [4.5.9]. Message contents are defined in clause 6.6.2.1G.3.4.3

6.6.2.1G.3.4.2 Test procedure

1. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to *SL-V2X-Preconfiguration* in TS36.508[7] Table [6.8.2.1-1A] with the exception specified in table 6.6.2.1G.3.4.3-1;

2. The V2X UE schedules the V2X RMC with transmission power at P_{UMAX} level according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.6.2.1G.3.4.1-1;

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3G.1.1.5-1 for Power Class 3 UEs or in [6.2.3G.2.1.5-1] for Power Class 2 UEs. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.1G.3.5-1. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.1G.3.4.3 Message Contents

Message content are according to 36.508[7] Table [6.8.2.1-1A] with the exception listed in table 6.6.2.1G.3.4.3-1, 6.6.2.1G.3.4.3-2 and 6.6.2.1G.3.4.3-3

Table 6.6.2.1G.3.4.3-1: SL-V2X-PreconfigFreqInfo-r14-DEFAULT for CC1 & CC2

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-PreconfigFreqInfo-r14-DEFAULT ::= SEQUENCE {			
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
maxTxPower-r12	23		Power class 3
sl-bandwidth-r12	n50	10Mhz	V2X_47B
}			
}			
v2x-CommRxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-RxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {	1 entry		
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.6.2.1G.3.4.3-2	SL-V2X-PreconfigCommPool-r14	
}			
v2x-CommTxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-TxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {			
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.6.2.1G.3.4.3-2		
}			
v2x-ResourceSelectionConfig	SL-CommTxPoolSensingConfig-r14-DEFAULT with exception listed in Table 6.6.2.1G.3.4.3-3		
syncPriority-r14	GNSS		
}			

Table 6.6.2.1G.3.4.3-2: SL-V2X-PreconfigCommPool-r14-DEFAULT

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-CommResroucePoolV2X-r14-DEFAULT ::= SEQUENCE {			
sl-Subframe-r14 CHOICE {			
bs20-r14	1111111111111111111		BITMAP_6
}			
sizeSubchannel-r14	n1		$N_{RB_alloc} = 1$
	n12		$N_{RB_alloc} = 12$
	n48		$N_{RB_alloc} = 48$, $N_{RB_alloc} = 96$
numSubchannel-r14	n1		
startRB-Subchannel-r14	According to the test configuration in table 6.6.2.1G.3.4.1-1		
dataTxParameters-r14 SEQUENCE {			
p0-r12	31	It's set to the maximum value to disable its effect on transmission power.	
}			
syncAllowed-r14 ::= SEQUENCE {			
gnss-Sync-r14	True	The resource of CC1 can be used if the UE is directly or indirectly synchronized to GNSS	CC with LCRB >0
enb-Sync-r14	True	The resource of CC1 can be used if the UE is directly or indirectly synchronized to enb	CC with LCRB =0
}			
}			

Table 6.6.2.1G.3.4.3-3: SL-PSSCH-TxParameters-r14

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-PSSCH-TxParameters-r14 ::= SEQUENCE {			
minMCS-PSSCH-r14	0		QPSK
	11		16QAM
maxMCS-PSSCH-r14	10		QPSK
	19		16QAM
}			

6.6.2.1G.3.5 Test Requirement

The power of any UE emission shall fulfil requirements in Table. 6.6.2.1G.1.5-1 Bandwidth Class B

Table 6.6.2.1G.3.5-1: General E-UTRA spectrum emission mask for CA Bandwidth Class B, E-UTRA bands > 5GHz

Spectrum emission limit [dBm]/$BW_{Channel_CA}$		
Δf_{OOB} (MHz)	50RB+50RB (19.9 MHz)	Measurement bandwidth
± 0-1	-21 +TT	30 kHz
± 1-5	-10+TT	1 MHz
± 5-14.95	-13+TT	1 MHz
± 14.95-19.90	-13+TT	1 MHz
± 19.90-19.95	-25+TT	1 MHz
± 19.95-24.90	-25+TT	1 MHz

6.6.2.2 Additional Spectrum Emission Mask

6.6.2.2.1 Test purpose

To verify that the power of any UE emission shall not exceed specified level for the specified channel bandwidth under the deployment scenarios where additional requirements are specified.

6.6.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.6.2.2.3 Minimum conformance requirements

6.6.2.2.3.1 Minimum requirement (network signalled value "NS_03", “NS_11”, “NS_20” and “NS_21”)

When "NS_03", “NS_11”, “NS_20” or “NS_21” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2.3.1-1.

Table 6.6.2.2.3.1-1: Additional requirements (network signalled value "NS_03", “NS_11”, “NS_20” and “NS_21”)

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz
± 1-2.5	-13	-13	-13	-13	-13	-13	1 MHz
± 2.5-2.8	-25	-13	-13	-13	-13	-13	1 MHz
± 2.8-5		-13	-13	-13	-13	-13	1 MHz
± 5-6		-25	-13	-13	-13	-13	1 MHz
± 6-10			-25	-13	-13	-13	1 MHz
± 10-15				-25	-13	-13	1 MHz
± 15-20					-25	-13	1 MHz
± 20-25						-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2.2.1.

6.6.2.2.3.2 Minimum requirement (network signalled value "NS_04")

When "NS_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2.3.2-1. or Table 6.6.2.2.3.2-2

Table 6.6.2.2.3.2-1: Additional requirements (network signalled value "NS_04") (Rel-11 and earlier)

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz
± 1-2.5	-13	-13	-13	-13	-13	-13	1 MHz
± 2.5-2.8	-25	-13	-13	-13	-13	-13	1 MHz
± 2.8-5		-13	-13	-13	-13	-13	1 MHz
± 5-6		-25	-25	-25	-25	-25	1 MHz
± 6-10			-25	-25	-25	-25	1 MHz
± 10-15				-25	-25	-25	1 MHz
± 15-20					-25	-25	1 MHz
± 20-25						-25	1 MHz

Table 6.6.2.2.3.2-2: Additional requirements (network signalled value "NS_04") (Rel-12 and onwards)

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
± 0-1	-15	-18	-20	-21	30 kHz
± 1-2.5	-10	-10	-10	-10	1 MHz
± 2.5-2.8	-10	-10	-10	-10	1 MHz
± 2.8-5	-10	-10	-10	-10	1 MHz
± 5-6	-13	-13	-13	-13	1 MHz
± 6-9	-25	-13	-13	-13	1 MHz
± 9-10	-25	-25	-13	-13	1 MHz
± 10-13.5		-25	-13	-13	1 MHz
± 13.5-15		-25	-25	-13	1 MHz
± 15-18			-25	-13	1 MHz
± 18-20			-25	-25	1 MHz
± 20-25				-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2.2.2.

6.6.2.2.3.3 Minimum requirement (network signalled value "NS_06" or NS_07)

When "NS_06" or "NS_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2.3.3-1.

Table 6.6.2.2.3.3-1: Additional requirements (network signalled value "NS_06" or "NS_07")

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
± 0-0.1	-13	-13	-15	-18	30 kHz
± 0.1-1	-13	-13	-13	-13	100 kHz
± 1-2.5	-13	-13	-13	-13	1 MHz
± 2.5-2.8	-25	-13	-13	-13	1 MHz
± 2.8-5		-13	-13	-13	1 MHz
± 5-6		-25	-13	-13	1 MHz
± 6-10			-25	-13	1 MHz
± 10-15				-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2.2.3.

6.6.2.2.3.4 Minimum requirement (network signalled value “NS_27”)

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When “NS_27” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2.3.4-1.

Table 6.6.2.2.3.4-1: Additional requirements (network signalled value "NS_27")

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
± 0-1	-13	-13	-13	-13	Note 1
± 1-10	-13	-13	-13	-13	1 MHz
± 10-15		-25	-25	-25	1 MHz
± 15-20			-25	-25	1 MHz
± 20-25				-25	1 MHz
Note 1: The measurement bandwidth is 1% of the applicable E-UTRA channel bandwidth.					

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2.2.5.

6.6.2.2.4 Test description

6.6.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Tables 6.6.2.2.4.1-1 through 6.6.2.2.4.1-10. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Additional Spectrum Emission Mask testing.			QPSK	6	6
1.4MHz				QPSK	5	5
1.4MHz				16QAM (Note 4)	5	5
3MHz				QPSK	15	15
3MHz				QPSK	4	4
3MHz				16QAM (Note 4)	15	15
3MHz				16QAM (Note 4)	4	4
5MHz				QPSK	25	25
5MHz				QPSK	8	8
5MHz				QPSK	6	6
5MHz				16QAM (Note 4)	25	25
5MHz				16QAM (Note 4)	8	8
10MHz				QPSK	50	50
10MHz				QPSK	12	12
10MHz				QPSK	6	6
10MHz				16QAM (Note 4)	50 (Note 3)	50 (Note 3)
10MHz				16QAM (Note 4)	12	12
15MHz				QPSK	75	75
15MHz				QPSK	16	16
15MHz				QPSK	8	8
15MHz				16QAM (Note 4)	75 (Note 3)	75 (Note 3)
15MHz				16QAM (Note 4)	16	16
20MHz				QPSK	100	100
20MHz				QPSK	18	18
20MHz				QPSK	10	10
20MHz				16QAM (Note 4)	100 (Note 3)	100 (Note 3)
20MHz				16QAM (Note 4)	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 – RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.2.2.4.1-2: Test Configuration Table (network signalled value "NS_04", Power Class 2)

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range Additional test frequencies: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_05 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1 (Note 1)	5MHz	N/A for A-MPR testing		QPSK	1	0
2 (Note 1)	5MHz			QPSK	16	9
3 (Note 2)	5MHz			QPSK	25	0
4 (Note 1)	5MHz			16QAM	16	9
5 (Note 2)	5MHz			16QAM	25	0
6 (Note 1)	10MHz			QPSK	1	0
7 (Note 1)	10MHz			QPSK	1	49
8 (Note 1)	10MHz			QPSK	24	0
9 (Note 1)	10MHz			QPSK	40	10
10	10MHz			QPSK	50	0
11	10MHz			16QAM	50	0
12 (Note 1)	15MHz			QPSK	1	0
13 (Note 1)	15MHz			QPSK	1	74
14 (Note 1)	15MHz			QPSK	32	0
15 (Note 1)	15MHz			QPSK	60	15
16	15MHz			QPSK	75	0
17	15MHz			16QAM	75	0
18 (Note 1)	20MHz			QPSK	1	0
19 (Note 1)	20MHz			QPSK	1	99
20 (Note 1)	20MHz			QPSK	36	0
21 (Note 1)	20MHz			QPSK	75	25
22	20MHz			QPSK	100	0
23	20MHz			16QAM	100	0
Note 1: Only applicable for Low Range. Note 2: Only applicable for Mid, High Range and additional test frequencies.						

Table 6.6.2.2.4.1-3: Test Configuration Table (network signalled value "NS_04", Power Class 3)

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0: For 5 MHz bandwidth: 2499.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866 Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39686 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10 MHz, 15 MHz, 20MHz		
Test Parameters for NS_04 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation TDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1 (Note 6)	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Note 6)	5MHz			QPSK	8	Note 3
3(Note 6)	5MHz			QPSK	6	Note 3
4 (Note 6)	5MHz			16QAM (Note 5)	25	0
5 (Note 6)	5MHz			16QAM (Note 5)	8	Note 3
6 (Note 6)	10MHz			QPSK	1	0
7 (Note 6)	10MHz			QPSK	12	0
8 (Note 6)	10MHz			QPSK	50	0
9 Note 6)	10MHz			16QAM (Note 5)	50 (Note 4)	0
10 (Note 6)	10MHz			QPSK	24	13
11 (Note 6)	10MHz			16QAM (Note 5)	24	13
12 (Note 6)	10MHz			QPSK	36	13
13 (Note 6)	10MHz			QPSK	12	37
14 (Note 6)	10MHz			QPSK	1	49
15 (Note 6)	15MHz			QPSK	1	0
16 (Note 6)	15MHz			QPSK	16	0
17 (Note 6)	15MHz			QPSK	75	0
18 (Note 6)	15MHz			16QAM	75	0

			(Note 5)	(Note 4)	
19 (Note 6)	15MHz		QPSK	36	19
20 (Note 6)	15MHz		16QAM (Note 5)	36 (Note 4)	19
21 (Note 6)	15MHz		QPSK	50	19
22 (Note 6)	15MHz		QPSK	18	56
23 (Note 6)	15MHz		QPSK	1	74
24 (Note 6)	20MHz		QPSK	1	0
25 (Note 6)	20MHz		QPSK	18	0
26 (Note 6)	20MHz		QPSK	100	0
27 (Note 6)	20MHz		16QAM (Note 5)	100 (Note 4)	0
28 (Note 6)	20MHz		QPSK	50	25
29 (Note 6)	20MHz		16QAM (Note 5)	50 (Note 4)	25
30 (Note 6)	20MHz		QPSK	75	25
31 (Note 6)	20MHz		QPSK	25	75
32 (Note 6)	20MHz		QPSK	1	99
33 (Note 8)	5MHz		QPSK	1	0
34 (Note 8)	5MHz		QPSK	16	9
35 (Note 9)	5MHz		QPSK	25	0
36 (Note 8)	5MHz		16QAM (Note 5)	16	9
37 (Note 9)	5MHz		16QAM (Note 5)	25	0
38 (Note 8)	10MHz		QPSK	1	0
39 (Note 8)	10MHz		QPSK	1	49
40 (Note 8)	10MHz		QPSK	24	0
41 (Note 8)	10MHz		QPSK	40	10
42 (Note 7)	10MHz		QPSK	50	0
43 (Note 7)	10MHz		16QAM (Note 5)	50	0
44 (Note 8)	15MHz		QPSK	1	0
45 (Note 8)	15MHz		QPSK	1	74
46 (Note 8)	15MHz		QPSK	32	0
47 (Note 8)	15MHz		QPSK	60	15
48 (Note 7)	15MHz		QPSK	75	0
49 (Note 7)	15MHz		16QAM (Note 5)	75	0
50 (Note 8)	20MHz		QPSK	1	0
51 (Note 8)	20MHz		QPSK	1	99
52 (Note 8)	20MHz		QPSK	36	0
53 (Note 8)	20MHz		QPSK	75	25
54 (Note 7)	20MHz		QPSK	100	0
55 (Note 7)	20MHz		16QAM (Note 5)	100	0

Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in subclause 6.2.4 as not all combinations are necessarily required based on the applicability of the UE.
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 4: Applies only for UE-Categories ≥2.
Note 5: The 16QAM configurations shall not apply to UEs which support UL 64QAM.
Note 6: Applies only for Rel-11 and earlier.
Note 7: Applies only for Rel-12 and later.
Note 8: Applies only for Rel-12 and later and Low Range.
Note 9: Applies only for Rel-12 and later and Mid, High Range and additional test frequencies.

Table 6.6.2.2.4.1-4: Test Configuration Table (network signalled value "NS_06", Power Class 1)

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest	
Test Parameters for NS_06 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	5MHz	N/A for A-MPR testing		QPSK	25
2	5MHz			QPSK	8
3	5MHz			16QAM	8
4	10MHz			QPSK	50
5	10MHz			QPSK	12
6	10MHz			16QAM	12
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					
Note 2: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_1.5 as not all combinations are necessarily required based on the applicability of the UE.					
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

Table 6.6.2.2.4.1-5: Test Configuration Table (network signalled value "NS_06", Power Class 3)

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Additional Spectrum Emission Mask testing.			QPSK	6	NA
1.4MHz				QPSK	5	
1.4MHz				16QAM (Note 3)	5	
3MHz				QPSK	15	
3MHz				QPSK	4	
3MHz				16QAM (Note 3)	4	
5MHz				QPSK	25	
5MHz				QPSK	8	
5MHz				16QAM (Note 3)	8	
10MHz				QPSK	50	
10MHz				QPSK	12	
10MHz				16QAM (Note 3)	12	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 – RB allocation) of the channel bandwidth.						
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.6.2.2.4.1-6: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD	RB_{start}
1	10MHz	N/A for Additional Spectrum Emission Mask testing.		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			16QAM (Note 2)	36 (Note 1)	13
7	10MHz			QPSK	16	19
8	10MHz			QPSK	12	19
9	10MHz			16QAM (Note 2)	16	19
10	10MHz			QPSK	30	19
11	10MHz			16QAM (Note 2)	30 (Note 1)	19
12	10MHz			QPSK	6	43
13	10MHz			QPSK	2	48
14	10MHz			QPSK	50	0
15	10MHz			QPSK	12	0
16	10MHz			16QAM (Note 2)	50 (Note 1)	0
Note 1: Applies only for UE-Categories 2-5. Note 2: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.6.2.2.4.1-7: Test Configuration Table (network signalled value "NS_11")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal

Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	Low range, Mid range, High range For 3 MHz Channel Bandwidth: a. 2001.5 MHz (N_{UL} = 25515) b. 2004.5 MHz (N_{UL} = 25545) For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2004.5 MHz (N_{UL} = 25545) c. 2007.5 MHz (N_{UL} = 25575) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2005.5 MHz (N_{UL} = 25555) c. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2007.5 MHz (N_{UL} = 25575) b. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	3MHz, 5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_11 A-MPR					
		Downlink Configuration		Uplink Configuration	
Configuration ID	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	3MHz	N/A for A-MPR testing		QPSK	6
2	3MHz			QPSK	15
3	3MHz			16QAM (Note 4)	6
4	3MHz			16QAM (Note 4)	15
5	5MHz			QPSK	1
6	5MHz			QPSK	8
7	5MHz			QPSK	25
8	5MHz			16QAM (Note 4)	8
9	5MHz			16QAM (Note 4)	25
10	10MHz			QPSK	1
11	10MHz			QPSK	12
12	10MHz			QPSK	50
13	10MHz			16QAM (Note 4)	12
14	10MHz			16QAM (Note 4)	50 (Note 3)
15	15MHz			QPSK	1
16	15MHz			QPSK	8
17	15MHz			QPSK	25
18	15MHz			QPSK	30
19	15MHz			QPSK	75
20	15MHz			16QAM (Note 4)	8
21	15MHz			16QAM (Note 4)	25
22	15MHz			16QAM (Note 4)	30
23	15MHz			16QAM (Note 4)	75
24	20MHz			QPSK	1
25	20MHz			QPSK	10
26	20MHz			QPSK	25
27	20MHz			QPSK	100
28	20MHz			16QAM (Note 4)	10
29	20MHz			16QAM (Note 4)	25
30	20MHz			16QAM (Note 4)	100

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.2.2.4.1-8: Test Configuration Table (network signalled value "NS_20")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	Low range, Mid range, High range For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2007.5 MHz (N_{UL} = 25575) c. 2012.5 MHz (N_{UL} = 25625) d. 2017.5 MHz (N_{UL} = 25675) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_20 A-MPR					
		Downlink Configuration		Uplink Configuration	
Configuration ID	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	5MHz	N/A for A-MPR testing		QPSK	8
2	5MHz			QPSK	15
3	5MHz			QPSK	25
4	5MHz			16QAM (Note 4)	15
5	5MHz			16QAM (Note 4)	25
6	10MHz			QPSK	8
7	10MHz			QPSK	12
8	10MHz			QPSK	50
9	10MHz			16QAM (Note 4)	12
10	10MHz			16QAM (Note 4)	50 (Note 3)
11	15MHz			QPSK	6
12	15MHz			QPSK	25
13	15MHz			QPSK	36
14	15MHz			QPSK	75
15	15MHz			16QAM (Note 4)	25
16	15MHz			16QAM (Note 4)	36
17	15MHz			16QAM (Note 4)	75
18	20MHz			QPSK	8
19	20MHz			QPSK	18
20	20MHz			QPSK	25
21	20MHz			QPSK	75
22	20MHz			QPSK	100
23	20MHz			16QAM (Note 4)	18
24	20MHz			16QAM (Note 4)	25
25	20MHz			16QAM (Note 4)	75
26	20MHz			16QAM (Note 4)	100

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.2.2.4.1-9: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range or High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 2)	5 MHz			QPSK	1	0
2 (note 2)	5 MHz			QPSK	25	0
3 (note 2)	10 MHz			QPSK	1	0
4 (note 3)	10 MHz			QPSK	1	49
5 (note 2)	10 MHz			QPSK	15	0
6 (note 3)	10 MHz			QPSK	3	47
7 (note 3)	10 MHz			QPSK	50	0
8 (note 1, 3)	10 MHz			16QAM (Note 4)	50	0
Note 1: Applies only for UE-Categories ≥2. Note 2: Applicable only to low range frequency testing. Note 3: Applicable only to high range frequency testing. Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.6.2.2.4.1-10: Test Configuration Table (network signalled value "NS_27")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to Frequency column in test parameters		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid	5MHz	N/A for A-MPR testing		QPSK	1	0
2	High	5MHz			QPSK	1	24
3	Low/Mid/High	5MHz			QPSK	25	0
4	Low/Mid/High	5MHz			16QAM	25	0
5	Low/Mid	10MHz			QPSK	1	0
6	High	10MHz			QPSK	1	49
7	Low/Mid/High	10MHz			QPSK	50	0
8 (Note 2)	Low/Mid/High	10MHz			16QAM	50	0
9	Low/Mid	15MHz			QPSK	1	0
10	Low	15MHz			QPSK	1	7
11	Low/Mid	15MHz			QPSK	16	0
12	High	15MHz			QPSK	1	74
13	High	15MHz			QPSK	1	67
14	High	15MHz			QPSK	16	74
15	Low/Mid/High	15MHz			QPSK	75	0
16 (Note 2)	Low/Mid/High	15MHz			16QAM	75	0
17	Low/Mid	20MHz			QPSK	1	0
18	Low	20MHz			QPSK	1	13
19	Low	20MHz			QPSK	1	16
20	Low/Mid	20MHz			QPSK	21	0
21	High	20MHz			QPSK	1	99
22	High	20MHz			QPSK	1	86
23	High	20MHz			QPSK	1	83
24	High	20MHz			QPSK	21	0
25	Low/Mid/High	20MHz			QPSK	100	0
26 (Note 2)	Low/Mid/High	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The DL Reference Measurement channels are set according to Tables 6.6.2.2.4.1-1 to 6.6.2.2.4.1-10.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2.4.3.

6.6.2.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to applicable table from Table 6.6.2.2.4.1-1 to 6.6.2.2.4.1-10. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.4.5-1 to 6.2.4.5-27 or 6.2.4_1.5-1 as appropriate. The period of the measurement shall be at least one sub-frame (1ms).

4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.2.2.5.1-1, 6.6.2.2.5.2-1, 6.6.2.2.5.3-1 or Table 6.6.2.2.5.1-2, 6.6.2.2.5.2-2, 6.6.2.2.5.3-2, or 6.6.2.2.5.4-1 as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions for each network signalled value.

6.6.2.2.4.3.1 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.2.2.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

6.6.2.2.4.3.2 Message contents exceptions (network signalled value "NS_04")

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.2.2.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	4 (NS_04)		

6.6.2.2.4.3.3 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.2.2.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

6.6.2.2.4.3.4 Message contents exceptions (network signalled value "NS_07")

1. Information element additionalSpectrumEmission is set to NS_07. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.2.2.4.3.4-1: *SystemInformationBlockType2*: Additional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	7 (NS_07)		

6.6.2.2.4.3.5 Message contents exceptions (network signalled value "NS_11")

1. Information element additionalSpectrumEmission is set to NS_11. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.2.2.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	11 (NS_11)		

6.6.2.2.4.3.6 Message contents exceptions (network signalled value "NS_20")

1. Information element additionalSpectrumEmission is set to NS_20. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.2.2.4.3.6-1: *SystemInformationBlockType2*: Additional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	20 (NS_20)		

6.6.2.2.4.3.7 Message contents exceptions (network signalled value "NS_21")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.2.2.4.3.7-1: *SystemInformationBlockType2*: Additional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	21 (NS_21)		

6.6.2.2.4.3.8 Message contents exceptions (network signalled value "NS_27")

1. Information element additionalSpectrumEmission is set to NS_27. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.2.2.4.3.8-1: *SystemInformationBlockType2*: Additional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	27 (NS_27)		

6.6.2.2.5 Test requirements

6.6.2.2.5.1 Test requirements (network signalled value "NS_03", “NS_11”, “NS_20” and “NS_21”)

When "NS_03" or “NS_11” or “NS_20” or “NS_21” is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-1 and 6.2.4.5-2 as appropriate,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2.5.1-1 or 6.6.2.2.5.1-2, as applicable.

Table 6.6.2.2.5.1-1: Additional requirements (network signalled value "NS_03", “NS_11”, “NS_20” and “NS_21”), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5					1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2.5.1-2: Additional requirements (network signalled value "NS_03", “NS_11”, “NS_20” and “NS_21”), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth

Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2					1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2.5.2 Test requirements (network signalled value "NS_04")

When "NS_04" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-3 for a Power Class 3 UE or 6.2.4_1.5-2 for a Power Class 2 UE as appropriate,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2.5.2-1 or Table.6.6.2.2.5.2-3, as applicable.

Table 6.6.2.2.5.2-1: Additional requirements (network signalled value "NS_04") (Rel-11 and earlier)

	Spectrum emission limit (dBm)/ Channel bandwidth

Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-23.5	-23.5	-23.5	-23.5	1 MHz
6-10							1 MHz
10-15							1 MHz
15-20							1 MHz
20-25							1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_04 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2.5.2-2: Void

Table 6.6.2.2.3.2-3: Additional requirements (network signalled value "NS_04") (Rel-12 and onwards)

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
± 0-1	-13.5	-16.5	-18.5	-19.5	30 kHz
± 1-2.5	-8.5	--8.5	-8.5	-8.5	1 MHz
± 2.5-2.8					1 MHz
± 2.8-5					1 MHz
± 5-6	-11.5	-11.5	-11.5	-11.5	1 MHz
± 6-9	-23.5				1 MHz
± 9-10		-23.5			1 MHz
± 10-13.5					1 MHz
± 13.5-15			-23.5		1 MHz
± 15-18					1 MHz
± 18-20				-23.5	1 MHz
± 20-25					1 MHz

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2.5.3 Test requirements (network signalled value "NS_06" or "NS_07")

When "NS_06" or "NS_07" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-5, 6.2.4.5-6 and 6.2.4.5-7 as appropriate for a Power Class 3 UE or in Table 6.2.4_1.5-1 for a Power Class 1 UE,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2.5.3-1 or Table.6.6.2.2.5.3-2, as applicable.

Table 6.6.2.2.5.3-1: Additional requirements (network signalled value "NS_06" or "NS_07"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.5	-11.5	-13.5	-16.5	30 kHz
0.1-1	-11.5	-11.5	-11.5	-11.5	100 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5				1 MHz
2.8-5					1 MHz
5-6		-23.5			1 MHz
6-10			-23.5		1 MHz
10-15				-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.

Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.

Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel

Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.

Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2.5.3-2: Additional requirements (network signalled value "NS_06" or "NS_07"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.2	-11.2	-13.2	-16.2	30 kHz
0.1-1	-11.2	-11.2	-11.2	-11.2	100 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2				1 MHz
2.8-5					1 MHz
5-6		-23.2			1 MHz
6-10			-23.2		1 MHz
10-15				-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.

Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.

Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel

Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.

Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2.5.4 Test requirements (network signalled value "NS_27")

When "NS_27" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-27 as appropriate for a Power Class 3 UE

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2.5.4-1, as applicable.

Table 6.6.2.2.5.4-1: Additional requirements (network signalled value "NS_27")

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
± 0-1	-11.2	-11.2	-11.2	-11.2	Note 1
± 1-10	-11.2	-11.2	-11.2	-11.2	1 MHz
± 10-15		-23.2	-23.2	-23.2	1 MHz
± 15-20			-23.2	-23.2	1 MHz
± 20-25				-23.2	1 MHz
Note 1: The measurement bandwidth is 1% of the applicable E-UTRA channel bandwidth.					

6.6.2.2_1 Additional Spectrum Emission Mask for UL 64QAM

6.6.2.2_1.1 Test purpose

Same test purpose as in clause 6.6.2.2.1

6.6.2.2_1.2 Test applicability

This test case applies to all types of E-UTRA UE from release 13 and forward that support UL 64QAM.

6.6.2.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.2.2.3

6.6.2.2_1.4 Test description

6.6.2.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Tables 6.6.2.2_1.4.1-1 through 6.6.2.2_1.4.1-8. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2_1.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Additional Spectrum Emission Mask testing.			64QAM	5	5
3MHz				64QAM	15	15
3MHz				64QAM	4	4
5MHz				64QAM	25	25
5MHz				64QAM	8	8
10MHz				64QAM	50	50
10MHz				64QAM	12	12
15MHz				64QAM	75	75
15MHz				64QAM	16	16
20MHz				64QAM	100	100
20MHz				64QAM	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 − RB allocation) of the channel bandwidth.						

Table 6.6.2.2_1.4.1-2: Test Configuration Table (network signalled value "NS_04")

<table>
<tr><th colspan="7">Initial Conditions</th></tr>
<tr><td colspan="4">Test Environment
(as specified in TS 36.508 [7] subclause 4.1)</td><td colspan="3">Normal</td></tr>
<tr><td colspan="4">Test Frequencies
(as specified in TS 36.508 [7] subclause 4.3.1)</td><td colspan="3">Low Range, Mid Range, High Range
Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0:

For 5 MHz bandwidth:
2499.6 MHz, N_{UL}= 39696

For 10 MHz bandwidth:
2504.1 MHz, N_{UL}= 39731

For 15 MHz bandwidth:
2510.9 MHz, N_{UL}= 39799

For 20 MHz bandwidth:
2517.6 MHz, N_{UL}= 39866

Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1:

For 5 MHz bandwidth:
2500.6 MHz, N_{UL}= 39686

For 10 MHz bandwidth:
2504.1 MHz, N_{UL}= 39731

For 15 MHz bandwidth:
2510.9 MHz, N_{UL}= 39799

For 20 MHz bandwidth:
2517.6 MHz, N_{UL}= 39866</td></tr>
<tr><td colspan="4">Test Channel Bandwidths
(as specified in TS 36.508 [7] subclause 4.3.1)</td><td colspan="3">5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><th colspan="7">Test Parameters for NS_04 A-MPR</th></tr>
<tr><th></th><th></th><th colspan="2">Downlink Configuration</th><th colspan="3">Uplink Configuration</th></tr>
<tr><th>Configuration ID</th><th>Ch BW</th><th>Mod'n</th><th>RB allocation FDD</th><th>Mod'n</th><th>RB allocation FDD</th><th>RB_{start} FDD</th></tr>
<tr><td>1 (Note 1)</td><td>5MHz</td><td colspan="2" rowspan="5">N/A for A-MPR testing</td><td>64QAM</td><td>16</td><td>9</td></tr>
<tr><td>2 (Note 2)</td><td>5MHz</td><td>64QAM</td><td>25</td><td>0</td></tr>
<tr><td>3</td><td>10MHz</td><td>64QAM</td><td>50</td><td>0</td></tr>
<tr><td>4</td><td>15MHz</td><td>64QAM</td><td>75</td><td>0</td></tr>
<tr><td>5</td><td>20MHz</td><td>64QAM</td><td>100</td><td>0</td></tr>
<tr><td colspan="7">Note 1: Only applicable for Low Range.
Note 2: Only applicable for Mid, High Range and additional test frequencies.</td></tr>
</table>

Table 6.6.2.2_1.4.1-3: Test Configuration Table (network signalled value "NS_06")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Additional Spectrum Emission Mask testing.			64QAM	5	NA
3MHz				64QAM	4	
5MHz				64QAM	8	
10MHz				64QAM	12	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 – RB allocation) of the channel bandwidth.						

Table 6.6.2.2_1.4.1-4: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD	RB_{start}
1	10MHz	N/A for Additional Spectrum Emission Mask testing.		64QAM	36	13
2	10MHz			64QAM	16	19
3	10MHz			64QAM	30	19
4	10MHz			64QAM	50	0

Table 6.6.2.2_1.4.1-5: Test Configuration Table (network signalled value "NS_11")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal

Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	Low range, Mid range, High range For 3 MHz Channel Bandwidth: a. 2001.5 MHz (N_{UL} = 25515) b. 2004.5 MHz (N_{UL} = 25545) For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2004.5 MHz (N_{UL} = 25545) c. 2007.5 MHz (N_{UL} = 25575) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2005.5 MHz (N_{UL} = 25555) c. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2007.5 MHz (N_{UL} = 25575) b. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	3MHz, 5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_11 A-MPR

		Downlink Configuration		Uplink Configuration	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	3MHz	N/A for Additional Spectrum Emission Mask testing.		64QAM	6
2	3MHz			64QAM	15
3	5MHz			64QAM	8
4	5MHz			64QAM	25
5	10MHz			64QAM	12
6	10MHz			64QAM	50
7	15MHz			64QAM	8
8	15MHz			64QAM	25
9	15MHz			64QAM	30
10	15MHz			64QAM	75
11	20MHz			64QAM	10
12	20MHz			64QAM	25
13	20MHz			64QAM	100

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Table 6.6.2.2_1.4.1-6: Test Configuration Table (network signalled value "NS_20")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal

Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	Low range, Mid range, High range For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2007.5 MHz (N_{UL} = 25575) c. 2012.5 MHz (N_{UL} = 25625) d. 2017.5 MHz (N_{UL} = 25675) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_20 A-MPR

		Downlink Configuration		Uplink Configuration	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for Additional Spectrum Emission Mask testing.		64QAM	15
2	5MHz			64QAM	25
3	10MHz			64QAM	12
4	10MHz			64QAM	50
5	15MHz			64QAM	25
6	15MHz			64QAM	36
7	15MHz			64QAM	75
8	20MHz			64QAM	18
9	20MHz			64QAM	25
10	20MHz			64QAM	75
11	20MHz			64QAM	100

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Table 6.6.2.2_1.4.1-7: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC					
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	High range					
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	10 MHz					
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	10 MHz	N/A for Additional Spectrum Emission Mask testing.		64QAM	50	0

Table 6.6.2.2_1.4.1-8: Test Configuration Table (network signalled value "NS_27")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal						
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Refer to Frequency column in test parameters						
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz						
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid/High	5MHz			64QAM	25	0
2	Low/Mid/High	10MHz			64QAM	50	0
3	Low/Mid/High	15MHz			64QAM	75	0
4	Low/Mid/High	20MHz			64QAM	100	0

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The DL Reference Measurement channels are set according to Tables 6.6.2.2_1.4.1-1 to 6.6.2.2_1.4.1-8.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2_1.4.3.

6.6.2.2_1.4.2 Test procedure

Same test procedure as in clause 6.6.2.2.4.2

6.6.2.2_1.4.3 Message contents

Same message contents as in clause 6.6.2.2.4.3

6.6.2.2_1.5 Test requirements

Same test requirements as in clause 6.6.2.2.5

6.6.2.2_2 Additional Spectrum Emission Mask with PUSCH frequency hopping

Following aspects missing or not yet determined:

- Annex F is not updated
- HARQ configuration for re-transmissions is missing

6.6.2.2_2.1 Test purpose

To verify that the power of any UE emission shall not exceed specified level for the specified channel bandwidth under the deployment scenarios where additional requirements are specified.

6.6.2.2_2.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.6.2.2_2.3 Minimum conformance requirements

Same minimum conformance requirements as section 6.6.2.2.3

6.6.2.2_2.4 Test description

6.6.2.2_2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.2.2_2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2_2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal	
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					Test dependant	
Test Parameters						
			Downlink Configuration		**Uplink Configuration**	
Configuration ID	NS-value	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD
1	NS_07	10 MHz	N/A for A-MPR testing		QPSK	1
3 (Note 3)	NS_11	15 MHz			QPSK	1
10 (Note 4)	NS_20	10 MHz			QPSK	1
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4_3.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: The RB_{start} of partial RB allocation shall be RB# 0 of the channel bandwidth. Note 3: High range test frequency to be used. Note 4: Low range test frequency to be used.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The DL Reference Measurement channels are set according to Table 6.6.2.2_2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2.4.3.

6.6.2.2_2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 with hopping bit(s) set to 1 (PUSCH type 2 hopping) for C_RNTI to schedule the UL RMC according to the applicable Table 6.6.2.2_2.4.1-1. SS sends always NACK on PHICH to trigger UE retransmissions needed for mirroring of RBs. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode in a TTI. The period of measurement shall be one sub-frame (1ms) excluding the 20 us transient periods in beginning and end of the subframe.
4. Measure the mean power of the UE in the channel bandwidth of the radio access mode in the next TTI of the same HARQ process. The period of measurement shall be one sub-frame (1ms) excluding the 20 us transient periods in beginning and end of the subframe.
5. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Tables 6.6.2.2.5-1 to 6.6.2.2.5-6, as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs excluding the 20 us transient periods in beginning and end of the subframe. The measurement period shall include at least two consecutive UL TTI's.

6.6.2.2_2.4.3 Message contents

Message content is the same as in section 6.6.2.2.4.2

6.6.2.2_2.5 Test requirements

- the measured UE mean power in the channel bandwidth, derived in step 3 and 4, shall fulfil requirements in Table 6.2.4_3.5-1 and 6.2.4_3.5-2 as appropriate,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2_2.5-1 to 6.6.2.2_2.5-6, as applicable.

Table 6.6.2.2_2.5-1: Additional requirements (network signalled value "NS_03", "NS_11", "NS_20" and "NS_21"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth

Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5					1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2_2.5-2: Additional requirements (network signalled value "NS_03", "NS_11", "NS_20" and "NS_21"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2					1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

Table 6.6.2.2_2.5-3: Additional requirements (network signalled value "NS_04"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth

Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-23.5	-23.5	-23.5	-23.5	1 MHz
6-10							1 MHz
10-15							1 MHz
15-20							1 MHz
20-25							1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_04 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.							
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

Table 6.6.2.2_2.5-4: Additional requirements (network signalled value "NS_04"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2	-23.2	-23.2	-23.2	-23.2	1 MHz
6-10							1 MHz
10-15							1 MHz
15-20							1 MHz
20-25							1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_04 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.							
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

Table 6.6.2.2_2.5-5: Additional requirements (network signalled value "NS_06" or "NS_07"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth

Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.5	-11.5	-13.5	-16.5	30 kHz
0.1-1	-11.5	-11.5	-11.5	-11.5	100 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5				1 MHz
2.8-5					1 MHz
5-6		-23.5			1 MHz
6-10			-23.5		1 MHz
10-15				-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz.
The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2_2.5-6: Additional requirements (network signalled value "NS_06" or "NS_07"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.2	-11.2	-13.2	-16.2	30 kHz
0.1-1	-11.2	-11.2	-11.2	-11.2	100 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2				1 MHz
2.8-5					1 MHz
5-6		-23.2			1 MHz
6-10			-23.2		1 MHz
10-15				-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz.
The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2A Additional Spectrum Emission Mask for CA

6.6.2.2A.1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA)

6.6.2.2A.1.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth for CA under the deployment scenarios where additional requirements are specified.

6.6.2.2A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA but do not support UL 64QAM.

6.6.2.2A.1.3 Minimum conformance requirements

6.6.2.2A.1.3.1 Minimum requirements (network signalled value "CA_NS_04")

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "CA_NS_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2A.1.3.1-1.

Table 6.6.2.2A.1.3.1-1: Additional requirements

Spectrum emission limit [dBm]/$BW_{Channel_CA}$					
Δf_{OOB} (MHz)	**50+100RB (29.9 MHz)**	**75+75B (30 MHz)**	**75+100RB (34.85 MHz)**	**100+100RB (39.8 MHz)**	**Measurement bandwidth**
± 0-1	-22.5	-22.5	-23.5	-24	30 kHz
± 1-5.5	-13	-13	-13	-13	1 MHz
± 5.5-34.9	-25	-25	-25	-25	1 MHz
± 34.9-35		-25	-25	-25	1 MHz
± 35-39.85			-25	-25	1 MHz
± 39.85-44.8				-25	1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The normative reference for this requirement is TS 36.101[2] subclause 6.6.2.2A.

6.6.2.2A.1.4 Test description

6.6.2.2A.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.2A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2A.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			C: Low and High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			As in Table 6.6.2.2A.1.3.1-1						
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	100	50	N/A	QPSK	10	P_10@20	S_0@0		
2	100	50		QPSK	60	P_50@50	S_10@0		
3	100	50		16QAM	15	P_0@0	S_15@0		
4	100	50		QPSK	2	P_1@0	S_1@49		
5	75	75		QPSK	10	P_10@20	S_0@0		
6	75	75		QPSK	75	P_30@45	S_45@0		
7	75	75		QPSK	2	P_1@0	S_1@74		
8	100	75		QPSK	10	P_10@20	S_0@0		
9	100	75		QPSK	80	P_50@50	S_30@0		
10	100	75		16QAM	20	P_0@0	S_20@15		
11	100	75		QPSK	2	P_1@0	S_1@74		
12	100	100		QPSK	10	P_10@25	S_0@0		
13	100	100		QPSK	90	P_40@60	S_50@0		
14	100	100		16QAM	15	P_0@0	S_15@40		
15	100	100		16QAM	20	P_0@0	S_20@30		
16	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.2A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2A.1.4.3.

6.6.2.2A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.2A.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.2A.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the mean power over all component carriers in the CA configuration of the radio access mode, which shall meet the requirements described in Table 6.2.4A.1.5-4. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

7. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.2A.1.5.1-1. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.2A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. The following exceptions apply for each network signalled value.

6.6.2.2A.1.4.3.1 Message contents exceptions (network signalled value "CA_NS_04")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_04. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

Table 6.6.2.2A.1.4.3.1-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NS_04"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	4 (CA_NS_04)		

6.6.2.2A.1.5 Test Requirements

6.6.2.2A.1.5.1 Test requirement for CA (network signalled value "CA_NS_04")

When "CA_NS_04" is indicated in the cell

- the measured UE mean power with the aggregated channel bandwidth as specified in clause 5.4.2A, derived in step 6 , shall fulfil requirements in Table 6.2.4A.1.5-4 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2A.1.5.1-1.

Table 6.6.2.2A.1.5.1-1: Additional requirements

Spectrum emission limit [dBm]/$BW_{Channel_CA}$					
Δf_{OOB} (MHz)	**50+100RB (29.9 MHz)**	**75+75B (30 MHz)**	**75+100RB (34.85 MHz)**	**100+100RB (39.8 MHz)**	**Measurement bandwidth**
± 0-1	-21	-21	-22	-22.5	30 kHz
± 1-5.5	-11.5	-11.5	-11.5	-11.5	1 MHz
± 5.5-34.9	-23.5	-23.5	-23.5	-23.5	1 MHz
± 34.9-35		-23.5	-23.5	-23.5	1 MHz
± 35-39.85			-23.5	-23.5	1 MHz
± 39.85-44.8				-23.5	1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz. Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively. Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel Note 4: Above SEM requirement applies to bands corresponding to network signalling value CA_NS_04 as defined in TS 36.101 [2] subclause 6.6.2.2A Table 6.2.2.2A-1.					

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2A.1_1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM

6.6.2.2A.1_1.1 Test purpose

Same test purpose as in clause 6.6.2.2A.1.1.

6.6.2.2A.1_1.2 Test applicability

This test case applies to all types of E-UTRA UE from release 13 and forward that support intra-band contiguous DL CA, UL CA and UL 64QAM.

6.6.2.2A.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.2.2.A.1.3.

6.6.2.2A.1_1.4 Test description

6.6.2.2A.1_1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.2A.1_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2A.1_1.4.1-1: Test Configuration Table for CA_NS_04

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	As in Table 6.6.2.2A.1.3.1-1

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	100	50	N/A	64QAM	10	P_10@20	S_0@0		
2	100	50		64QAM	60	P_50@50	S_10@0		
3	100	50		64QAM	15	P_0@0	S_15@0		
4	100	50		64QAM	2	P_1@0	S_1@49		
5	75	75		64QAM	10	P_10@20	S_0@0		
6	75	75		64QAM	75	P_30@45	S_45@0		
7	75	75		64QAM	2	P_1@0	S_1@74		
8	100	75		64QAM	10	P_10@20	S_0@0		
9	100	75		64QAM	80	P_50@50	S_30@0		
10	100	75		64QAM	20	P_0@0	S_20@15		
11	100	75		64QAM	2	P_1@0	S_1@74		
12	100	100		64QAM	10	P_10@25	S_0@0		
13	100	100		64QAM	90	P_40@60	S_50@0		
14	100	100		64QAM	15	P_0@0	S_15@40		
15	100	100		64QAM	20	P_0@0	S_20@30		
16	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.2A.1_1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2A.1_1.4.3.

6.6.2.2A.1_1.4.2 Test procedure

Same test procedure as in clause 6.6.2.2A.1.4.2 with following exceptions:

- Instead of Table 6.2.4A.1.5-4→ use Table 6.2.4A.1_1.5-4.

6.6.2.2A.1_1.4.3 Message contents

Same message contents as in clause 6.6.2.2A.1.4.3.

6.6.2.2A.1_1.5 Test Requirements

Same test requirements as in clause 6.6.2.2A.1.5 with following exceptions:

- Instead of Table 6.2.4A.1.5-4→ use Table 6.2.4A.1_1.5-4.

6.6.2.2A.2 Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA)

6.6.2.2A.2.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth for CA under the deployment scenarios where additional requirements are specified.

6.6.2.2A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.6.2.2A.2.3 Minimum conformance requirements

The minimum requirements are the same as in section 6.6.2.2.3 per component carrier.

6.6.2.2A.2.4 Test description

6.6.2.2A.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. For Uplink CA Configurations listed in table 6.6.2.2A.2.4.1-1, Additional Spectrum emission requirements are tested.

Table 6.6.2.2A.2.4.1-1: Additional Spectrum Emission mask for inter-band CA

Uplink CA Configuration	NS-value per CC (in same order as UL CA Configuration column)		Applicable spectrum emission requirements (in same order as UL CA Configuration column)	
CA_1A-3A CA_1A-5A CA_1A-7A CA_1A-8A CA_1A-18A CA_1A-26A CA_1A-42A	NS_05	NS_01	N/A	N/A
CA_1A-19A	NS_05	NS_08	N/A	N/A
CA_1A-21A	NS_05	NS_09	N/A	N/A
CA_1A-28A	NS_05	NS_17	N/A	N/A
CA_2A-4A, CA_2A-66A	NS_03	NS_03	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.1-1
CA_2A-12A, CA_2A-13A, CA_4A-12A, CA_4A-13A, CA_4A-17A	NS_03	NS_06	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1
CA_2A-30A	NS_03	NS_21	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.1-1
CA_3A-5A CA_3A-7A CA_3A-8A CA_5A-7A CA_39A-41A CA_41A-42A	NS_01	NS_01	N/A	N/A
CA_3A-19A	NS_01	NS_08	N/A	N/A
CA_3A-20A CA_7A-20A	NS_01	NS_10	N/A	N/A
CA_2A-13A, CA_4A-13A	NS_03	NS_07	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1
CA_2A-5A CA_2A-7A, CA_4A-5A, CA_4A-7A	NS_03	NS_01	Table 6.6.2.2.3.1-1	N/A
CA_5A-66A[Note 5]	NS_01	NS_03	N/A	Table 6.6.2.2.3.1-1
CA_5A-12A CA_5A-17A	NS_01	NS_06	N/A	Table 6.6.2.2.3.3-1
CA_5A-30A	NS_01	NS_21	N/A	Table 6.6.2.2.3.1-1
CA_7A-28A CA_18A-28A	NS_01	NS_17	N/A	N/A
CA_7A-28A	NS_01	NS_18	N/A	N/A
CA_12A-30A	NS_06	NS_21	Table 6.6.2.2.3.3-1	Table 6.6.2.2.3.3-1
CA_19A-21A	NS_08	NS_09	N/A	N/A

Note 1: For CCs with NS_01, there are no additional requirements defined in 36.101. Only CCs with NS-value different than NS_01 needs to be tested.
Note 2: A-MPR values for NS-values in this table are the same as in section 6.2.4.3.
Note 3: Selection of CA configurations and NS-values to test is derived in TR 36.905 [19].
Note 4: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column.
Note 5: As an exception to note 4, PCC is mapped to the second band of the combination as listed in Uplink CA Configuration column.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in tables 6.6.2.2A.2.4.1-2 to 6.6.2.2A.1.4.1-9. The details of the uplink

reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2A.2.4.1-2: Test Configuration Table (network signalled value NS_01/NS_03 or network signalled value NS_03/NS_01)

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and high range for PCC Mid range for SCC (Note 3)
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}(Note 2)

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	NS_03 CC	**NS_01 CC**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	6	8
2	25	25		16QAM	16QAM	25	25
3	25	25		16QAM	QPSK	25	8
4	50	50		QPSK	QPSK	6	12
5	50	50		16QAM	16QAM	50	50
6	50	50		16QAM	QPSK	50	12
7	50	100		QPSK	QPSK	6	18
8	50	100		16QAM	16QAM	50	100
9	50	100		16QAM	QPSK	50	18
10	100	50		QPSK	QPSK	10	12
11	100	50		16QAM	16QAM	100	50
12	100	50		16QAM	QPSK	100	12
13	100	100		QPSK	QPSK	10	18
14	100	100		16QAM	16QAM	100	100
15	100	100		16QAM	QPSK	100	18

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Mapping of NS-value per CC and PCC/SCC selection are specified in Table 6.6.2.2A.2.4.1-1.

Table 6.6.2.2A.2.4.1-3: Test Configuration Table (network signalled value NS_01/NS_06)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1						NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for both PCC and SCC (Note 3)	
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest and Highest N_{RBagg}(Note 2)	
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03) NRB	**SCC (NS_07) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	25	25	N/A for this test	QPSK	QPSK	6	6
2	25	25		16QAM	16QAM	25	9
3	25	25		QPSK	16QAM	6	9
4	50	50		QPSK	QPSK	12	12
5	50	50		16QAM	16QAM	50	15
6	50	50		QPSK	16QAM	12	15
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.							
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.2.2A.2.4.1-4: Test Configuration Table (network signalled value NS_01/NS_21)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_21)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	8	8
2	25	25		16QAM	16QAM	25	25
3	25	25		QPSK	16QAM	8	25
4 (Note 4)	50	50		QPSK	QPSK	12	12@7
5 (Note 5)	50	50		QPSK	QPSK	12	12@31
6	50	50		16QAM	16QAM	50	1
7	50	50		QPSK	16QAM	12	1
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.							
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.6.2.2A.2.4.1-1.							
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							
Note 4: Applicable only to Low range frequency testing.							
Note 5: Applicable only to High range frequency testing.							

Table 6.6.2.2A.2.4.1-5: Test Configuration Table (network signalled value NS_03/NS_03)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1						NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for both PCC and SCC (Note 3)	
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest and Highest N_{RBagg} (Note 2)	
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_03)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	15	25	N/A for this test	QPSK	QPSK	4	6
2	15	25		16QAM	16QAM	15	25
3	15	25		16QAM	QPSK	15	6
4	25	25		QPSK	QPSK	6	6
5	25	25		16QAM	16QAM	25	25
6	25	25		16QAM	QPSK	25	6
7	50	50		QPSK	QPSK	6	6
8	50	50		16QAM	16QAM	50	50
9	50	50		16QAM	QPSK	50	6
10	100	100		QPSK	QPSK	10	10
11	100	100		16QAM	16QAM	100	100
12	100	100		16QAM	QPSK	100	10
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.							
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.							
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.2.2A.2.4.1-6: Test Configuration Table (network signalled value NS_03/NS_06)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_06)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	15	25	N/A for this test	QPSK	QPSK	4	8
2	15	25		16QAM	16QAM	15	25
3	15	25		16QAM	QPSK	15	8
4	25	15		QPSK	QPSK	6	4
5	25	15		16QAM	16QAM	25	15
6	25	15		16QAM	QPSK	25	4
7	25	25		QPSK	QPSK	6	8
8	25	25		16QAM	16QAM	25	25
9	25	25		16QAM	QPSK	25	8
10	25	50		QPSK	QPSK	6	12
11	25	50		16QAM	16QAM	25	50
12	25	50		16QAM	QPSK	25	12
13	50	50		QPSK	QPSK	6	12
14	50	50		16QAM	16QAM	50	50
15	50	50		16QAM	QPSK	50	12
16	100	50		QPSK	QPSK	10	12
17	100	50		16QAM	16QAM	100	50
18	100	50		16QAM	QPSK	100	12

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.6.2.2A.2.4.1-7: Test Configuration Table (network signalled value NS_03/NS_07)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_07)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	50	N/A for this test	QPSK	QPSK	6	4
2	25	50		16QAM	16QAM	25	50
3	25	50		QPSK	16QAM	6	50
4	50	50		QPSK	QPSK	6	4
5	50	50		16QAM	16QAM	50	50
6	50	50		QPSK	16QAM	6	50
7	100	50		QPSK	QPSK	10	4
8	100	50		16QAM	16QAM	100	50
9	100	50		QPSK	16QAM	10	50
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list. Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.2.2A.2.4.1-8: Test Configuration Table (network signalled value NS_03/NS_21)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03) NRB	**SCC (NS_21) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	25	25	N/A for this test	QPSK	QPSK	6	8
2	25	25		16QAM	16QAM	25	25
3	25	25		16QAM	QPSK	25	8
4 (Note 4)	100	50		QPSK	QPSK	10	12@7
5 (Note 5)	100	50		QPSK	QPSK	10	12@31
6	100	50		16QAM	16QAM	100	1
7	100	50		QPSK	16QAM	10	1

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.6.2.2A.2.4.1-1.
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Applicable only to Low range frequency testing.
Note 5: Applicable only to High range frequency testing.

Table 6.6.2.2A.2.4.1-9: Test Configuration Table (network signalled value NS_06/NS_21)

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and High range for both PCC and SCC
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_06) NRB	**SCC (NS_21) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	25	25	N/A for this test	QPSK	QPSK	8	8
2	25	25		16QAM	16QAM	25	25
3	25	25		16QAM	QPSK	25	8
4 (Note 4)	50	50		QPSK	QPSK	12	12@7
5 (Note 5)	50	50		QPSK	QPSK	12	12@31
6	50	50		16QAM	16QAM	50	1
7	50	50		QPSK	16QAM	12	1

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.6.2.2A.2.4.1-1.
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Applicable only to Low range frequency testing.
Note 5: Applicable only to High range frequency testing.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.2A.2.4.1-2 to 6.6.2.2A.2.4.1-9.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2A.2.4.3.

6.6.2.2A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.2A.2.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.2A.2.4.1-2 to 6.6.2.2A.2.4.1-9 on both PCC and SCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the mean power over all component carriers in the CA configuration of the radio access mode, which shall meet the requirements described in Tables 6.2.4A.2.5-2 to 6.2.4A.2.5-12. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

7. Measure the power of the transmitted signal for PCC if NS-value other than NS_01 with a measurement filter of bandwidths according to tables 6.6.2.2A.2.5.1-1 to 6.6.2.2A.2.5.1-4 as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

8. Measure the power of the transmitted signal for SCC if NS-value other than NS_01 with a measurement filter of bandwidths according to tables 6.6.2.2A.2.5.1-1 to 6.6.2.2A.2.5.1-4 as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.2A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. The following exceptions apply for each network signalled value. These exceptions indicate that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

6.6.2.2A.2.4.3.1 Message contents exceptions (network signalled value " NS_03" on PCC)

1. Information element additionalSpectrumEmission is set to NS_03 for PCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.6.2.2A.2.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03" on PCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

6.6.2.2A.2.4.3.2 Message contents exceptions (network signalled value " NS_03" on SCC)

1. Information element additionalSpectrumEmissionSCell-r10 is set to NS_03 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.6.2.2A.2.4.3.2-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_03" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	3 (NS_03)		

6.6.2.2A.2.4.3.3 Message contents exceptions (network signalled value " NS_06" on SCC)

1. Information element additionalSpectrumEmissionSCell-r10 is set to NS_06 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.6.2.2A.2.4.3.3-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_06" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	6 (NS_06)		

6.6.2.2A.2.4.3.4 Message contents exceptions (network signalled value " NS_07" on SCC)

1. Information element additionalSpectrumEmissionSCell-r10 is set to NS_07 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.6.2.2A.1.4.3.4-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_07" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	7 (NS_07)		

6.6.2.2A.2.4.3.5 Message contents exceptions (network signalled value " NS_21" on SCC)

1. Information element additionalSpectrumEmission is set to NS_21 for SCC. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message.

Table 6.6.2.2A.2.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_21" on SCC

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	21 (NS_21)		

2. Information element additionalSpectrumEmissionSCell-r10 is set to NS_21 for SCC. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.6.2.2A.2.4.3.5-2: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "NS_21" on SCC

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	21 (NS_21)		

6.6.2.2A.2.5 Test Requirements

The measured UE mean power with the aggregated channel bandwidth as specified in clause 5.4.2A, derived in step 6 , shall fulfil requirements in Tables 6.2.4A.2.5-1 to 6.2.4A.2.5-12 as appropriate,

and

The power of any UE emission per component carrier derived in step 7 and 8 shall not exceed the levels specified in Tables 6.6.2.2A.2.5.1-1 to 6.6.2.2A.2.5.1-4.

Table 6.6.2.2A.2.5-1: Additional requirements (network signalled value "NS_03", “NS_11”, “NS_20” and “NS_21”), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5					1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2A.2.5-2: Additional requirements (network signalled value "NS_03", “NS_11”, “NS_20” and “NS_21”), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2					1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2A.2.5-3: Additional requirements (network signalled value "NS_06" or "NS_07"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.5	-11.5	-13.5	-16.5	30 kHz
0.1-1	-11.5	-11.5	-11.5	-11.5	100 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5				1 MHz
2.8-5					1 MHz
5-6		-23.5			1 MHz
6-10			-23.5		1 MHz
10-15				-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.

Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.

Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel

Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.

Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2A.2.5-4: Additional requirements (network signalled value "NS_06" or "NS_07"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.2	-11.2	-13.2	-16.2	30 kHz
0.1-1	-11.2	-11.2	-11.2	-11.2	100 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2				1 MHz
2.8-5					1 MHz
5-6		-23.2			1 MHz
6-10			-23.2		1 MHz
10-15				-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.

Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.

Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.

Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.

Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2A.3 Additional Spectrum Emission Mask for CA (intra-band non-contiguous DL CA and UL CA)

6.6.2.2A.3.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth for CA under the deployment scenarios where additional requirements are specified.

6.6.2.2A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.6.2.2A.3.3 Minimum conformance requirements

Minimum conformance requirements are specified in section 6.2.4A.3.1.

6.6.2.2A.3.4 Test description

6.6.2.2A.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.2A.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.2.4A.3.4.1-1: Test Configuration Table (network signalled value CA_NC_NS_01)

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: Low Wgap, Maximum Wgap
Test CC Combination setting (N_{RB}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC

Test Parameters for CA Configurations									
ID	CA Configuration / N_{RB_agg}		W_{gap} [MHz]	DL Allocation		UL Allocation			
	PCC N_{RB}	SCCs N_{RB}		CC MOD	PCC & SCC RB allocation	CC MOD	PCC N_{RB_alloc} (L_{CRB} @ RB_{start})	CC MOD	SCC N_{RB_alloc} (L_{CRB} @ RB_{start})
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	16QAM	P_1@0	16QAM	S_1@24
2	25	25	35	N/A	N/A	16QAM	P_25@0	16QAM	S_25@0
3	25	25	5	N/A	N/A	16QAM	P_1@0	16QAM	S_1@24
4	25	25	5	N/A	N/A	16QAM	P_25@0	16QAM	S_25@0
5	100	100	5	N/A	N/A	16QAM	P_1@0	16QAM	S_1@99
6	100	100	5	N/A	N/A	16QAM	P_25@0	16QAM	S_25@75
7	100	100	5	N/A	N/A	16QAM	P_100@0	16QAM	S_100@0

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.2A.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2A.3.4.3.

6.6.2.2A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.2A.3.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.2A.3.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the mean power over all component carriers in the CA configuration of the radio access mode, which shall meet the requirements described in Table 6.2.3A.3.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

7. Measure the power of the transmitted signal for PCC with a measurement filter of bandwidths according to tables 6.6.2.2A.3.5.1-1 to 6.6.2.2A.3.5.1-2 as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

8. Measure the power of the transmitted signal for SCC with a measurement filter of bandwidths according to tables 6.6.2.2A.3.5.1-1 to 6.6.2.2A.3.5.1-2 as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.2A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. The following exceptions apply for each network signalled value. These exceptions indicate that the UE shall meet the additional spectrum emission requirement for a specific deployment scenario.

6.6.2.2A.3.4.3.2 Message contents exceptions (network signalled value "CA_NC_NS_01")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NC_NS_01. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages.

Table 6.6.2.2A.3.4.3.2-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for "CA_NC_NS_01"

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	1 (CA_NC_NS_01)		

6.6.2.2A.3.5 Test Requirements

The measured UE mean power with the aggregated channel bandwidth as specified in clause 5.4.2A, derived in step 6 , shall fulfil requirements in Table 6.2.3A.3.5-1,

and

The power of any UE emission per component carrier derived in step 7 and 8 shall not exceed the levels specified in Tables 6.6.2.2A.3.5.1-1 to 6.6.2.2A.3.5.1-2. The spectrum emission mask requirement is defined as a composite spectrum emissions mask, as defined in section 6.6.2.1A.0.

Table 6.6.2.2A.3.5-1: Additional requirements (network signalled value " CA_NC_NS_01"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5					1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2A.3.5-2: Additional requirements (network signalled value " CA_NC_NS_01"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2					1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2A.2_1 Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA) for UL 64QAM

6.6.2.2A.2_1.1 Test purpose

To verify that the power of any UE emission shall not exceed specified lever for the specified channel bandwidth for CA under the deployment scenarios where additional requirements are specified.

6.6.2.2A.2_1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support inter-band DL CA and UL CA and UL 64QAM.

6.6.2.2A.2_1.3 Minimum conformance requirements

The minimum requirements are the same as in section 6.6.2.2A.2.3.

6.6.2.2A.2_1.4 Test description

6.6.2.2A.2_1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. For Uplink CA Configurations listed in table 6.6.2.2A.2_1.4.1-1, Additional Spectrum emission requirements are tested.

Table 6.6.2.2A.2_1.4.1-1 Additional Spectrum Emission mask for inter-band CA

Uplink CA Configuration	NS-value per CC (in same order as UL CA Configuration column)		Applicable spectrum emission requirements (in same order as UL CA Configuration column)	
CA_2A-4A, CA_2A-66A	NS_03	NS_03	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.1-1
CA_2A-12A, CA_2A-13A, CA_4A-12A, CA_4A-13A, CA_4A-17A	NS_03	NS_06	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1
CA_2A-13A, CA_4A-13A	NS_03	NS_07	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1
CA_2A-5A, CA_2A-7A, CA_4A-5A, CA_4A-7A	NS_03	NS_01	Table 6.6.2.2.3.1-1	N/A
CA_5A-66A[Note5]	NS_01	NS_03	N/A	Table 6.6.2.2.3.1-1
CA_2A-30A	NS_03	NS_21	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.1-1
CA_5A-12A	NS_01	NS_06	N/A	Table 6.6.2.2.3.3-1
CA_5A-30A	NS_01	NS_21	N/A	Table 6.6.2.2.3.1-1
CA_12A-30A	NS_06	NS_21	Table 6.6.2.2.3.3-1	Table 6.6.2.2.3.3-1
CA_1A-3A	NS_05	NS_01	N/A	N/A
CA_1A-19A	NS_05	NS_08	N/A	N/A
CA_1A-21A	NS_05	NS_09	N/A	N/A
CA_3A-19A	NS_01	NS_08	N/A	N/A
CA_19A-21A	NS_08	NS_09	N/A	N/A

Note 1: For CCs with NS_01, there are no additional requirements defined in 36.101. Only CCs with NS-value different than NS_01 needs to be tested.
Note 2: A-MPR values for NS-values in this table are the same as in section 6.2.4.3.
Note 3: Selection of CA configurations and NS-values to test is derived in TR 36.905 [19].
Note 4: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column.
Note 5: As an exception to note 4, PCC is mapped to the second band of the combination as listed in Uplink CA Configuration column.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in tables 6.6.2.2A.2_1.4.1-2 to 6.6.2.2A.1.4.1-9. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2A.2_1.4.1-2: Test Configuration Table (network signalled value NS_01/NS_03 or network signalled value NS_03/NS_01)

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and high range for PCC Mid range for SCC (Note 3)
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}(Note 2)

Test Parameters for CA Configurations

Config ID	CA Configuration / NRB_agg		DL Allocation	CC MOD		UL Allocation	
	NS_03 CC	NS_01 CC	PCC & SCC RB allocation	PCC	SCC	PCC & SCC RB allocations	
	NRB	NRB					
1	25	25	N/A for this test	QPSK	QPSK	6	8
2	25	25		64QAM	64QAM	25	25
3	25	25		64QAM	QPSK	25	8
4	50	50		QPSK	QPSK	6	12
5	50	50		64QAM	64QAM	50	50
6	50	50		64QAM	QPSK	50	12
7	50	100		QPSK	QPSK	6	18
8	50	100		64QAM	64QAM	50	100
9	50	100		64QAM	QPSK	50	18
10	100	50		QPSK	QPSK	10	12
11	100	50		64QAM	64QAM	100	50
12	100	50		64QAM	QPSK	100	12
13	100	100		QPSK	QPSK	10	18
14	100	100		64QAM	64QAM	100	100
15	100	100		64QAM	QPSK	100	18

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Note 4: Mapping of NS-value per CC and PCC/SCC selection are specified in Table 6.6.2.2A.2_1.4.1-1.

Table 6.6.2.2A.2_1.4.1-3: Test Configuration Table (network signalled value NS_01/NS_06)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1						NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for both PCC and SCC (Note 3)	
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest and Highest N_{RBagg}(Note 2)	
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_07)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	6	6
2	25	25		64QAM	64QAM	25	9
3	25	25		QPSK	64QAM	6	9
4	50	50		QPSK	QPSK	12	12
5	50	50		64QAM	64QAM	50	15
6	50	50		QPSK	64QAM	12	15
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list. Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.2.2A.2_1.4.1-4: Test Configuration Table (network signalled value NS_01/NS_21)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_21)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	8	8
2	25	25		64QAM	64QAM	25	25
3	25	25		QPSK	64QAM	8	25
4 (Note 4)	50	50		QPSK	QPSK	12	12@7
5 (Note 5)	50	50		QPSK	QPSK	12	12@31
6	50	50		64QAM	64QAM	50	1
7	50	50		QPSK	64QAM	12	1
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.							
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.6.2.2A.2_1.4.1-1.							
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							
Note 4: Applicable only to Low range frequency testing.							
Note 5: Applicable only to High range frequency testing.							

Table 6.6.2.2A.2_1.4.1-5: Test Configuration Table (network signalled value NS_03/NS_03)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg} (Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03) NRB	**SCC (NS_03) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	15	25	N/A for this test	QPSK	QPSK	4	6
2	15	25		64QAM	64QAM	15	25
3	15	25		64QAM	QPSK	15	6
4	25	25		QPSK	QPSK	6	6
5	25	25		64QAM	64QAM	25	25
6	25	25		64QAM	QPSK	25	6
7	50	50		QPSK	QPSK	6	6
8	50	50		64QAM	64QAM	50	50
9	50	50		64QAM	QPSK	50	6
10	100	100		QPSK	QPSK	10	10
11	100	100		64QAM	64QAM	100	100
12	100	100		64QAM	QPSK	100	10
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.							
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.2.2A.2_1.4.1-6: Test Configuration Table (network signalled value NS_03/NS_06)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_06)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	15	25	N/A for this test	QPSK	QPSK	4	8
2	15	25		64QAM	64QAM	15	25
3	15	25		64QAM	QPSK	15	8
4	25	15		QPSK	QPSK	6	4
5	25	15		64QAM	64QAM	25	25
6	25	15		64QAM	QPSK	25	4
7	25	25		QPSK	QPSK	6	8
8	25	25		64QAM	64QAM	25	25
9	25	25		64QAM	QPSK	25	8
10	25	50		QPSK	QPSK	6	12
11	25	50		64QAM	64QAM	25	50
12	25	50		64QAM	QPSK	25	12
13	50	50		QPSK	QPSK	6	12
14	50	50		64QAM	64QAM	50	50
15	50	50		64QAM	QPSK	50	12
16	100	50		QPSK	QPSK	10	12
17	100	50		64QAM	64QAM	100	50
18	100	50		64QAM	QPSK	100	12

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.6.2.2A.2_1.4.1-7: Test Configuration Table (network signalled value NS_03/NS_07)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_07)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	50	N/A for this test	QPSK	QPSK	6	4
2	25	50		64QAM	64QAM	25	50
3	25	50		QPSK	64QAM	6	50
4	50	50		QPSK	QPSK	6	4
5	50	50		64QAM	64QAM	50	50
6	50	50		QPSK	64QAM	6	50
7	100	50		QPSK	QPSK	10	4
8	100	50		64QAM	64QAM	100	50
9	100	50		QPSK	64QAM	10	50
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list. Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.2.2A.2_1.4.1-8: Test Configuration Table (network signalled value NS_03/NS_21)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_21)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	6	8
2	25	25		64QAM	64QAM	25	25
3	25	25		64QAM	QPSK	25	8
4 (Note 4)	100	50		QPSK	QPSK	10	12@7
5 (Note 5)	100	50		QPSK	QPSK	10	12@31
6	100	50		64QAM	64QAM	100	1
7	100	50		QPSK	64QAM	10	1

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.6.2.2A.2_1.4.1-1.
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Applicable only to Low range frequency testing.
Note 5: Applicable only to High range frequency testing.

Table 6.6.2.2A.2_1.4.1-9: Test Configuration Table (network signalled value NS_06/NS_21)

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and High range for both PCC and SCC
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}

Test Parameters for CA Configurations

Config ID	CA Configuration / NRB_agg		DL Allocation	CC MOD		UL Allocation	
	PCC (NS_06) NRB	SCC (NS_21) NRB	PCC & SCC RB allocation	PCC	SCC	PCC & SCC RB allocations	
1	25	25	N/A for this test	QPSK	QPSK	8	8
2	25	25		64QAM	64QAM	25	25
3	25	25		64QAM	QPSK	25	8
4 (Note 4)	50	50		QPSK	QPSK	12	12@7
5 (Note 5)	50	50		QPSK	QPSK	12	12@31
6	50	50		64QAM	64QAM	50	1
7	50	50		QPSK	64QAM	12	1

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: For simplifying test, PCC is mapped to the first band of the combination as listed in Uplink CA Configuration column in Table 6.6.2.2A.2_1.4.1-1.
Note 3: For partial RB allocation unless RBstart is explicitly defined, for Low range place test point with RBstart=0, for High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.
Note 4: Applicable only to Low range frequency testing.
Note 5: Applicable only to High range frequency testing.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.2A.2_1.4.1-2 to 6.6.2.2A.2_1.4.1-9.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2A.2_1.4.3.

6.6.2.2A.2_1.4.2 Test procedure

Same test procedure as in clause 6.6.2.2A.2.4.2.

6.6.2.2A.2_1.4.3 Message contents

Same message contents as in clause 6.6.2.2A.2.4.3.

6.6.2.2A.2_1.5 Test Requirements

Same test requirements as in clause 6.6.2.2A.2.5.

6.6.2.2B Additional Spectrum Emission Mask for UL-MIMO

6.6.2.2B.1 Test purpose

To verify that the power of any UE emission at each transmit antenna shall not exceed specified lever for the specified channel bandwidth under the deployment scenarios where additional requirements are specified.

6.6.2.2B.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO

6.6.2.2B.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.2.3.

6.6.2.2B.4 Test description

6.6.2.2B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Tables 6.6.2.2B.4.1-1 to 6.6.2.2B.4.1-6.The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2 respectively. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2B.4.1-1: Test Configuration Table (network signalled value "NS_03", “NS_11”, and “NS_20”)

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Additional Spectrum Emission Mask testing.			QPSK	6	6
1.4MHz				QPSK	5	5
1.4MHz				16QAM	5	5
3MHz				QPSK	15	15
3MHz				QPSK	4	4
3MHz				16QAM	15	15
3MHz				16QAM	4	4
5MHz				QPSK	25	25
5MHz				QPSK	8	8
5MHz				QPSK	6	6
5MHz				16QAM	25	25
5MHz				16QAM	8	8
10MHz				QPSK	50	50
10MHz				QPSK	12	12
10MHz				QPSK	6	6
10MHz				16QAM	50 (Note 3)	50 (Note 3)
10MHz				16QAM	12	12
15MHz				QPSK	75	75
15MHz				QPSK	16	16
15MHz				QPSK	8	8
15MHz				16QAM	75 (Note 3)	75 (Note 3)
15MHz				16QAM	16	16
20MHz				QPSK	100	100
20MHz				QPSK	18	18
20MHz				QPSK	10	10
20MHz				16QAM	100 (Note 3)	100 (Note 3)
20MHz				16QAM	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.

Note 3: Applies only for UE-Categories [FFS].

Table 6.6.2.2B.4.1-2: Test Configuration Table (network signalled value "NS_04")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0: For 5 MHz bandwidth: 2499.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866 Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39686 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10 MHz, 15 MHz, 20MHz		
Test Parameters for NS_04 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation TDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1 (Note 6)	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Note 6)	5MHz			QPSK	8	Note 3
3(Note 6)	5MHz			QPSK	6	Note 3
4 (Note 6)	5MHz			16QAM (Note 5)	25	0
5 (Note 6)	5MHz			16QAM (Note 5)	8	Note 3
6 (Note 6)	10MHz			QPSK	1	0
7 (Note 6)	10MHz			QPSK	12	0
8 (Note 6)	10MHz			QPSK	50	0
9 Note 6)	10MHz			16QAM (Note 5)	50 (Note 4)	0
10 (Note 6)	10MHz			QPSK	24	13
11 (Note 6)	10MHz			16QAM (Note 5)	24	13
12 (Note 6)	10MHz			QPSK	36	13
13 (Note 6)	10MHz			QPSK	12	37
14 (Note 6)	10MHz			QPSK	1	49
15 (Note 6)	15MHz			QPSK	1	0
16 (Note 6)	15MHz			QPSK	16	0
17 (Note 6)	15MHz			QPSK	75	0

18 (Note 6)	15MHz		16QAM (Note 5)	75 (Note 4)	0
19 (Note 6)	15MHz		QPSK	36	19
20 (Note 6)	15MHz		16QAM (Note 5)	36 (Note 4)	19
21 (Note 6)	15MHz		QPSK	50	19
22 (Note 6)	15MHz		QPSK	18	56
23 (Note 6)	15MHz		QPSK	1	74
24 (Note 6)	20MHz		QPSK	1	0
25 (Note 6)	20MHz		QPSK	18	0
26 (Note 6)	20MHz		QPSK	100	0
27 (Note 6)	20MHz		16QAM (Note 5)	100 (Note 4)	0
28 (Note 6)	20MHz		QPSK	50	25
29 (Note 6)	20MHz		16QAM (Note 5)	50 (Note 4)	25
30 (Note 6)	20MHz		QPSK	75	25
31 (Note 6)	20MHz		QPSK	25	75
32 (Note 6)	20MHz		QPSK	1	99
33 (Note 8)	5MHz		QPSK	1	0
34 (Note 8)	5MHz		QPSK	16	9
35 (Note 9)	5MHz		QPSK	25	0
36 (Note 8)	5MHz		16QAM (Note 5)	16	9
37 (Note 9)	5MHz		16QAM (Note 5)	25	0
38 (Note 8)	10MHz		QPSK	1	0
39 (Note 8)	10MHz		QPSK	1	49
40 (Note 8)	10MHz		QPSK	24	0
41 (Note 8)	10MHz		QPSK	40	10
42 (Note 7)	10MHz		QPSK	50	0
43 (Note 7)	10MHz		16QAM (Note 5)	50	0
44 (Note 8)	15MHz		QPSK	1	0
45 (Note 8)	15MHz		QPSK	1	74
46 (Note 8)	15MHz		QPSK	32	0
47 (Note 8)	15MHz		QPSK	60	15
48 (Note 7)	15MHz		QPSK	75	0
49 (Note 7)	15MHz		16QAM (Note 5)	75	0
50 (Note 8)	20MHz		QPSK	1	0
51 (Note 8)	20MHz		QPSK	1	99
52 (Note 8)	20MHz		QPSK	36	0
53 (Note 8)	20MHz		QPSK	75	25
54 (Note 7)	20MHz		QPSK	100	0
55 (Note 7)	20MHz		16QAM (Note 5)	100	0

Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in subclause 6.2.4 as not all combinations are necessarily required based on the applicability of the UE.
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 4: Applies only for UE-Categories ≥2.
Note 5: Void.
Note 6: Applies only for Rel-11 and earlier.
Note 7: Applies only for Rel-12 and later.
Note 8: Applies only for Rel-12 and later and Low Range.
Note 9: Applies only for Rel-12 and later and Mid, High Range and additional test frequencies.

Table 6.6.2.2B.4.1-3: Test Configuration Table (network signalled value "NS_06")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Additional Spectrum Emission Mask testing.			QPSK	6	NA
1.4MHz				QPSK	5	
1.4MHz				16QAM	5	
3MHz				QPSK	15	
3MHz				QPSK	4	
3MHz				16QAM	4	
5MHz				QPSK	25	
5MHz				QPSK	8	
5MHz				16QAM	8	
10MHz				QPSK	50	
10MHz				QPSK	12	
10MHz				16QAM	12	
15MHz				QPSK	75	
15MHz				QPSK	16	
15MHz				16QAM	16	
20MHz				QPSK	100	
20MHz				QPSK	18	
20MHz				16QAM	18	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.						

Table 6.6.2.2B.4.1-4: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				10MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	RB_{start}
1	10MHz	N/A for Additional Spectrum Emission Mask testing.		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			16QAM	36 (Note 1)	13
7	10MHz			QPSK	16	19
8	10MHz			QPSK	12	19
9	10MHz			16QAM	16	19
10	10MHz			QPSK	30	19
11	10MHz			16QAM	30 (Note 1)	19
12	10MHz			QPSK	6	43
13	10MHz			QPSK	2	48
14	10MHz			QPSK	50	0
15	10MHz			QPSK	12	0
16	10MHz			16QAM	50 (Note 1)	0
Note 1: Applies only for UE-Categories [FFS].						

Table 6.6.2.2B.4.1-5: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range or High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 2)	5 MHz			QPSK	1	0
2 (note 2)	5 MHz			QPSK	25	0
3 (note 2)	10 MHz			QPSK	1	0
4 (note 3)	10 MHz			QPSK	1	49
5 (note 2)	10 MHz			QPSK	15	0
6 (note 3)	10 MHz			QPSK	3	47
7 (note 3)	10 MHz			QPSK	50	0
8 (note 1, 3)	10 MHz			16QAM	50	0

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only to low range frequency testing.
Note 3: Applicable only to high range frequency testing.

Table 6.6.2.2B.4.1-6: Test Configuration Table (network signalled value "NS_27")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to Frequency column in test parameters		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid	5MHz	N/A for A-MPR testing		QPSK	1	0
2	High	5MHz			QPSK	1	24
3	Low/Mid/High	5MHz			QPSK	25	0
4	Low/Mid/High	5MHz			16QAM	25	0
5	Low/Mid	10MHz			QPSK	1	0
6	High	10MHz			QPSK	1	49
7	Low/Mid/High	10MHz			QPSK	50	0
8 (Note 2)	Low/Mid/High	10MHz			16QAM	50	0
9	Low/Mid	15MHz			QPSK	1	0
10	Low	15MHz			QPSK	1	7
11	Low/Mid	15MHz			QPSK	16	0
12	High	15MHz			QPSK	1	74
13	High	15MHz			QPSK	1	67
14	High	15MHz			QPSK	16	74
15	Low/Mid/High	15MHz			QPSK	75	0
16 (Note 2)	Low/Mid/High	15MHz			16QAM	75	0
17	Low/Mid	20MHz			QPSK	1	0
18	Low	20MHz			QPSK	1	13
19	Low	20MHz			QPSK	1	16
20	Low/Mid	20MHz			QPSK	21	0
21	High	20MHz			QPSK	1	99
22	High	20MHz			QPSK	1	86
23	High	20MHz			QPSK	1	83
24	High	20MHz			QPSK	21	0
25	Low/Mid/High	20MHz			QPSK	100	0
26 (Note 2)	Low/Mid/High	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Tables 6.6.2.2B.4.1-1 to 6.6.2.2B.4.1-6.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.2B.4.3.

6.6.2.2B.4.2 Test procedure

Same test procedure as defined in clause 6.6.2.2.4.2.

6.6.2.2B.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6, with the same exceptions as in clause 6.6.2.2.4.3.

6.6.2.2B.5 Test requirements

Same test requirements as defined in clause 6.6.2.2.5.

6.6.2.2E Additional Spectrum Emission Mask for UE category 0

6.6.2.2E.1 Test purpose

Same test purpose as in clause 6.6.2.2.1.

6.6.2.2E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.6.2.2E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.2.2.3

6.6.2.2E.4 Test description

6.6.2.2E.4.1 Initial conditions

Same initial conditions as in clause 6.6.2.2.4.1 with following exceptions for HD-FDD:

- Instead of Tables 6.6.2.2.4.1-1 through 6.6.2.2.4.1-10 → use Table 6.6.2.2E.4.1-1 through 6.6.2.2E.4.1-4.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.6.2.2E.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD and HD-FDD	TDD
1.4MHz	N/A for Additional Spectrum Emission Mask testing.			QPSK	6	6
1.4MHz				QPSK	5	5
1.4MHz				16QAM	5	5
3MHz				QPSK	15	15
3MHz				QPSK	4	4
3MHz				16QAM	5	5
3MHz				16QAM	4	4
5MHz				QPSK	25	25
5MHz				QPSK	8	8
5MHz				QPSK	6	6
5MHz				16QAM	5	5
10MHz				QPSK	36	36
10MHz				QPSK	12	12
10MHz				QPSK	6	6
10MHz				16QAM	5	5
15MHz				QPSK	36	36
15MHz				QPSK	16	16
15MHz				QPSK	8	8
15MHz				16QAM	5	5
20MHz				QPSK	36	36
20MHz				QPSK	18	18
20MHz				QPSK	10	10
20MHz				16QAM	5	5

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 – RB allocation) of the channel bandwidth.

Table 6.6.2.2E.4.1-2: Test Configuration Table (network signalled value "NS_04")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10 MHz, 15 MHz, 20MHz		
Test Parameters for NS_04 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	Ch BW	Mod'n	RB allocation TDD	Mod'n	RB allocation TDD	RB_{start} TDD
1	5MHz	N/A for Additional Spectrum Emission Mask testing		QPSK	25	Note 2
2	5MHz			QPSK	8	Note 2
3	5MHz			QPSK	6	Note 2
4	5MHz			16QAM	5	Note 2
5	10MHz			QPSK	1	0
6	10MHz			QPSK	12	0
7	10MHz			QPSK	36	0
8	10MHz			QPSK	24	13
9	10MHz			16QAM	5	13
10	10MHz			QPSK	36	13
11	10MHz			QPSK	12	37
12	10MHz			QPSK	1	49
13	15MHz			QPSK	1	0
14	15MHz			QPSK	16	0
15	15MHz			QPSK	36	0
16	15MHz			QPSK	36	19
17	15MHz			QPSK	18	56
18	15MHz			QPSK	1	74
19	20MHz			QPSK	1	0
20	20MHz			QPSK	18	0
21	20MHz			QPSK	36	0
22	20MHz			QPSK	36	25
23	20MHz			QPSK	25	75
24	20MHz			QPSK	1	99

Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 – RB allocation) of the channel bandwidth.

Table 6.6.2.2E.4.1-3: Test Configuration Table (network signalled value "NS_06")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD and HD-FDD	TDD
1.4MHz	N/A for Additional Spectrum Emission Mask testing.			QPSK	6	NA
1.4MHz				QPSK	5	
1.4MHz				16QAM	5	
3MHz				QPSK	15	
3MHz				QPSK	4	
3MHz				16QAM	4	
5MHz				QPSK	25	
5MHz				QPSK	8	
5MHz				16QAM	5	
10MHz				QPSK	36	
10MHz				QPSK	12	
10MHz				16QAM	5	
15MHz				QPSK	36	
15MHz				QPSK	16	
15MHz				16QAM	5	
20MHz				QPSK	36	
20MHz				QPSK	18	
20MHz				16QAM	5	
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 – RB allocation) of the channel bandwidth.						

Table 6.6.2.2E.4.1-4: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation FDD	Mod'n	RB allocation FDD and HD-FDD	RB_{start}
1	10MHz	N/A for Additional Spectrum Emission Mask testing.		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			QPSK	16	19
7	10MHz			QPSK	12	19
	10MHz			16QAM	5	19
10	10MHz			QPSK	30	19
12	10MHz			QPSK	6	43
13	10MHz			QPSK	2	48
14	10MHz			QPSK	36	0
15	10MHz			QPSK	12	0

6.6.2.2E.4.2 Test procedure

Same test procedure as in clause 6.2.3.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard sub frame are not under test.

6.6.2.2E.4.3 Message contents

Same message contents as in clause 6.6.2.2.4.3.

6.6.2.2E.5 Test requirements

6.6.2.2E.5.1 Test requirements (network signalled value "NS_03"")

When "NS_03" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-1 and 6.2.4.5-2 as appropriate,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2E.5.1-1 or 6.6.2.2E.5.1-2, as applicable.

Table 6.6.2.2E.5.1-1: Additional requirements (network signalled value "NS_03"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5					1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.							
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

Table 6.6.2.2E.5.1-2: Additional requirements (network signalled value "NS_03"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2					1 MHz
6-10			-23.2				1 MHz
10-15				-23.2			1 MHz
15-20					-23.2		1 MHz
20-25						-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2E.5.2 Test requirements (network signalled value "NS_04")

When "NS_04" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-3 as appropriate,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2E.5.2-1 or Table.6.6.2.2E.5.2-2, as applicable.

Table 6.6.2.2E.5.2-1: Additional requirements (network signalled value "NS_04"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-23.5	-23.5	-23.5	-23.5	1 MHz
6-10							1 MHz
10-15							1 MHz
15-20							1 MHz
20-25							1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_04 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.							
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

Table 6.6.2.2E.5.2-2: Additional requirements (network signalled value "NS_04"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.2	-11.2	-13.2	-16.2	-18.2	-19.2	30 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2						1 MHz
2.8-5							1 MHz
5-6		-23.2	-23.2	-23.2	-23.2	-23.2	1 MHz
6-10							1 MHz
10-15							1 MHz
15-20							1 MHz
20-25							1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_04 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.							
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

Test requirements (network signalled value "NS_06" or "NS_07")

When "NS_06" or "NS_07" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-5, 6.2.4.5-6 and 6.2.4.5-7 as appropriate l,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2E.5.3-1 or Table.6.6.2.2E.5.3-2, as applicable.

Table 6.6.2.2E.5.3-1: Additional requirements (network signalled value "NS_06" or "NS_07"), E-UTRA bands ≤ 3GHz

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.5	-11.5	-13.5	-16.5	30 kHz
0.1-1	-11.5	-11.5	-11.5	-11.5	100 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5				1 MHz
2.8-5					1 MHz
5-6		-23.5			1 MHz
6-10			-23.5		1 MHz
10-15				-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz.
The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.

Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.

Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel.

Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.

Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

Table 6.6.2.2E.5.3-2: Additional requirements (network signalled value "NS_06" or "NS_07"), 3GHz < E-UTRA bands ≤ 4.2GHz

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.2	-11.2	-13.2	-16.2	30 kHz
0.1-1	-11.2	-11.2	-11.2	-11.2	100 kHz
1-2.5	-11.2	-11.2	-11.2	-11.2	1 MHz
2.5-2.8	-23.2				1 MHz
2.8-5					1 MHz
5-6		-23.2			1 MHz
6-10			-23.2		1 MHz
10-15				-23.2	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.

Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.

Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel

Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 Table 6.2.4-1.

Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2EA Additional Spectrum Emission Mask for UE category M1

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- NS_04 (B41): Test configuration table missing due to minimum requirements for A-MPR in 36.101 are incomplete.

6.6.2.2EA.1 Test purpose

Same test purpose as in clause 6.6.2.2.1.

6.6.2.2EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.6.2.2EA.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.2.2.3

6.6.2.2EA.4 Test description

6.6.2.2EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Tables 6.6.2.2EA.4.1-1 through 6.6.2.2EA.4.1-4. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 respectively. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.6.2.2EA.4.1-1: Test Configuration Table (network signalled value "NS_03")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
Low range, Mid range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	0
7	3MHz		QPSK	5	0
8	3MHz		QPSK	6	0
9	3MHz		16QAM	2	0
10	3MHz		16QAM	5	0
11	5MHz		QPSK	6	0
12 (Note 4)	5MHz		16QAM	1	0
13	5MHz		16QAM	3	0
14	5MHz		16QAM	5	0
15 (Note 4)	10MHz		QPSK	4	0
16	10MHz		QPSK	6	0
17 (Note 4)	10MHz		16QAM	3	0
18	10MHz		16QAM	5	0
19	15MHz		QPSK	6	0
20	15MHz		16QAM	5	0
21	20MHz		16QAM	5	0
High range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	1
7	3MHz		QPSK	5	1
8	3MHz		QPSK	6	1
9	3MHz		16QAM	2	1
10	3MHz		16QAM	5	1
11	5MHz		QPSK	6	3
12 (Note 4)	5MHz		16QAM	1	3
13	5MHz		16QAM	3	3
14	5MHz		16QAM	5	3

15 (Note 4)	10MHz		QPSK	4	7
16	10MHz		QPSK	6	7
17 (Note 4)	10MHz		16QAM	3	7
18	10MHz		16QAM	5	7
19	15MHz		QPSK	6	11
20	15MHz		16QAM	5	11
21	20MHz		16QAM	6	15
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband. Note 4: Only for power class 3 UE					

Table 6.6.2.2EA.4.1-2: Test Configuration Table (network signalled value "NS_04")

TBD

Table 6.6.2.2EA.4.1-3: Test Configuration Table (network signalled value "NS_06")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, Mid range, High range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest, 5MHz, 10MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
Low range, Mid range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	0
7	3MHz		QPSK	5	0
8	3MHz		QPSK	6	0
9	3MHz		16QAM	2	0
10	3MHz		16QAM	5	0
11	5MHz		QPSK	6	0
12 (Note 4)	5MHz		16QAM	1	0
13	5MHz		16QAM	3	0
14	5MHz		16QAM	5	0
15 (Note 4)	10MHz		QPSK	4	0
16	10MHz		QPSK	6	0
17 (Note 4)	10MHz		16QAM	3	0
18	10MHz		16QAM	5	0
High range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	1
7	3MHz		QPSK	5	1
8	3MHz		QPSK	6	1
9	3MHz		16QAM	2	1
10	3MHz		16QAM	5	1
11	5MHz		QPSK	6	3
12 (Note 4)	5MHz		16QAM	1	3
13	5MHz		16QAM	3	3
14	5MHz		16QAM	5	3
15 (Note 4)	10MHz		QPSK	4	7
16	10MHz		QPSK	6	7
17 (Note 4)	10MHz		16QAM	3	7
18	10MHz		16QAM	5	7

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4

Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.

Note 4: Only for power class 3 UE

Table 6.6.2.2EA.4.1-4: Test Configuration Table (network signalled value "NS_07")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			10MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
Low range, Mid range					
1	10MHz		QPSK	1	0
2	10MHz		QPSK	4	0
3	10MHz		QPSK	6	0
4	10MHz		16QAM	5	0
High range					
1	10MHz		QPSK	1	7
2	10MHz		QPSK	4	7
3	10MHz		QPSK	6	7
4	10MHz		16QAM	5	7
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

1. Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The DL Reference Measurement channels are set according to Tables 6.6.2.2EA.4.1-1 to 6.6.2.2EA.4.1-4.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.6.2.2EA.4.3.

6.6.2.2EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to applicable table from Table 6.6.2.2EA.4.1-1 to 6.6.2.2.4EA.1-4. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

4. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.4EA.5-1 to 6.2.4EA.5-9 as appropriate. The period of the measurement shall be at least one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test

5. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.2.2EA.5.1-1, 6.6.2.2EA.5.2-1 and, 6.6.2.2.5EA.3-1 as applicable. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.2EA.4.3 Message contents

Message contents are same as in clause 6.2.4EA.4.3.

6.6.2.2EA.5 Test requirements

6.6.2.2EA.5.1 Test requirements (network signalled value "NS_03"")

When "NS_03" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4EA.5-1 and 6.2.4EA.5-2 as appropriate,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2EA.5.1-1, as applicable.

Table 6.6.2.2EA.5.1-1: Additional requirements (network signalled value "NS_03")

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	**1.4 MHz**	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Measurement bandwidth**
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5					1 MHz
6-10			-23.5				1 MHz
10-15				-23.5			1 MHz
15-20					-23.5		1 MHz
20-25						-23.5	1 MHz
Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.							
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.							
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel							
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_03 as defined in TS 36.101 [2] subclause 6.2.4 E Table 6.2.4 E -1.							
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.							

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2EA.5.2 Test requirements (network signalled value "NS_04")

When "NS_04" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4EA.5-3 as appropriate,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2EA.5.2-1, as applicable.

Table 6.6.2.2EA.5.2-1: Additional requirements (network signalled value "NS_04")

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth
0-1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5						1 MHz
2.8-5							1 MHz
5-6		-23.5	-23.5	-23.5	-23.5	-23.5	1 MHz
6-10							1 MHz
10-15							1 MHz
15-20							1 MHz
20-25							1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.985 MHz.
Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.
Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel
Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_04 as defined in TS 36.101 [2] subclause 6.2.4 E Table 6.2.4 E -1.
Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

Test requirements (network signalled value "NS_06" or "NS_07")

When "NS_06" or "NS_07" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4EA.5-5, 6.2.4EA.5-6 and 6.2.4EA.5-7 as appropriate ,

and

- the power of any UE emission shall fulfil requirements in Table 6.6.2.2EA.5.3-1, as applicable.

Table 6.6.2.2EA.5.3-1: Additional requirements (network signalled value "NS_06" or "NS_07")

	Spectrum emission limit (dBm)/ Channel bandwidth				
Δf_{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth
0-0.1	-11.5	-11.5	-13.5	-16.5	30 kHz
0.1-1	-11.5	-11.5	-11.5	-11.5	100 kHz
1-2.5	-11.5	-11.5	-11.5	-11.5	1 MHz
2.5-2.8	-23.5				1 MHz
2.8-5					1 MHz
5-6		-23.5			1 MHz
6-10			-23.5		1 MHz
10-15				-23.5	1 MHz

Note 1: The first and last measurement position with a 30 kHz filter is at ΔfOOB equals to 0.015 MHz and 0.085 MHz. The first and last measurement position with a 100 kHz filter is at ΔfOOB equals to 0.15 MHz and 0.95 MHz.

Note 2: At the boundary of spectrum emission limit, the first and last measurement position with a 1 MHz filter is the inside of +0.5MHz and -0.5MHz, respectively.

Note 3: The measurements are to be performed above the upper edge of the channel and below the lower edge of the channel

Note 4: Above SEM requirement applies to bands corresponding to network signalling value NS_06 and NS_07 as defined in TS 36.101 [2] subclause 6.2.4 E Table 6.2.4 E -1.

Note 5: For the 2.5-2.8 MHz offset range with 1.4 MHz channel bandwidth, the measurement position is at Δf_{OOB} equals to 3 MHz.

NOTE: (only for emission measurement) As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2G Additional Spectrum Emission Mask for V2X Communication

6.6.2.2G.1 Additional Spectrum Emission Mask for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The clause number of reference to measurement average power of channel bandwidth is left TBD.
- Network signal for additional spectrum emission of NS_33 is still open in RAN2
- Test tolerance is open
- The clause number of reference to test mode in 36.508 is left TBD.

6.6.2.2G.1.1 Test purpose

To verify that the power of V2X UE emission shall not exceed specified level for the specified channel bandwidth under the deployment scenarios where additional requirements are specified.

6.6.2.2G.1.2 Test applicability

This test case applies to E-UTRA UE release 14 and forward which support V2X communication.

6.6.2.2G.1.3 Minimum conformance requirements

The additional spectrum mask in Table 6.6.2.2G.1.3-1 applies for E-UTRA V2X UE within 5855 MHz to 5950 MHz according to ETSI EN 302 571. Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS_33" is indicated in the cell, the power of any V2X UE emission shall not exceed the levels specified in Table 6.6.2.2G.1.3-1.

Table 6.6.2.2G.1.3-1: Additional requirements for 10MHz channel bandwidth

Spectrum emission limit (dBm)/ Channel bandwidth		
Δf_{OOB} (MHz)	10 MHz	Measurement bandwidth
± 0-0.5	$[-13 - 12\left(\left\|\Delta fOOB\right\| / MHz\right)]$	100 kHz
± 0.5-5	$[-19 - \frac{16}{9}\left(\left\|\Delta fOOB\right\| / MHz - 0.5\right)]$	100 kHz
± 5-10	$[-27 - 2\left(\left\|\Delta fOOB\right\| / MHz - 5.0\right)]$	100 kHz

NOTE 1: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 2: Additional SEM for V2X overrides any other requirements in frequency range 5855-5950MHz.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2.2.4.

6.6.2.2G.1.4 Test description

6.6.2.2G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.2G.1.4.1-1 the details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3 and refer GNSS system simulator configuration to Annex C Table C.2-8.

Table 6.6.2.2G.1.4.1-1: Test Configuration for V2X sidelink transmission (Network signalled NS_33)

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		Low range, Mid range, High range
Test Channel Bandwidths (as specified in subclause 5.4.2G)		Lowest, Mid, Highest
Test Parameters for Channel Bandwidths		
	V2X sidelink transmission	
Ch BW	Mod'n	RB Allocation
10MHz	QPSK	6
10MHz	QPSK	12
10MHz	QPSK	48
10MHz	16QAM	12
10MHz	16QAM	48
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in specified in subclause 5.4.2G.		
Note 2: The allowed MPR for maximum output power UE might apply is described in clause 36.101[2] subclause 6.2.4G.		
Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max+1 – RB allocation) of the channel bandwidth.		

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure [A.67].

2. Propagation conditions are set according to Annex B.0

3. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to SL-V2X-Preconfiguration in TS36.508 [7] subclause Table 6.8.2.1-1 with the exception specified in table 6.6.2.1G.1.4.3-1;

4. Ensure the UE is in Side link test mode State [5A-V2X], according to TS 36.508 [7] clause [4.5.9], Message contents are defined in clause 6.6.2.1G.1.4.3

6.6.2.2G.1.4.2 Test procedure

1. The V2X UE schedules the V2X RMC with transmission power at P_{UMAX} level according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.6.2.2G.1.4.1-1;

2. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in subclass [6.2.4G.xxx TBD]for Power Class 3. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

3. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.2.2G.1.3-1. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

6.6.2.2G.1.4.3 Message contents

Refer to the subclause 6.6.3G.1.4.3 with the following exceptions

Table 6.6.2.2G.1.4.3a: SL-V2X-PreconfigFreqInfo-r14-DEFAULT

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-Preconfiguration-r14 ::= SEQUENCE {			
v2x-PreconfigFreqList-r14 SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE {	One entry of v2x-PreconfigFreqInfo		
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
maxTxPower-r12	23		Power class3
additionalSpectrumEmission-r12	[TBD]	NS_33	Power class3
}			
}			
}			

6.6.2.2G.1.5 Test requirements

When "NS_33" is indicated in the cell,

- the measured UE mean power in the channel bandwidth, derived in step 2, shall fulfil the requirements described in subclass [6.2.4G.xxx TBD]for Power Class 3 UEs;

And

- The power of any UE emission shall fulfil requirements in Table 6.6.2.2G.1.5-1 as applicable.

The power of any V2X UE emission shall not exceed the levels specified in Table 6.6.2.2G.1.3-1.

Table 6.6.2.2G.1.5-1: Additional requirements for 10MHz channel bandwidth

Spectrum emission limit (dBm)/ Channel bandwidth		
Δf_{OOB} (MHz)	**10 MHz**	**Measurement bandwidth**
± 0-0.5	$[-13 - 12\left(\left\|\Delta f_{OOB}\right\| / MHz\right)]$ + TT	100 kHz
± 0.5-5	$[-19 - \frac{16}{9}\left(\left\|\Delta f_{OOB}\right\| / MHz - 0.5\right)]$+ TT	100 kHz
± 5-10	$[-27 - 2\left(\left\|\Delta f_{OOB}\right\| / MHz - 5.0\right)]$+ TT	100 kHz

6.6.2.3 Adjacent Channel Leakage power Ratio

6.6.2.3.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR).

6.6.2.3.2 Test applicability

This test case applies to all types of E-UTRA Power Class 3 UE release 8 and forward.

6.6.2.3.3 Minimum conformance requirements

ACLR requirements are specified for two scenarios for an adjacent E -UTRA$_{ACLR}$ and UTRA$_{ACLR1/2}$ as shown in Figure 6.6.2.3.3-1.

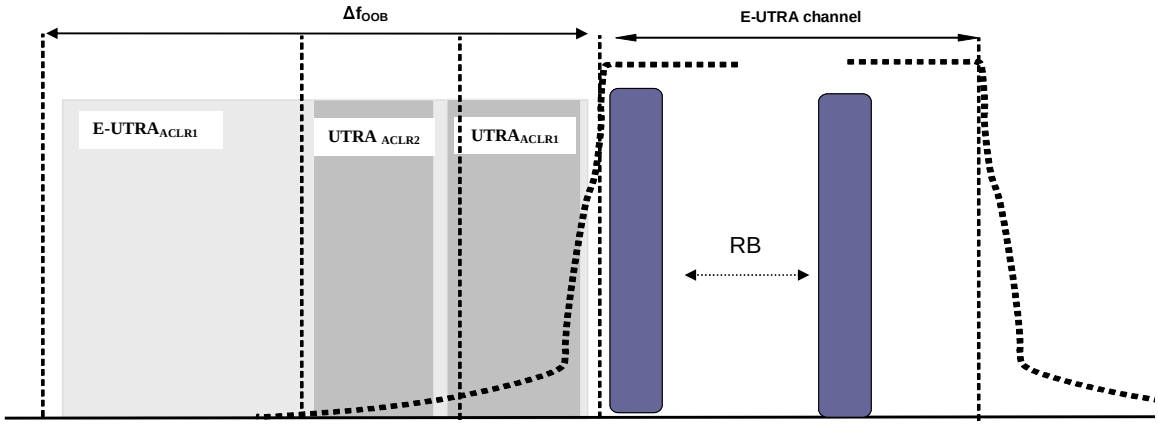


Figure 6.6.2.3.3-1: Adjacent Channel Leakage Power Ratio requirements

6.6.2.3.3.1 Minimum conformance requirements for E-UTRA

E-UTRA ACLR (E-UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. The assigned E-UTRA channel power and adjacent E-UTRA channel power are measured with rectangular filters with measurement bandwidth specified in Table 6.6.2.3.3.1-1.

If the measured adjacent channel power is greater than –50dBm then the E-UTRA$_{ACLR}$ shall be higher than the valued specified in Table 6.6.2.3.3.1-1.

Table 6.6.2.3.3.1-1: General requirements for E-UTRA$_{ACLR}$

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
E-UTRA$_{ACLR1}$	30 dB	30 dB	30 dB	30 dB	30 dB	30 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.2.3.1.

6.6.2.3.3.2 Minimum conformance requirements for UTRA

UTRA ACLR (UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned E-UTRA channel frequency to the filtered mean power centred on an adjacent UTRA channel frequency.

UTRA ACLR is specified for both the first UTRA adjacent channel (UTRA$_{ACLR1}$) and the 2nd UTRA adjacent channel (UTRA$_{ACLR2}$). The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor $\alpha = 0.22$. The assigned E-UTRA channel power is measured with a rectangular filter with measurement bandwidth specified in Table 6.6.2.3.3.2-1.

If the measured UTRA channel power is greater than –50dBm then the UTRA$_{ACLR1}$, and UTRA$_{ACLR2}$ shall be higher than the valued specified in Table 6.6.2.3.3.2-1.

Table 6.6.2.3.3.2-1: General requirements for UTRA$_{ACLR1/2}$

	Channel bandwidth / UTRA$_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz

$UTRA_{ACLR1}$	33 dB	33 dB	33 dB	33 dB	33 dB	33 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW_{UTRA}/2 / -0.7-BW_{UTRA}/2	1.5+BW_{UTRA}/2 / -1.5-BW_{UTRA}/2	2.5+BW_{UTRA}/2 / -2.5-BW_{UTRA}/2	5+BW_{UTRA}/2 / -5-BW_{UTRA}/2	7.5+BW_{UTRA}/2 / -7.5-BW_{UTRA}/2	10+BW_{UTRA}/2 / -10-BW_{UTRA}/2
$UTRA_{ACLR2}$	-	-	36 dB	36 dB	36 dB	36 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW_{UTRA}/2 / -2.5-3*BW_{UTRA}/2	5+3*BW_{UTRA}/2 / -5-3*BW_{UTRA}/2	7.5+3*BW_{UTRA}/2 / -7.5-3*BW_{UTRA}/2	10+3*BW_{UTRA}/2 / -10-3*BW_{UTRA}/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum.						

The normative reference for this requirement is TS 36.101 subclause 6.6.2.3.2.

6.6.2.3.4 Test description

6.6.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in AnnexeA.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	N/A for ACLR testing			QPSK	6	6
1.4MHz				QPSK	5	5
1.4MHz				16QAM	6	6
1.4MHz				16QAM	5	5
3MHz				QPSK	15	15
3MHz				QPSK	4	4
3MHz				16QAM	15	15
3MHz				16QAM	4	4
5MHz				QPSK	25	25
5MHz				QPSK	8	8
5MHz				16QAM	25	25
5MHz				16QAM	8	8
10MHz				QPSK	50	50
10MHz				QPSK	12	12
10MHz				16QAM	50 (Note 3)	50 (Note 3)
10MHz				16QAM	12	12
15MHz				QPSK	75	75
15MHz				QPSK	16	16
15MHz				16QAM	75 (Note 3)	75 (Note 3)
15MHz				16QAM	16	16
20MHz				QPSK	100	100
20MHz				QPSK	18	18
20MHz				16QAM	100 (Note 3)	100 (Note 3)
20MHz				16QAM	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 – RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories 2-5

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3.4.3.

6.6.2.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.3.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.
4. Measure the rectangular filtered mean power for E-UTRA.
5. Measure the rectangular filtered mean power of the first E-UTRA adjacent channel on both lower and upper side of the E-UTRA channel, respectively.
6. Measure the RRC filtered mean power of the first and the second UTRA adjacent channel on both lower and upper side of the E-UTRA channel, respectively.
7. Calculate the ratios of the power between the values measured in step 4 over step 5 for lower and upper E-$UTRA_{ACLR}$, respectively.
8. Calculated the ratios of the power between the values measured in step 4 over step 6 for lower and upper $UTRA_{ACLR1}$, $UTRA_{ACLR2}$, respectively.

6.6.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.3.5 Test requirement

6.6.2.3.5.1 Test requirements E-UTRA

- The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3.5-1 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured E-$UTRA_{ACLR}$, derived in step 7, shall be higher than the limits in table 6.6.2.3.5.1-1.

Table 6.6.2.3.5.1-1: E-UTRA UE ACLR

	Channel bandwidth / E-$UTRA_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-$UTRA_{ACLR1}$	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	+1.4 MHz or -1.4 MHz	+3 MHz or -3 MHz	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

Test requirements UTRA

If the measured UTRA channel power is greater than –50dBm then the measured $UTRA_{ACLR1}$, $UTRA_{ACLR2}$, derived in step 8, shall be higher than the limits in table 6.6.2.3.5.2-1.

Table 6.6.2.3.5.2-1: UTRA UE ACLR

	Channel bandwidth / $UTRA_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

$UTRA_{ACLR1}$	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW_{UTRA}/2 / -0.7-BW_{UTRA}/2	1.5+BW_{UTRA}/2 / -1.5-BW_{UTRA}/2	2.5+BW_{UTRA}/2 / -2.5-BW_{UTRA}/2	5+BW_{UTRA}/2 / -5-BW_{UTRA}/2	7.5+BW_{UTRA}/2 / -7.5-BW_{UTRA}/2	10+BW_{UTRA}/2 / -10-BW_{UTRA}/2
$UTRA_{ACLR2}$	-	-	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW_{UTRA}/2 / -2.5-3*BW_{UTRA}/2	5+3*BW_{UTRA}/2 / -5-3*BW_{UTRA}/2	7.5+3*BW_{UTRA}/2 / -7.5-3*BW_{UTRA}/2	10+3*BW_{UTRA}/2 / -10-3*BW_{UTRA}/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. Note 3: BW_{UTRA} for UTRA FDD is 5MHz and for UTRA TDD is 1.6MHz.						

6.6.2.3_1 Adjacent Channel Leakage power Ratio for HPUE

6.6.2.3_1.1 Test purpose

To verify that HPUE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR).

6.6.2.3_1.2 Test applicability

This test case applies to all types of E-UTRA Power Class 1 or Power Class 2 UE release 10 and forward.

6.6.2.3_1.3 Minimum conformance requirements

ACLR requirements are specified for an adjacent E -$UTRA_{ACLR}$ as shown in Figure 6.6.2.3_1.3-1.

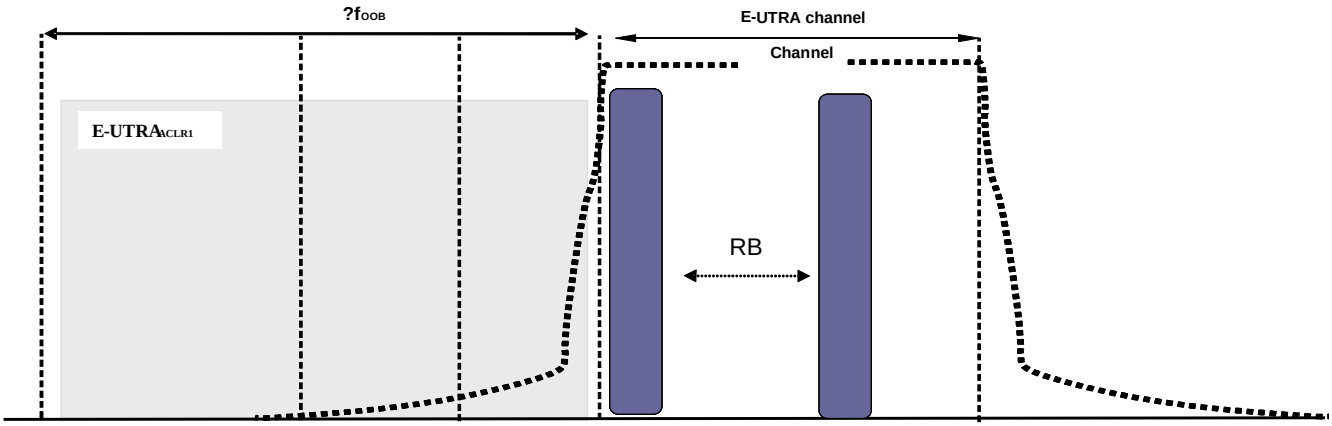


Figure 6.6.2.3_1.3-1: Adjacent Channel Leakage Power Ratio requirements

6.6.2.3_1.3.1 Minimum conformance requirements for E-UTRA for HPUE

Same minimum conformance requirements as in clause 6.6.2.3.3.1 with for following exceptions:

- Instead of Table 6.6.2.3.3.1-1 → use Table 6.6.2.3_1.3.1-1 and 6.6.2.3_1.3.1-2

Table 6.6.2.3_1.3.1-1: Additional E-UTRA$_{ACLR}$ requirements for Power Class 1

	Channel bandwidth / E-UTRA$_{ACLR1}$ / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	N/A	N/A	37 dB	37 dB	N/A	N/A
E-UTRA channel Measurement bandwidth	N/A	N/A	4.5 MHz	9.0 MHz	N/A	N/A
Adjacent channel centre frequency offset [MHz]	N/A	N/A	+5 / -5	+10 / -10	N/A	N/A
Note 1: E-UTRA$_{ACLR1}$ shall be applicable for >23dBm						

Table 6.6.2.3_1.3.1-2: Additional E-UTRA$_{ACLR}$ requirements for Band 41 Power Class 2

	Channel bandwidth / E-UTRA$_{ACLR1}$ / Measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	N/A	N/A	31 dB	31 dB	31 dB	31 dB
E-UTRA channel Measurement bandwidth	N/A	N/A	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
Adjacent channel centre frequency offset [MHz]	N/A	N/A	+5 / -5	+10 / -10	+15 / -15	+20 / -20

The normative reference for this requirement is TS 36.101 [2] clause 6.6.2. 3.

6.6.2.3_1.4 Test description

6.6.2.3_1.4.1 Initial conditions

Same initial conditions as in clause 6.6.2.3.4.1.

6.6.2.3_1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.3.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3_1.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

4. Measure the rectangular filtered mean power for E-UTRA.

5. Measure the rectangular filtered mean power of the first E-UTRA adjacent channel on both lower and upper side of the E-UTRA channel, respectively.

6. Calculate the ratios of the power between the values measured in step 4 over step 5 for lower and upper E-UTRA$_{ACLR}$, respectively.

6.6.2.3_1.4.3 Message contents

Same message contents as in clause 6.6.2.3.4.3

6.6.2.3_1.5 Test requirement

6.6.2.3_1.5.1 Test requirements E-UTRA

- The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3_1.5-1 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured E-UTRA$_{ACLR}$, derived in step 7, shall be higher than the limits in table 6.6.2.3_1.4.1-1 for Power Class1 UE and in table 6.6.2.3_1.4.1-2 for Power Class 2 UE.

Table 6.6.2.3_1.4.1-1: E-UTRA UE ACLR for Power Class 1

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	N/A	N/A	36.2 dB	36.2 dB	N/A	N/A
E-UTRA channel Measurement bandwidth	N/A	N/A	4.5 MHz	9.0 MHz	N/A	N/A
UE channel	N/A	N/A	+5MHz or -5MHz	+10MHz or -10MHz	N/A	N/A

Table 6.6.2.3_1.4.1-2: E-UTRA UE ACLR for Power Class 2

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	N/A	N/A	30.2 dB	30.2 dB	30.2 dB	30.2 dB
E-UTRA channel Measurement bandwidth	N/A	N/A	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	N/A	N/A	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

6.6.2.3_2 Adjacent Channel Leakage power Ratio for Multi-Cluster PUSCH

6.6.2.3_2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR) for Multi-Cluster PUSCH transmission.

6.6.2.3_2.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support multi cluster PUSCH within a component carrier for the tested band but do not support UL 64QAM.

6.6.2.3_2.3 Minimum conformance requirements

ACLR requirements are specified for two scenarios for an adjacent E -UTRA$_{ACLR}$ and UTRA$_{ACLR1/2}$ as shown in Figure 6.6.2.3_2.3-1.

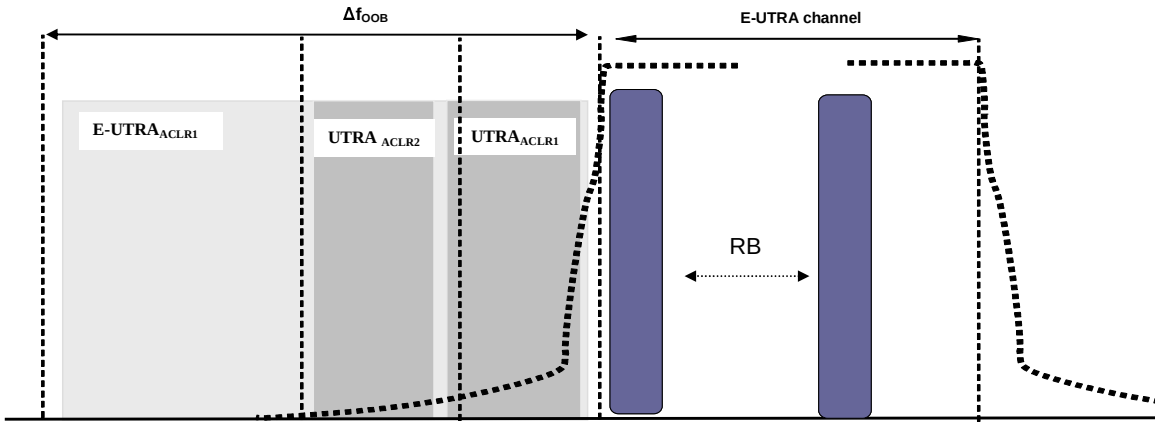


Figure 6.6.2.3_2.3-1: Adjacent Channel Leakage Power Ratio requirements

6.6.2.3_2.3.1 Minimum conformance requirements for E-UTRA

E-UTRA ACLR (E-UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. The assigned E-UTRA channel power and adjacent E-UTRA channel power are measured with rectangular filters with measurement bandwidth specified in Table 6.6.2.3_2.3.1-1.

If the measured adjacent channel power is greater than –50dBm then the E-UTRA$_{ACLR}$ shall be higher than the valued specified in Table 6.6.2.3_2.3.1-1.

Table 6.6.2.3_2.3.1-1: General requirements for E-UTRA$_{ACLR}$

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	30 dB	30 dB	30 dB	30 dB	30 dB	30 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.2.3.1.

6.6.2.3_2.3.2 Minimum conformance requirements for UTRA

UTRA ACLR (UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned E-UTRA channel frequency to the filtered mean power centred on an adjacent UTRA channel frequency.

UTRA ACLR is specified for both the first UTRA adjacent channel (UTRA$_{ACLR1}$) and the 2nd UTRA adjacent channel (UTRA$_{ACLR2}$). The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor $\alpha = 0.22$. The assigned E-UTRA channel power is measured with a rectangular filter with measurement bandwidth specified in Table 6.6.2.3_2.3.2-1.

If the measured UTRA channel power is greater than –50dBm then the UTRA$_{ACLR1}$, and UTRA$_{ACLR2}$ shall be higher than the valued specified in Table 6.6.2.3_2.3.2-1.

Table 6.6.2.3_2.3.2-1: General requirements for UTRA$_{ACLR1/2}$

	Channel bandwidth / UTRA$_{ACLR1/2}$ / measurement bandwidth					
	1.4	**3.0**	**5**	**10**	**15**	**20**

	MHz	MHz	MHz	MHz	MHz	MHz
$UTRA_{ACLR1}$	33 dB	33 dB	33 dB	33 dB	33 dB	33 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW_{UTRA}/2 / -0.7-BW_{UTRA}/2	1.5+BW_{UTRA}/2 / -1.5-BW_{UTRA}/2	2.5+BW_{UTRA}/2 / -2.5-BW_{UTRA}/2	5+BW_{UTRA}/2 / -5-BW_{UTRA}/2	7.5+BW_{UTRA}/2 / -7.5-BW_{UTRA}/2	10+BW_{UTRA}/2 / -10-BW_{UTRA}/2
$UTRA_{ACLR2}$	-	-	36 dB	36 dB	36 dB	36 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW_{UTRA}/2 / -2.5-3*BW_{UTRA}/2	5+3*BW_{UTRA}/2 / -5-3*BW_{UTRA}/2	7.5+3*BW_{UTRA}/2 / -7.5-3*BW_{UTRA}/2	10+3*BW_{UTRA}/2 / -10-3*BW_{UTRA}/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum.						

The normative reference for this requirement is TS 36.101 subclause 6.6.2.3.2.

6.6.2.3_2.4 Test description

6.6.2.3_2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3_2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in AnnexeA.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3_2.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1		Low range, Mid range, High range
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Highest
Test Parameters for Channel Bandwidths		
Configuration ID	**Downlink Configuration**	**Uplink Configuration**

	Ch BW	N/A for SEM testing	Mod'n	Cluster1 RB allocations (L_{CRB} @ RB_{start})	Cluster2 RB allocations (L_{CRB} @ RB_{start})
1	5MHz		16QAM	2@0	1@24
2	5MHz		16QAM	18@0	2@22
3	5MHz		16QAM	2@0	18@6
4	10MHz		16QAM	3@0	2@48
5	10MHz		16QAM	42@0	3@45
6	10MHz		16QAM	3@0	42@6
7	15MHz		16QAM	8@0	7@68
8	15MHz		16QAM	60@0	4@68
9	15MHz		16QAM	4@0	60@12
10	20MHz		16QAM	4@0	4@96
11	20MHz		16QAM	92@0	4@96
12	20MHz		16QAM	4@0	92@8
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3_2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3_2.4.3.

6.6.2.3_2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.3_2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3_2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.
4. Measure the rectangular filtered mean power for E-UTRA.
5. Measure the rectangular filtered mean power of the first E-UTRA adjacent channel on both lower and upper side of the E-UTRA channel, respectively.
6. Measure the RRC filtered mean power of the first and the second UTRA adjacent channel on both lower and upper side of the E-UTRA channel, respectively.
7. Calculate the ratios of the power between the values measured in step 4 over step 5 for lower and upper E-$UTRA_{ACLR}$, respectively.
8. Calculated the ratios of the power between the values measured in step 4 over step 6 for lower and upper $UTRA_{ACLR1}$, $UTRA_{ACLR2}$, respectively.

6.6.2.3_2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.3_2.5 Test requirement

6.6.2.3_2.5.1 Test requirements E-UTRA

- The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3_2.5-1 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured E-UTRA$_{ACLR}$, derived in step 7, shall be higher than the limits in table 6.6.2.3_2.5.1-1.

Table 6.6.2.3_2.5.1-1: E-UTRA UE ACLR

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	+1.4 MHz or -1.4 MHz	+3 MHz or -3 MHz	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

6.6.2.3_2.5.2 Test requirements UTRA

If the measured UTRA channel power is greater than –50dBm then the measured UTRA$_{ACLR1}$, UTRA$_{ACLR2}$, derived in step 8, shall be higher than the limits in table 6.6.2.3_2.5.2-1.

Table 6.6.2.3_2.5.2-1: UTRA UE ACLR

	Channel bandwidth / UTRA$_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
UTRA$_{ACLR1}$	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW$_{UTRA}$/2 / -0.7-BW$_{UTRA}$/2	1.5+BW$_{UTRA}$/2 / -1.5-BW$_{UTRA}$/2	2.5+BW$_{UTRA}$/2 / -2.5-BW$_{UTRA}$/2	5+BW$_{UTRA}$/2 / -5-BW$_{UTRA}$/2	7.5+BW$_{UTRA}$/2 / -7.5-BW$_{UTRA}$/2	10+BW$_{UTRA}$/2 / -10-BW$_{UTRA}$/2
UTRA$_{ACLR2}$	-	-	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW$_{UTRA}$/2 / -2.5-3*BW$_{UTRA}$/2	5+3*BW$_{UTRA}$/2 / -5-3*BW$_{UTRA}$/2	7.5+3*BW$_{UTRA}$/2 / -7.5-3*BW$_{UTRA}$/2	10+3*BW$_{UTRA}$/2 / -10-3*BW$_{UTRA}$/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. Note 3: BW$_{UTRA}$ for UTRA FDD is 5MHz and for UTRA TDD is 1.6MHz.						

6.6.2.3_3 Adjacent Channel Leakage power Ratio for UL 64QAM

6.6.2.3_3.1 Test purpose

Same test purpose as in clause 6.6.2.3.1.

6.6.2.3_3.2 Test applicability

This test case applies to all types of E-UTRA UE from release 13 and forward that support UL 64QAM.

6.6.2.3_3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.2.3.3.

6.6.2.3_3.4 Test description

6.6.2.3_3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3_3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in AnnexeA.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3_3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz				64QAM	6	6
1.4MHz				64QAM	5	5
3MHz				64QAM	15	15
3MHz				64QAM	4	4
5MHz				64QAM	25	25
5MHz				64QAM	8	8
10MHz				64QAM	50	50
10MHz				64QAM	12	12
15MHz				64QAM	75	75
15MHz				64QAM	16	16
20MHz				64QAM	100	100
20MHz				64QAM	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 – RB allocation) of the channel bandwidth.						

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3_3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3_3.4.3.

6.6.2.3_3.4.2 Test procedure

Same test procedure as in clause 6.6.2.3.4.2 with the following exceptions

- In step 3, instead of Table 6.2.3.5-1 use Table 6.2.3_3.5-1

.

6.6.2.3_3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.3_3.5 Test requirement

6.6.2.3_3.5.1 Test requirements E-UTRA

- The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3_1.5-1 as appropriate, and
- if the measured adjacent channel power is greater than –50 dBm then the measured E-UTRA$_{ACLR}$, derived in step 7, shall be higher than the limits in table 6.6.2.3_3.5.1-1.

Table 6.6.2.3_3.5.1-1: E-UTRA UE ACLR

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	+1.4 MHz or -1.4 MHz	+3 MHz or -3 MHz	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

6.6.2.3_3.5.1 Test requirements UTRA

If the measured UTRA channel power is greater than –50dBm then the measured UTRA$_{ACLR1}$, UTRA$_{ACLR2}$, derived in step 8, shall be higher than the limits in table 6.6.2.3_3.5.2-1.

Table 6.6.2.3_3.5.2-1: UTRA UE ACLR

	Channel bandwidth / UTRA$_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

$UTRA_{ACLR1}$	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW_{UTRA}/2 / -0.7-BW_{UTRA}/2	1.5+BW_{UTRA}/2 / -1.5-BW_{UTRA}/2	2.5+BW_{UTRA}/2 / -2.5-BW_{UTRA}/2	5+BW_{UTRA}/2 / -5-BW_{UTRA}/2	7.5+BW_{UTRA}/2 / -7.5-BW_{UTRA}/2	10+BW_{UTRA}/2 / -10-BW_{UTRA}/2
$UTRA_{ACLR2}$	-	-	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW_{UTRA}/2 / -2.5-3*BW_{UTRA}/2	5+3*BW_{UTRA}/2 / -5-3*BW_{UTRA}/2	7.5+3*BW_{UTRA}/2 / -7.5-3*BW_{UTRA}/2	10+3*BW_{UTRA}/2 / -10-3*BW_{UTRA}/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. Note 3: BW_{UTRA} for UTRA FDD is 5MHz and for UTRA TDD is 1.6MHz.						

6.6.2.3_4 Adjacent Channel Leakage power Ratio for Multi-Cluster PUSCH with UL 64QAM

6.6.2.3_4.1 Test purpose

Same test purpose as in clause 6.6.2.3_2.

6.6.2.3_4.2 Test applicability

This test case applies to all types of E-UTRA UE from release 13 and forward that support UL 64QAM and multi cluster PUSCH within a component carrier for the tested band.

6.6.2.3_4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.2.3_2.3.

6.6.2.3_4.4 Test description

6.6.2.3_4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3_4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in AnnexeA.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3_4.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1			Low range, Mid range, High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			Highest		
Test Parameters for Channel Bandwidths					
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Ch BW	N/A for SEM testing	Mod'n	Cluster1 RB allocations (L_{CRB} @ RB_{start})	Cluster2 RB allocations (L_{CRB} @ RB_{start})
1	5MHz		64QAM	2@0	1@24
2	5MHz		64QAM	18@0	2@22
3	5MHz		64QAM	2@0	18@6
4	10MHz		64QAM	3@0	2@48
5	10MHz		64QAM	42@0	3@45
6	10MHz		64QAM	3@0	42@6
7	15MHz		64QAM	8@0	7@68
8	15MHz		64QAM	60@0	4@68
9	15MHz		64QAM	4@0	60@12
10	20MHz		64QAM	4@0	4@96
11	20MHz		64QAM	92@0	4@96
12	20MHz		64QAM	4@0	92@8
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3_4.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3_4.4.3.

6.6.2.3_4.4.2 Test procedure

Same test procedure as in clause 6.6.2.3_2.4.2 with following exception:

- In step 3, instead of Table 6.2.3_2.5-1 → use Table 6.2.3_4.5-1

6.6.2.3_4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.3_4.5 Test requirement

Same test requirements as in clause 6.6.2.3_2.5 with following exception:

- Instead of Table 6.2.3_2.5-1 → use Table 6.2.3_4.5-1

6.6.2.3A Adjacent Channel Leakage power Ratio for CA

6.6.2.3A.0 Minimum conformance requirements

ACLR for CA requirements are specified for two scenarios for an adjacent E -UTRA$_{ACLR}$ and UTRA$_{ACLR1/2}$ as shown in Figure 6.6.2.3A.0-1.

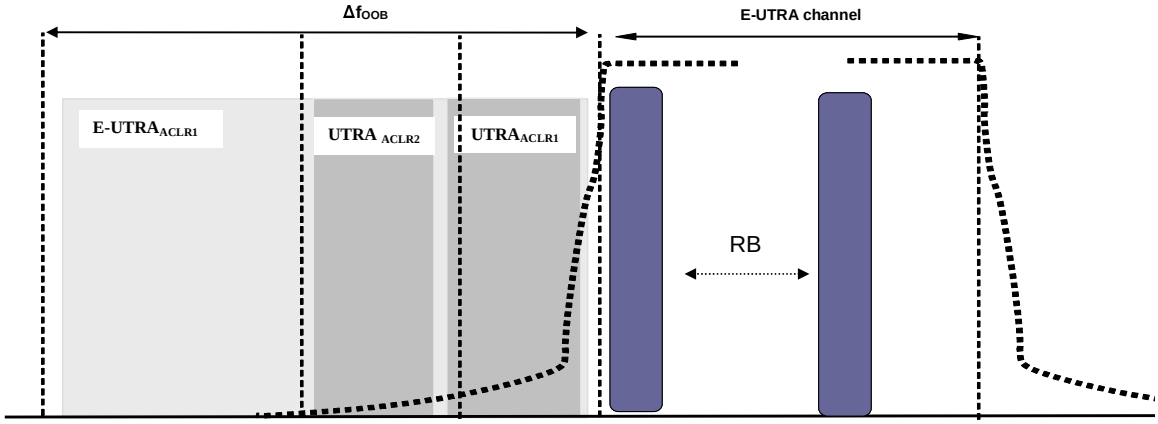


Figure 6.6.2.3A.0-1: Adjacent Channel Leakage Power Ratio for CA requirements

6.6.2.3A.0.1 Minimum requirement UTRA for CA

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the UTRA Adjacent Channel Leakage power Ratio (UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned channel bandwidth on the component carrier to the filtered mean power centred on an adjacent channel frequency. The UTRA Adjacent Channel Leakage power Ratio is defined per carrier and the requirement is specified in subclause 6.6.2.3.3.

For intra-band contiguous carrier aggregation the UTRA Adjacent Channel Leakage power Ratio (UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent(s) UTRA channel frequency.

For intra-band non-contiguous carrier aggregation when all sub-blocks consist of one component carrier the UTRA Adjacent Channel Leakage power Ratio (UTRA$_{ACLR}$) is the ratio of the sum of the filtered mean powers centred on the assigned sub-block frequencies to the filtered mean power centred on an adjacent(s) UTRA channel frequency. UTRA$_{ACLR1/2}$ requirements are applicable for all sub-blocks and are specified in Table 6.6.2.3A.0.1-2. UTRA$_{ACLR1}$ is required to be met in the sub-block gap when the gap bandwidth Wgap is 5MHz≤Wgap <15MHz. Both UTRA$_{ACLR1}$ and UTRA$_{ACLR2}$ are required to be met in the sub-block gap when the gap bandwidth Wgap is 15MHz≤Wgap.

UTRA Adjacent Channel Leakage power Ratio is specified for both the first UTRA adjacent channel (UTRA$_{ACLR1}$) and the 2nd UTRA adjacent channel (UTRA$_{ACLR2}$). The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor α =0.22. The assigned aggregated channel bandwidth power is measured with a rectangular filter with measurement bandwidth specified in Table 6.6.2.3A.0.1-1 for intraband contiguous carrier aggregation or 6.6.2.3A.0.1-2 for intraband non-contiguous carrier aggregation. If the measured UTRA channel power is greater than –50dBm then the UTRA$_{ACLR}$ shall be higher than the value specified in Table 6.6.2.3A.0.1-1 for intraband contiguous carrier aggregation or 6.6.2.3A.0.1-2 for intraband non-contiguous carrier aggregation.

Table 6.6.2.3A.0.1-1: Requirements for $UTRA_{ACLR1/2}$

	CA bandwidth class / $UTRA_{ACLR1/2}$ / measurement bandwidth
	CA bandwidth class B and C
$UTRA_{ACLR1}$	33 dB
Adjacent channel centre frequency offset (in MHz)	+ $BW_{Channel_CA}$ /2 + BW_{UTRA}/2 / - $BW_{Channel_CA}$ / 2 - BW_{UTRA}/2
$UTRA_{ACLR2}$	36 dB
Adjacent channel centre frequency offset (in MHz)	+ $BW_{Channel_CA}$ /2 + 3*BW_{UTRA}/2 / - $BW_{Channel_CA}$ /2 – 3*BW_{UTRA}/2
CA E-UTRA channel Measurement bandwidth	$BW_{Channel_CA}$ - 2* BW_{GB}
UTRA 5MHz channel Measurement bandwidth (Note 1)	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth (Note 2)	1.28 MHz
NOTE 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. NOTE 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum.	

Table 6.6.2.3A.0.1-2: Requirements for intraband non-contiguous CA $UTRA_{ACLR1/2}$

	$UTRA_{ACLR1/2}$ / measurement bandwidth
$UTRA_{ACLR1}$	33 dB
Adjacent channel centre frequency offset (in MHz)	+ $F_{edge,block,high}$ + BW_{UTRA}/2 / - $F_{edge,block,low}$ - BW_{UTRA}/2
$UTRA_{ACLR2}$	36 dB
Adjacent channel centre frequency offset (in MHz)	+ $F_{edge,block,high}$ + 3*BW_{UTRA}/2 / - $F_{edge,block,low}$ – 3*BW_{UTRA}/2
Sub-block measurement bandwidth	$BW_{Channel,block}$ - 2* BW_{GB}
UTRA 5 MHz channel Measurement bandwidth (Note 1)	3.84 MHz
UTRA 1.6 MHz channel measurement bandwidth (Note 2)	1.28 MHz
NOTE 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. NOTE 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum.	

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.2.3.2A.

6.6.2.3A.0.2 Minimum requirements for CA E-UTRA

For intra-band contiguous carrier aggregation the carrier aggregation E-UTRA Adjacent Channel Leakage power Ratio (CA E-$UTRA_{ACLR}$) is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent aggregated channel bandwidth at nominal channel spacing. The assigned aggregated channel bandwidth power and adjacent aggregated channel bandwidth power are measured with rectangular filters with measurement bandwidths specified in Table 6.6.2.3A.0.2-1. If the measured adjacent channel power is greater than –50dBm then the E-$UTRA_{ACLR}$ shall be higher than the value specified in Table 6.6.2.3A.0.2-1.

Table 6.6.2.3A.0.2-1: General requirements for CA E-UTRA$_{ACLR}$

	CA bandwidth class / CA E-UTRA$_{ACLR}$ / Measurement bandwidth
	CA bandwidth class B and C
CA E-UTRA$_{ACLR}$	30 dB
CA E-UTRA channel Measurement bandwidth	$BW_{Channel_CA}$ - 2* BW_{GB}
Adjacent channel centre frequency offset (in MHz)	+ $BW_{Channel_CA}$ / - $BW_{Channel_CA}$

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, E-UTRA Adjacent Channel Leakage power Ratio (E-UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned channel bandwidth on a component carrier to the filtered mean power centred on an adjacent channel frequency. The E-UTRA Adjacent Channel Leakage power Ratio is defined per carrier and the requirement is specified in subclause 6.6.2.3.1.

For intra-band non-contiguous carrier aggregation when all sub-blocks consist of one component carrier the E-UTRA Adjacent Channel Leakage power Ratio (E-UTRA$_{ACLR}$) is the ratio of the sum of the filtered mean powers centred on the assigned sub-block frequencies to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. In case the sub-block gap bandwidth Wgap is smaller than of the sub-block bandwidth then for that sub-block no E-UTRA$_{ACLR}$ requirement is set for the gap. In case the sub-block gab bandwidth Wgap is smaller than either of the sub-block bandwidths then no E- UTRA$_{ACLR}$ requirement is set for the gap. The assigned E-UTRA sub-block power and adjacent E-UTRA channel power are measured with rectangular filters with measurement bandwidths specified in Table 6.6.2.3A.0.2-2. If the measured adjacent channel power is greater than –50dBm then the E-UTRA$_{ACLR}$ shall be higher than the value specified in Table 6.6.2.3A.0.2-2.

Table 6.6.2.3A.0.2-2: General requirements for non-contiguous intraband CA E-UTRA$_{ACLR}$

	CC and adjacent channel bandwidth / E-UTRA$_{ACLR}$ / Measurement bandwidth					
	1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	30 dB	30 dB	30 dB	30 dB	30 dB	30 dB
CC and adjacent channel measurement bandwidth [MHz]	1.08	2.7	4.5	9	13.5	18
Adjacent channel centre frequency offset [MHz]	+ 1.4 / - 1.4	+ 3 / - 3	+ 5 / - 5	+ 10 / - 10	+ 15 / - 15	+ 20 / - 20

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.2.3.3A.

6.6.2.3A.1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA)

6.6.2.3A.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR) for CA.

6.6.2.3A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra band contiguous DL CA and UL CA.

6.6.2.3A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.3A.0.

6.6.2.3A.1.4 Test description

6.6.2.3A.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3A.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low range, High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}			**DL Allocation**	**CC MOD**	**UL Allocation**				
ID	**PCC N_{RB}**	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations(L_{CRB} @ RB_{start})**			
1	100	25	N/A for this test	QPSK	8	P_8@0	S_0@0	-	-
2	100	25		QPSK	25	P_25@0	S_0@0	-	-
3	100	25		QPSK	125	P_100@0	S_25@0	-	-
4	100	25		16QAM	8	P_8@0	S_0@0	-	-
5	100	25		16QAM	25	P_25@0	S_0@0	-	-
6	100	25		16QAM	125	P_100@0	S_25@0	-	-
7	100	25		QPSK	2	P_1@0	S_1@24	-	-
8	75	75		QPSK	16	P_16@0	S_0@0	-	-
9	75	75		QPSK	75	P_75@0	S_0@0	-	-
10	75	75		QPSK	150	P_75@0	S_75@0	-	-
11	75	75		16QAM	16	P_16@0	S_0@0	-	-
12	75	75		16QAM	75	P_75@0	S_0@0	-	-
13	75	75		16QAM	150	P_75@0	S_75@0	-	-
14	75	75		QPSK	2	P_1@0	S_1@74	-	-
15	100	50		QPSK	12	P_12@0	S_0@0	-	-
16	100	50		QPSK	50	P_50@0	S_0@0	-	-
17	100	50		QPSK	150	P_100@0	S_50@0	-	-
18	100	50		16QAM	12	P_12@0	S_0@0	-	-
19	100	50		16QAM	50	P_50@0	S_0@0	-	-
20	100	50		16QAM	150	P_100@0	S_50@0	-	-
21	100	50		QPSK	2	P_1@0	S_1@49	-	-
22	100	75		QPSK	16	P_16@0	S_0@0	-	-
23	100	75		QPSK	75	P_75@0	S_0@0	-	-
24	100	75		QPSK	175	P_100@0	S_75@0	-	-

25	100	75		16QAM	16	P_16@0	S_0@0	-	-
26	100	75		16QAM	75	P_75@0	S_0@0	-	-
27	100	75		16QAM	175	P_100@0	S_75@0	-	-
28	100	75		QPSK	2	P_1@0	S_1@74	-	-
29	100	100		QPSK	18	P_18@0	S_0@0	-	-
30	100	100		QPSK	100	P_100@0	S_0@0	-	-
31	100	100		QPSK	200	P_100@0	S_100@0	-	-
32	100	100		16QAM	18	P_18@0	S_0@0	-	-
33	100	100		16QAM	100	P_100@0	S_0@0	-	-
34	100	100		16QAM	200	P_100@0	S_100@0	-	-
35	100	100		QPSK	2	P_1@0	S_1@99	-	-
36	25	50		QPSK	8	P_8@0	S_0@0	-	-
37	25	50		QPSK	25	P_25@0	S_0@0	-	-
38	25	50		QPSK	75	P_25@0	S_50@0	-	-
39	25	50		16QAM	8	P_8@0	S_0@0	-	-
40	25	50		16QAM	25	P_25@0	S_0@0	-	-
41	25	50		16QAM	75	P_25@0	S_50@0	-	-
42	25	50		QPSK	2	P_1@0	S_1@49	-	-
43	50	50		QPSK	12	P_12@0	S_0@0	-	-
44	50	50		QPSK	50	P_50@0	S_0@0	-	-
45	50	50		QPSK	100	P_50@0	S_50@0	-	-
46	50	50		16QAM	12	P_12@0	S_0@0	-	-
47	50	50		16QAM	50	P_50@0	S_0@0	-	-
48	50	50		16QAM	100	P_50@0	S_50@0	-	-
49	50	50		QPSK	2	P_1@0	S_1@49	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3A.1.4.3.

6.6.2.3A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.3A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.3A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the mean power over all component carriers of the UE in the CA configuration of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3A.1.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

7. Measure the rectangular filtered mean power for CA E-UTRA.

8. Measure the rectangular filtered mean power of the first CA E-UTRA adjacent channel on both lower and upper side of the CA E-UTRA channel, respectively.

9. Measure the RRC filtered mean power of the first and the second UTRA adjacent channel on both lower and upper side of the CA E-UTRA channel, respectively.

10. Calculate the ratio of the power between the values measured in step 7 over step 8 for CA E-$UTRA_{ACLR}$.

11. Calculate the ratio of the power between the values measured in step 7 over step 9 for $UTRA_{ACLR1}$, $UTRA_{ACLR2}$.

6.6.2.3A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.2.3A.1.5 Test Requirements

6.6.2.3A.1.5.1 Test requirements of UTRA for CA

If the measured UTRA channel power is greater than –50dBm then the measured $UTRA_{ACLR1}$ and $UTRA_{ACLR2}$, derived in step 11, shall be higher than the limits in table 6.6.2.3A.1.5.1-1.

Table 6.6.2.3A.1.5.1-1: UTRA UE ACLR for CA

	CA bandwidth class / $UTRA_{ACLR1/2}$ / measurement bandwidth
	CA bandwidth class B and C
$UTRA_{ACLR1}$	32.2 dB
Adjacent channel centre frequency offset (in MHz)	+ $BW_{Channel_CA}$ /2 + BW_{UTRA}/2 / - $BW_{Channel_CA}$ / 2 - BW_{UTRA}/2
$UTRA_{ACLR2}$	35.2 dB
Adjacent channel centre frequency offset (in MHz)	+ $BW_{Channel_CA}$ /2 + 3*BW_{UTRA}/2 / - $BW_{Channel_CA}$ /2 – 3*BW_{UTRA}/2
CA E-UTRA channel Measurement bandwidth	$BW_{Channel_CA}$ - 2* BW_{GB}
UTRA 5MHz channel Measurement bandwidth (Note 1)	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth (Note 2)	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum.	

6.6.2.3A.1.5.2 Test requirements of CA E-UTRA

- The measured UE mean power in the channel bandwidth as specified in clause 5.4.2A, derived in step 6, shall fulfil requirements in Table 6.2.3A.1.5-1 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured CA E-UTRA$_{ACLR}$, derived in step 10, shall be higher than the limits in table 6.6.2.3A.1.5.2-1.

Table 6.6.2.3A.1.5.2-1: CA E-UTRA ACLR

	CA bandwidth class / CA E-UTRA$_{ACLR}$ / Measurement bandwidth
	CA bandwidth class B and C
CA E-UTRA$_{ACLR}$	29.2 dB
CA E-UTRA channel Measurement bandwidth	$BW_{Channel_CA}$ - 2* BW_{GB}
Adjacent channel centre frequency offset (in MHz)	+ $BW_{Channel_CA}$ / - $BW_{Channel_CA}$

6.6.2.3A.1_1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM

6.6.2.3A.1_1.1 Test purpose

Same test purpose as defined in clause 6.6.2.3A.1.1.

6.6.2.3A.1_1.2 Test applicability

This test case applies to all types of E-UTRA UE from release 13 and forward that support intra-band contiguous DL CA, UL CA and UL 64QAM.

6.6.2.3A.1_1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.3A.0.

6.6.2.3A.1_1.4 Test description

6.6.2.3A.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in Table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.2.3A.1_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3A.1_1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low range, High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}			**DL Allocation**	**CC MOD**	**UL Allocation**				
ID	**PCC N_{RB}**	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_allo}**	**PCC & SCC RB allocations(L_{CRB} @ RB_{start})**			
1	100	25	N/A	64QAM	8	P_8@0	S_0@0		
2	100	25		64QAM	100	P_100@0	S_0@0		
3	100	25		64QAM	125	P_100@0	S_25@0		
4	100	50		64QAM	12	P_12@0	S_0@0		
5	100	50		64QAM	100	P_100@0	S_0@0		
6	100	50		64QAM	150	P_100@0	S_50@0		
7	75	75		64QAM	16	P_16@0	S_0@0		
8	75	75		64QAM	75	P_75@0	S_0@0		
9	75	75		64QAM	150	P_75@0	S_75@0		
10	100	75		64QAM	16	P_16@0	S_0@0		
11	100	75		64QAM	100	P_100@0	S_0@0		
12	100	75		64QAM	175	P_100@0	S_75@0		
13	100	100		64QAM	18	P_18@0	S_0@0		
14	100	100		64QAM	100	P_100@0	S_0@0		
15	100	100		64QAM	200	P_100@0	S_100@0		
16	25	50		64QAM	8	P_8@0	S_0@0		
17	25	50		64QAM	25	P_25@0	S_0@0		
18	25	50		64QAM	75	P_25@0	S_50@0		
19	50	50		64QAM	12	P_12@0	S_0@0		
20	50	50		64QAM	50	P_50@0	S_0@0		
21	50	50		64QAM	100	P_50@0	S_50@0		
22	50	100		64QAM	12	P_12@0	S_0@0		
23	50	100		64QAM	50	P_50@0	S_0@0		
24	50	100		64QAM	150	P_50@0	S_100@0		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.									

6.6.2.3A.1_1.4.2 Test procedure

Same test procedure as defined in clause 6.6.2.3A.1.4.2 with following exceptions:

- Instead of Table 6.2.3A.1.5-1 → use Table 6.2.3A.1_1.5-1.

6.6.2.3A.1_1.4.3 Message contents

Same message contents as defined in clause 6.6.2.3A.1.4.3.

6.6.2.3A.1_1.5 Test requirement

Same test requirement as defined in clause 6.6.2.3A.1.5 with following exceptions:

- Instead of Table 6.2.3A.1.5-1 → use Table 6.2.3A.1_1.5-1.

6.6.2.3A.2 Adjacent Channel Leakage power Ratio for CA (inter-band DL CA and UL CA)

6.6.2.3A.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR) for CA.

6.6.2.3A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.6.2.3A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.3A.0.

6.6.2.3A.2.4 Test description

6.6.2.3A.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3A.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3A.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1						NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)		
Test Parameters for CA Configurations								
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**		
	PCC	**SCC**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**NRB_alloc**	**PCC & SCC RB allocations**	
	NRB	**NRB**						
1	6	25	N/A for this test	QPSK	QPSK	13	5	8
2	6	25		QPSK	QPSK	31	6	25
3	6	25		16QAM	16QAM	13	5	8
4	6	25		16QAM	16QAM	31	6	25
5	6	25		QPSK	16QAM	30	5	25
6	6	50		QPSK	QPSK	17	5	12
7	6	50		QPSK	QPSK	56	6	50
8	6	50		16QAM	16QAM	17	5	12
9	6	50		16QAM	16QAM	56	6	50
10	6	50		QPSK	16QAM	55	5	50
11	25	15		QPSK	QPSK	12	8	4
12	25	15		QPSK	QPSK	40	25	15
13	25	15		16QAM	16QAM	12	8	4
14	25	15		16QAM	16QAM	40	25	15
15	25	15		QPSK	16QAM	23	8	15
16	25	25		QPSK	QPSK	16	8	8
17	25	25		QPSK	QPSK	50	25	25
18	25	25		16QAM	16QAM	16	8	8
19	25	25		16QAM	16QAM	50	25	25
20	25	25		QPSK	16QAM	33	8	25
21	25	50		QPSK	QPSK	16	4	12
22	25	50		QPSK	QPSK	65	15	50
23	25	50		16QAM	16QAM	16	4	12
24	25	50		16QAM	16QAM	65	15	50
25	25	50		QPSK	16QAM	54	4	50
26	50	25		QPSK	QPSK	20	12	8
27	50	25		QPSK	QPSK	75	50	25
28	50	25		16QAM	16QAM	20	12	8
29	50	25		16QAM	16QAM	75	50	25

30	50	25		QPSK	16QAM	37	12	25
31	50	50		QPSK	QPSK	24	12	12
32	50	50		QPSK	QPSK	100	50	50
33	50	50		16QAM	16QAM	24	12	12
34	50	50		16QAM	16QAM	100	50	50
35	50	50		QPSK	16QAM	62	12	50
36	50	100		QPSK	QPSK	30	12	18
37	50	100		QPSK	QPSK	150	50	100
38	50	100		16QAM	16QAM	30	12	18
39	50	100		16QAM	16QAM	150	50	100
40	50	100		QPSK	16QAM	112	12	100
41	75	75		QPSK	QPSK	32	16	16
42	75	75		QPSK	QPSK	150	75	75
43	75	75		16QAM	16QAM	32	16	16
44	75	75		16QAM	16QAM	150	75	75
45	75	75		QPSK	16QAM	91	16	75
46	100	50		QPSK	QPSK	30	18	12
47	100	50		QPSK	QPSK	150	100	50
48	100	50		16QAM	16QAM	30	18	12
49	100	50		16QAM	16QAM	150	100	50
50	100	50		QPSK	16QAM	68	18	50
51	100	75		QPSK	QPSK	34	18	16
52	100	75		QPSK	QPSK	175	100	75
53	100	75		16QAM	16QAM	34	18	16
54	100	75		16QAM	16QAM	175	100	75
55	100	75		QPSK	16QAM	93	18	75
56	100	100		QPSK	QPSK	36	18	18
57	100	100		QPSK	QPSK	200	100	100
58	100	100		16QAM	16QAM	36	18	18
59	100	100		16QAM	16QAM	200	100	100
60	100	100		QPSK	16QAM	118	18	100

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3A.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3A.2.4.3.

6.6.2.3A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.3A.2.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.3A.2.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
6. Measure the mean power of the component carrier of the UE in the first band of the CA configuration of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3A.2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.
7. Measure the rectangular filtered mean power for CA E-UTRA in the first band of the CA configuration.
8. Measure the rectangular filtered mean power of the first CA E-UTRA adjacent channel on both lower and upper side of the CA E-UTRA channel in the first band of the CA configuration, respectively.
9. Measure the RRC filtered mean power of the first and the second UTRA adjacent channel on both lower and upper side of the CA E-UTRA channel in the first band of the CA configuration, respectively.
10. Calculate the ratio of the power between the values measured in step 7 over step 8 for CA E-$UTRA_{ACLR}$.
11. Calculate the ratio of the power between the values measured in step 7 over step 9 for $UTRA_{ACLR1}$, $UTRA_{ACLR2}$.
12. Repeat steps 6 to 11 for the second band of the CA configuration.

6.6.2.3A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.2.3A.2.5 Test Requirements

6.6.2.3A.2.5.1 Test requirements of UTRA for CA

If the measured UTRA channel power is greater than –50dBm then the measured $UTRA_{ACLR1}$ and $UTRA_{ACLR2}$, derived in step 11, shall be higher than the limits in table 6.6.2.3A.2.5.1-1.

Table 6.6.2.3A.2.5.1-1: UTRA UE ACLR for CA

	Channel bandwidth / $UTRA_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

$UTRA_{ACLR1}$	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW_{UTRA}/2 / -0.7-BW_{UTRA}/2	1.5+BW_{UTRA}/2 / -1.5-BW_{UTRA}/2	2.5+BW_{UTRA}/2 / -2.5-BW_{UTRA}/2	5+BW_{UTRA}/2 / -5-BW_{UTRA}/2	7.5+BW_{UTRA}/2 / -7.5-BW_{UTRA}/2	10+BW_{UTRA}/2 / -10-BW_{UTRA}/2
$UTRA_{ACLR2}$	-	-	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW_{UTRA}/2 / -2.5-3*BW_{UTRA}/2	5+3*BW_{UTRA}/2 / -5-3*BW_{UTRA}/2	7.5+3*BW_{UTRA}/2 / -7.5-3*BW_{UTRA}/2	10+3*BW_{UTRA}/2 / -10-3*BW_{UTRA}/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. Note 3: BW_{UTRA} for UTRA FDD is 5MHz and for UTRA TDD is 1.6MHz.						

6.6.2.3A.2.5.2 Test requirements of CA E-UTRA

- The measured UE mean power in the channel bandwidth as specified in clause 5.4.2A, derived in step 6, shall fulfil requirements in Table 6.2.3A.2.5-1 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured CA $E\text{-}UTRA_{ACLR}$, derived in step 10, shall be higher than the limits in table 6.6.2.3A.2.5.2-1.

Table 6.6.2.3A.2.5.2-1: CA E-UTRA ACLR

	Channel bandwidth / $E\text{-}UTRA_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
$E\text{-}UTRA_{ACLR1}$	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	+1.4 MHz or -1.4 MHz	+3 MHz or -3 MHz	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

6.6.2.3A.2_1 Adjacent Channel Leakage power Ratio for CA (inter-band DL CA and UL CA) for UL 64QAM

6.6.2.3A.2_1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR) for CA.

6.6.2.3A.2_1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support inter band DL CA and UL CA and UL 64QAM.

6.6.2.3A.2_1.3 Minimum conformance requirements

The minimum requirements are the same as in section 6.6.2.3A.2.3.

6.6.2.3A.2_1.4 Test description

6.6.2.3A.2_1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3A.2_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3A.2_1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1						NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes						Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)		
Test Parameters for CA Configurations								
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**		
	PCC	**SCC**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**NRB_alloc**	**PCC & SCC RB allocations**	
	NRB	**NRB**						
1	6	25	N/A for this test	64QAM	64QAM	13	5	8
2	6	25		64QAM	64QAM	31	6	25
3	6	50		64QAM	64QAM	17	5	12
4	6	50		64QAM	64QAM	56	6	50
5	25	15		64QAM	64QAM	12	8	4
6	25	15		64QAM	64QAM	40	25	15
7	25	25		64QAM	64QAM	16	8	8
8	25	25		64QAM	64QAM	50	25	25
9	25	50		64QAM	64QAM	16	4	12
10	25	50		64QAM	64QAM	65	15	50
11	50	25		64QAM	64QAM	20	12	8
12	50	25		64QAM	64QAM	75	50	25
13	50	50		64QAM	64QAM	24	12	12
14	50	50		64QAM	64QAM	100	50	50
15	50	100		64QAM	64QAM	30	12	18
16	50	100		64QAM	64QAM	150	50	100
17	75	75		64QAM	64QAM	32	16	16
18	75	75		64QAM	64QAM	150	75	75
19	100	50		64QAM	64QAM	30	18	12
20	100	50		64QAM	64QAM	150	100	50
21	100	75		64QAM	64QAM	34	18	16
22	100	75		64QAM	64QAM	175	100	75
23	100	100		64QAM	64QAM	36	18	18
24	100	100		64QAM	64QAM	200	100	100

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3A.2_1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3A.1.4.3.

6.6.2.3A.2_1.4.2 Test procedure

Same test procedure as in clause 6.6.2.3A.2.4.2.

6.6.2.3A.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.2.3A.2_1.5 Test Requirements

Same test requirements as in clause 6.6.2.3A.2.5.

6.6.2.3A.3 Adjacent Channel Leakage power Ratio for CA (intra-band non-contiguous DL CA and UL CA)

6.6.2.3A.3.1 Test purpose

Same test purpose as defined in clause 6.6.2.3A.1.1.

6.6.2.3A.3_1 Adjacent Channel Leakage power Ratio for CA (intra-band non-contiguous DL CA and UL CA) for UL 64QAM

6.6.2.3A.3_1.1 Test purpose

Same test purpose as defined in clause 6.6.2.3A.1.1.

6.6.2.3A.3_1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support intra-band non-contiguous DL CA and UL CA and UL 64QAM.

6.6.2.3A.3_1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.3A.0.

6.6.2.3A.3_1.4 Test description

6.6.2.3A.3_1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3A.3_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3A.3_1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1				NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.				Refer to test points A: Mid frequency, Maximum Wgap(low + high frequency)					
Test CC Combination setting (N_{RB}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC					
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	64QAM	P_1@0	64QAM	S_1@24
2	25	25	35	N/A	N/A	64QAM	P_25@0	64QAM	S_25@0
3	25	25	5	N/A	N/A	64QAM	P_1@0	64QAM	S_1@24
4	25	25	5	N/A	N/A	64QAM	P_25@0	64QAM	S_25@0
5	100	100	5	N/A	N/A	64QAM	P_1@0	64QAM	S_1@99
6	100	100	5	N/A	N/A	64QAM	P_25@0	64QAM	S_25@75
7	100	100	5	N/A	N/A	64QAM	P_100@0	64QAM	S_100@0

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3A.1.4.3.

6.6.2.3A.3_1.4.2 Test procedure

Same test procedure as in clause 6.6.2.3A.3.4.2.

6.6.2.3A.3_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.2.3A.3_1.5 Test Requirements

Same test requirements as in clause 6.6.2.3A.3.5.

6.6.2.3A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA but do not support UL 64QAM.

6.6.2.3A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.2.3A.0.

6.6.2.3A.3.4 Test description

6.6.2.3A.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3A.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3A.3.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: Low Wgap, Maximum Wgap
Test CC Combination setting (N_{RB}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC

Test Parameters for CA Configurations									
ID	CA Configuration / N_{RB_agg}		W_{gap} [MHz]	DL Allocation		UL Allocation			
	PCC N_{RB}	SCCs N_{RB}		CC MOD	PCC & SCC RB allocation	CC MOD	PCC N_{RB_alloc} (L_{CRB} @ RB_{start})	CC MOD	SCC N_{RB_alloc} (L_{CRB} @ RB_{start})
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	16QAM	P_1@0	16QAM	S_1@24
2	25	25	35	N/A	N/A	16QAM	P_25@0	16QAM	S_25@0
3	25	25	5	N/A	N/A	16QAM	P_1@0	16QAM	S_1@24
4	25	25	5	N/A	N/A	16QAM	P_25@0	16QAM	S_25@0
5	100	100	5	N/A	N/A	16QAM	P_1@0	16QAM	S_1@99
6	100	100	5	N/A	N/A	16QAM	P_25@0	16QAM	S_25@75
7	100	100	5	N/A	N/A	16QAM	P_100@0	16QAM	S_100@0

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.32 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3A.1.4.3.

6.6.2.3A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.2.3A.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.3A.3.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the mean power over all component carriers of the UE in the CA configuration of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3A.3.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

7. Measure the rectangular filtered mean power for E-UTRA.

8. Measure the rectangular filtered mean power of the CA E-UTRA adjacent channel on lower side of the lowest sub-clock, and the higher side of the highest sub-block (out of gap measurement).

9. If Wgap is larger or equal to either of the sub-block bandwidths, perform this step, otherwise continue to next step. Measure the rectangular filtered mean power of the CA E-UTRA adjacent channel on higher side of the lowest sub-clock, and the lower side of the highest sub-block (in gap measurement).

10. Measure the RRC filtered mean power of the first and the second UTRA adjacent channel on lower side of the lowest sub-clock, and the higher side of the highest sub-block (out of gap measurement).

11. If Wgap is larger or equal to 5 MHz, perform this step, otherwise continue to next step. Measure the rectangular filtered mean power of the first UTRA adjacent channel on higher side of the lowest sub-clock, and the lower side of the highest sub-block (in gap measurement).

12. If Wgap is larger or equal to 15 MHz, perform this step, otherwise continue to next step. Measure the rectangular filtered mean power of the second UTRA adjacent channel on higher side of the lowest sub-clock, and the lower side of the highest sub-block (in gap measurement).

13. Calculate the ratio of the power between the values measured in step 7 over step 8 for CA E-$UTRA_{ACLR}$ (out of gap measurement).

14. Calculate the ratio of the power between the values measured in step 7 over step 9 for CA E-$UTRA_{ACLR}$ (in gap measurement).

15. Calculate the ratio of the power between the values measured in step 7 over step 10 for $UTRA_{ACLR1}$, $UTRA_{ACLR2}$ (out of gap measurement).

16. Calculate the ratio of the power between the values measured in step 7 over step 11 and 12 for $UTRA_{ACLR1}$, $UTRA_{ACLR2}$ (in gap measurement).

6.6.2.3A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.2.3A.3.5 Test Requirements

6.6.2.3A.3.5.1 Test requirements E-UTRA

- The measured UE mean power, derived in step 6, shall fulfil requirements in Table 6.2.3A.3.5-1 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured E-$UTRA_{ACLR}$, derived in step 13 and 14, shall be higher than the limits in table 6.6.2.3A.3.5.1-1.

Table 6.6.2.3A.3.5.1-1: E-UTRA UE ACLR

	Channel bandwidth / E-$UTRA_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

E-UTRA$_{ACLR1}$	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	+1.4 MHz or -1.4 MHz	+3 MHz or -3 MHz	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

6.6.2.3A.3.5.2 Test requirements UTRA

If the measured UTRA channel power is greater than –50dBm then the measured UTRA$_{ACLR1}$, UTRA$_{ACLR2}$, derived in steps 15 and 16, shall be higher than the limits in table 6.6.2.3A.3.5.2-1.

Table 6.6.2.3A.3.5.2-1: UTRA UE ACLR

	Channel bandwidth / UTRA$_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
UTRA$_{ACLR1}$	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW$_{UTRA}$/2 / -0.7-BW$_{UTRA}$/2	1.5+BW$_{UTRA}$/2 / -1.5-BW$_{UTRA}$/2	2.5+BW$_{UTRA}$/2 / -2.5-BW$_{UTRA}$/2	5+BW$_{UTRA}$/2 / -5-BW$_{UTRA}$/2	7.5+BW$_{UTRA}$/2 / -7.5-BW$_{UTRA}$/2	10+BW$_{UTRA}$/2 / -10-BW$_{UTRA}$/2
UTRA$_{ACLR2}$	-	-	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW$_{UTRA}$/2 / -2.5-3*BW$_{UTRA}$/2	5+3*BW$_{UTRA}$/2 / -5-3*BW$_{UTRA}$/2	7.5+3*BW$_{UTRA}$/2 / -7.5-3*BW$_{UTRA}$/2	10+3*BW$_{UTRA}$/2 / -10-3*BW$_{UTRA}$/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. Note 3: BW$_{UTRA}$ for UTRA FDD is 5MHz and for UTRA TDD is 1.6MHz.						

6.6.2.3B Adjacent Channel Leakage power Ratio for UL-MIMO

6.6.2.3B.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR) for UL-MIMO.

6.6.2.3B.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.6.2.3B.3 Minimum conformance requirements

For UE with multiple transmit antenna connectors, the requirements for ACLR are specified at each transmit antenna connector. ACLR requirements are specified for two scenarios for an adjacent E -UTRAACLR and UTRAACLR1/2 as shown in Figure 6.6.2.3B.3-1.

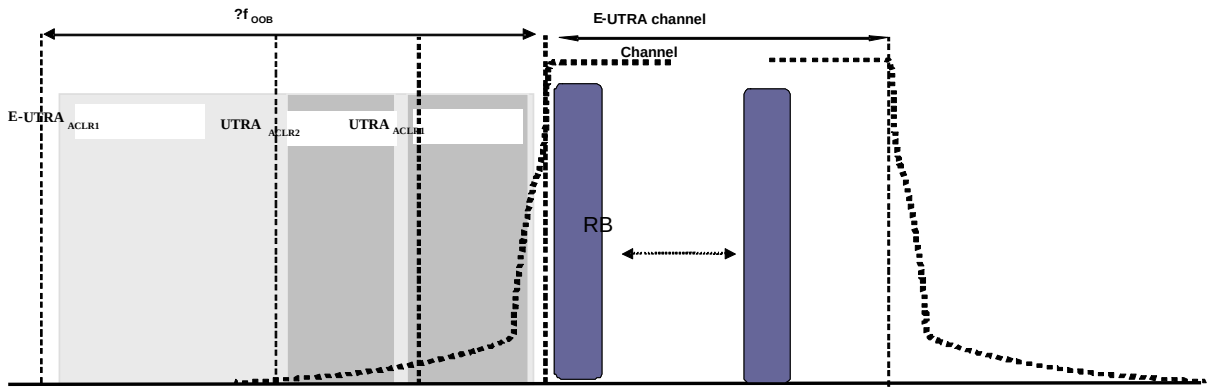


Figure 6.6.2.3B.3-1: Adjacent Channel Leakage Power Ratio requirements

6.6.2.3B.3.1 Minimum conformance requirements for E-UTRA

E-UTRA ACLR (E-UTRAACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. The assigned E-UTRA channel power and adjacent E-UTRA channel power are measured with rectangular filters with measurement bandwidth specified in Table 6.6.2.3B.3.1-1.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme ,, the requirements in Table 6.6.2.3B.3.1-1 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

If the measured adjacent channel power is greater than -50dBm then the E-UTRAACLR shall be higher than the valued specified in Table 6.6.2.3B.3.1-1.

Table 6.6.2.3B.3.1-1: General requirements for E-UTRA$_{ACLR}$

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	30 dB	30 dB	30 dB	30 dB	30 dB	30 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 clause 6.6.2B.

6.6.2.3B.3.2 Minimum conformance requirements for UTRA

UTRA ACLR (UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned E-UTRA channel frequency to the filtered mean power centred on an adjacent UTRA channel frequency.

UTRA ACLR is specified for both the first UTRA adjacent channel (UTRAACLR1) and the 2nd UTRA adjacent channel (UTRA$_{ACLR2}$).The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor α = 0.22. The assigned E-UTRA channel power is measured with a rectangular filter with measurement bandwidth specified in Table 6.6.2.3B.3.2-1.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements in Table 6.6.2.3B.3.2-1 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

If the measured UTRA channel power is greater than -50dBm then the UTRAACLR1, and UTRAACLR2 shall be higher than the valued specified in Table 6.6.2.3B.3.2-1.

Table 6.6.2.3B.3.2-1: General requirements for $UTRA_{ACLR1/2}$

	Channel bandwidth / $E\text{-}UTRA_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
$E\text{-}UTRA_{ACLR1}$	33 dB	33 dB	33 dB	33 dB	33 dB	33 dB
Adjacent channel centre frequency offset (in MHz)	$0.7+BW_{UTRA}/2$ / $-0.7-BW_{UTRA}/2$	$1.5+BW_{UTRA}/2$ / $-1.5-BW_{UTRA}/2$	$2.5+BW_{UTRA}/2$ / $-2.5-BW_{UTRA}/2$	$5+BW_{UTRA}/2$ / $-5-BW_{UTRA}/2$	$7.5+BW_{UTRA}/2$ / $-7.5-BW_{UTRA}/2$	$10+BW_{UTRA}/2$ / $-10-BW_{UTRA}/2$
$UTRA_{ACLR2}$	-	-	36 dB	36 dB	36 dB	36 dB
Adjacent channel centre frequency offset (in MHz)	-	-	$2.5+3*BW_{UTRA}/2$ / $-2.5-3*BW_{UTRA}/2$	$5+3*BW_{UTRA}/2$ / $-5-3*BW_{UTRA}/2$	$7.5+3*BW_{UTRA}/2$ / $-7.5-3*BW_{UTRA}/2$	$10+3*BW_{UTRA}/2$ / $-10-3*BW_{UTRA}/2$
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum.						

The normative reference for this requirement is TS 36.101 clause 6.6.2B.

6.6.2.3B.4 Test description

6.6.2.3B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in AnnexeA.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3B.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for ACLR testing			QPSK	6	6
1.4MHz				QPSK	5	5
1.4MHz				16QAM	6	6
1.4MHz				16QAM	5	5
3MHz				QPSK	15	15
3MHz				QPSK	4	4
3MHz				16QAM	15	15
3MHz				16QAM	4	4
5MHz				QPSK	25	25
5MHz				QPSK	8	8
5MHz				16QAM	25	25
5MHz				16QAM	8	8
10MHz				QPSK	50	50
10MHz				QPSK	12	12
10MHz				16QAM	50 (Note 3)	50 (Note 3)
10MHz				16QAM	12	12
15MHz				QPSK	75	75
15MHz				QPSK	16	16
15MHz				16QAM	75 (Note 3)	75 (Note 3)
15MHz				16QAM	16	16
20MHz				QPSK	100	100
20MHz				QPSK	18	18
20MHz				16QAM	100 (Note 3)	100 (Note 3)
20MHz				16QAM	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The RBstart of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories [FFS].

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.2.3B.4.3.

6.6.2.3B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.6.2.3B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the sum of the mean power at each antenna connector of UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in clause 6.2.3B.5. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test.

4. Measure the rectangular filtered mean power for E-UTRA at each antenna connector of UE.

5. Measure the rectangular filtered mean power of the first E-UTRA adjacent channel at each antenna connector of UE.

6. Measure the RRC filtered mean power of the first and the second UTRA adjacent channel at each antenna connector of UE.

7. Calculate the ratio of the power between the values measured in step 4 over step 5 for $E\text{-}UTRA_{ACLR}$.

8. Calculated the ratio of the power between the values measured in step 4 over step 6 for $UTRA_{ACLR1}$, $UTRA_{ACLR2}$.

6.6.2.3B.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.3B.5 Test requirement

6.6.2.3B.5.1 Test requirements E-UTRA

- The measured sum of mean power at each transmit antenna connector for UE in the channel bandwidth, derived in step 3, shall fulfil requirements in clause 6.2.3B.5 as appropriate,

and

- The requirements apply to each transmit antenna connector.

- if the measured adjacent channel power is greater than -50 dBm then the measured E-UTRAACLR, derived in step 7, shall be higher than the limits in table 6.6.2.3B.5.1-1.

Table 6.6.2.3B.5.1-1: E-UTRA UE ACLR

	Channel bandwidth / $E\text{-}UTRA_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
$E\text{-}UTRA_{ACLR1}$	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	+1.4 MHz or -1.4 MHz	+3 MHz or -3 MHz	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

6.6.2.3B.5.2 Test requirements UTRA

The requirements apply to each transmit antenna connector.

If the measured UTRA channel power is greater than -50dBm then the measured $UTRA_{ACLR1}$, $UTRA_{ACLR2}$, derived in step 8, shall be higher than the limits in table 6.6.2.3B.5.2-1.

Table 6.6.2.3B.5.2-1: UTRA UE ACLR

	Channel bandwidth / E-UTRA$_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
UTRA$_{ACLR1}$	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW$_{UTRA}$/2 / -0.7-BW$_{UTRA}$/2	1.5+BW$_{UTRA}$/2 / -1.5-BW$_{UTRA}$/2	2.5+BW$_{UTRA}$/2 / -2.5-BW$_{UTRA}$/2	5+BW$_{UTRA}$/2 / -5-BW$_{UTRA}$/2	7.5+BW$_{UTRA}$/2 / -7.5-BW$_{UTRA}$/2	10+BW$_{UTRA}$/2 / -10-BW$_{UTRA}$/2
UTRA$_{ACLR2}$	-	-	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW$_{UTRA}$/2 / -2.5-3*BW$_{UTRA}$/2	5+3*BW$_{UTRA}$/2 / -5-3*BW$_{UTRA}$/2	7.5+3*BW$_{UTRA}$/2 / -7.5-3*BW$_{UTRA}$/2	10+3*BW$_{UTRA}$/2 / -10-3*BW$_{UTRA}$/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. Note 3: BW$_{UTRA}$ for UTRA FDD is 5MHz and for UTRA TDD is 1.6MHz.						

6.6.2.3E Adjacent Channel Leakage power Ratio for UE category 0

6.6.2.3E.1 Test purpose

Same test purpose as in clause 6.6.2.3.1.

6.6.2.3E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.6.2.3E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.2.3.3.

6.6.2.3E.4 Test description

6.6.2.3E.4.1 Initial conditions

Same initial conditions as in clause 6.6.2.3.4.1 with following exceptions:

- Instead of Table 6.6.2.3.4.1-1 → use Table 6.6.2.3E.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.6.2.3E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD and HD-FDD**	**TDD**
1.4MHz	N/A for ACLR testing			QPSK	6	6
1.4MHz				QPSK	5	5
1.4MHz				16QAM	5	5
3MHz				QPSK	15	15
3MHz				QPSK	4	4
3MHz				16QAM	5	5
3MHz				16QAM	4	4
5MHz				QPSK	25	25
5MHz				QPSK	8	8
5MHz				16QAM	5	5
10MHz				QPSK	25	25
10MHz				QPSK	12	12
10MHz				16QAM	5	5
15MHz				QPSK	36	36
15MHz				QPSK	16	16
15MHz				16QAM	5	5
20MHz				QPSK	36	36
20MHz				QPSK	18	18
20MHz				16QAM	5	5
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 – RB allocation) of the channel bandwidth.						

6.6.2.3E.4.2 Test procedure

Same test procedure as in clause 6.6.2.3.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframe are not under test.

6.6.2.3E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.3E.5 Test requirement

6.6.2.3E.5.1 Test requirements E-UTRA

- The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3E.5-1 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured $E\text{-}UTRA_{ACLR}$, derived in step 7, shall be higher than the limits in table 6.6.2.3E.5.1-1.

Table 6.6.2.3E.5.1-1: E-UTRA UE ACLR

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	+1.4 MHz or -1.4 MHz	+3 MHz or -3 MHz	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

Test requirements UTRA

If the measured UTRA channel power is greater than –50dBm then the measured UTRA$_{ACLR1}$, UTRA$_{ACLR2}$, derived in step 8, shall be higher than the limits in table 6.6.2.3E.5.2-1.

Table 6.6.2.3E.5.2-1: UTRA UE ACLR

	Channel bandwidth / UTRA$_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
UTRA$_{ACLR1}$	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW$_{UTRA}$/2 / -0.7-BW$_{UTRA}$/2	1.5+BW$_{UTRA}$/2 / -1.5-BW$_{UTRA}$/2	2.5+BW$_{UTRA}$/2 / -2.5-BW$_{UTRA}$/2	5+BW$_{UTRA}$/2 / -5-BW$_{UTRA}$/2	7.5+BW$_{UTRA}$/2 / -7.5-BW$_{UTRA}$/2	10+BW$_{UTRA}$/2 / -10-BW$_{UTRA}$/2
UTRA$_{ACLR2}$	-	-	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW$_{UTRA}$/2 / -2.5-3*BW$_{UTRA}$/2	5+3*BW$_{UTRA}$/2 / -5-3*BW$_{UTRA}$/2	7.5+3*BW$_{UTRA}$/2 / -7.5-3*BW$_{UTRA}$/2	10+3*BW$_{UTRA}$/2 / -10-3*BW$_{UTRA}$/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. Note 3: BW$_{UTRA}$ for UTRA FDD is 5MHz and for UTRA TDD is 1.6MHz.						

6.6.2.3EA Adjacent Channel Leakage power Ratio for UE category M1

6.6.2.3EA.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR).

6.6.2.3EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.6.2.3EA.3 Minimum conformance requirements

ACLR requirements are specified for two scenarios for an adjacent E -UTRA$_{ACLR}$ and UTRA$_{ACLR1/2}$ as shown in Figure 6.6.2.3EA.3-1.

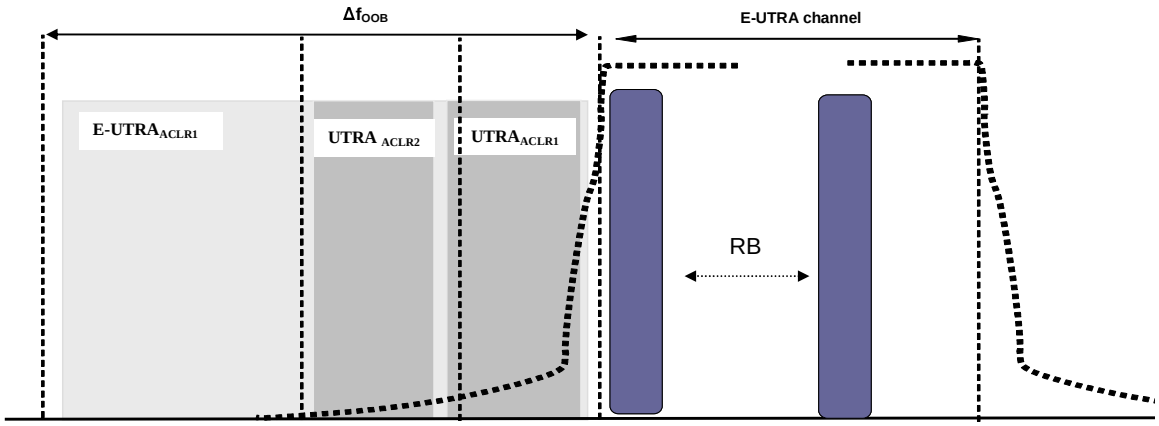


Figure 6.6.2.3EA.3-1: Adjacent Channel Leakage Power Ratio requirements

6.6.2.3EA.3.1 Minimum conformance requirements for E-UTRA

E-UTRA ACLR (E-UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. The assigned E-UTRA channel power and adjacent E-UTRA channel power are measured with rectangular filters with measurement bandwidth specified in Table 6.6.2.3EA.3.1-1.

If the measured adjacent channel power is greater than –50dBm then the E-UTRA$_{ACLR}$ shall be higher than the valued specified in Table 6.6.2.3EA.3.1-1.

Table 6.6.2.3EA.3.1-1: General requirements for E-UTRA$_{ACLR}$

	Channel bandwidth / E-UTRA$_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
E-UTRA$_{ACLR1}$	30 dB	30 dB	30 dB	30 dB	30 dB	30 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.2.3.1.

6.6.2.3EA.3.2 Minimum conformance requirements for UTRA

UTRA ACLR (UTRA$_{ACLR}$) is the ratio of the filtered mean power centred on the assigned E-UTRA channel frequency to the filtered mean power centred on an adjacent UTRA channel frequency.

UTRA ACLR is specified for both the first UTRA adjacent channel (UTRA$_{ACLR1}$) and the 2nd UTRA adjacent channel (UTRA$_{ACLR2}$). The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor $\alpha = 0.22$. The assigned E-UTRA channel power is measured with a rectangular filter with measurement bandwidth specified in Table 6.6.2.3EA.3.2-1.

If the measured UTRA channel power is greater than –50dBm then the UTRA$_{ACLR1}$, and UTRA$_{ACLR2}$ shall be higher than the valued specified in Table 6.6.2.3EA.3.2-1.

Table 6.6.2.3EA.3.2-1: General requirements for UTRA$_{ACLR1/2}$

	Channel bandwidth / UTRA$_{ACLR1/2}$ / measurement bandwidth					
	1.4	**3.0**	**5**	**10**	**15**	**20**

	MHz	MHz	MHz	MHz	MHz	MHz
$UTRA_{ACLR1}$	33 dB	33 dB	33 dB	33 dB	33 dB	33 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW_{UTRA}/2 / -0.7-BW_{UTRA}/2	1.5+BW_{UTRA}/2 / -1.5-BW_{UTRA}/2	2.5+BW_{UTRA}/2 / -2.5-BW_{UTRA}/2	5+BW_{UTRA}/2 / -5-BW_{UTRA}/2	7.5+BW_{UTRA}/2 / -7.5-BW_{UTRA}/2	10+BW_{UTRA}/2 / -10-BW_{UTRA}/2
$UTRA_{ACLR2}$	-	-	36 dB	36 dB	36 dB	36 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW_{UTRA}/2 / -2.5-3*BW_{UTRA}/2	5+3*BW_{UTRA}/2 / -5-3*BW_{UTRA}/2	7.5+3*BW_{UTRA}/2 / -7.5-3*BW_{UTRA}/2	10+3*BW_{UTRA}/2 / -10-3*BW_{UTRA}/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum.						

The normative reference for this requirement is TS 36.101 subclause 6.6.2.3.2.

6.6.2.3EA.4 Test description

6.6.2.3EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.2.3EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in AnnexeA.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3EA.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)			NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)			Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)			Lowest, 5MHz, 10MHz, Highest		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for ACLR test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
Low range, Mid range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	0
7	3MHz		QPSK	5	0
8	3MHz		QPSK	6	0
9	3MHz		16QAM	2	0
10	3MHz		16QAM	5	0
11	5MHz		QPSK	6	0
12 (Note 4)	5MHz		16QAM	1	0
13	5MHz		16QAM	3	0
14	5MHz		16QAM	5	0
15 (Note 4)	10MHz		QPSK	4	0
16	10MHz		QPSK	6	0
17 (Note 4)	10MHz		16QAM	3	0
18	10MHz		16QAM	5	0
19	15MHz		QPSK	6	0
20	15MHz		16QAM	5	0
21	20MHz		16QAM	5	0
High range					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	1
7	3MHz		QPSK	5	1
8	3MHz		QPSK	6	1
9	3MHz		16QAM	2	1
10	3MHz		16QAM	5	1
11	5MHz		QPSK	6	3
12 (Note 4)	5MHz		16QAM	1	3
13	5MHz		16QAM	3	3
14	5MHz		16QAM	5	3
15 (Note 4)	10MHz		QPSK	4	7
16	10MHz		QPSK	6	7
17 (Note 4)	10MHz		16QAM	3	7
18	10MHz		16QAM	5	7
19	15MHz		QPSK	6	11
20	15MHz		16QAM	5	11
21	20MHz		16QAM	5	15

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4

Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 3:	The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.
Note 4:	Only for power class 3 UE

1. Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3EA.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.6.2.3EA.4.3.

6.6.2.3EA.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.6.2.3EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3EA.5-1 to 6.2.3EA.5-3. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.
4. Measure the rectangular filtered mean power for E-UTRA.
5. Measure the rectangular filtered mean power of the first E-UTRA adjacent channel on both lower and upper side of the E-UTRA channel, respectively.
6. Measure the RRC filtered mean power of the first and the second UTRA adjacent channel on both lower and upper side of the E-UTRA channel, respectively.
7. Calculate the ratios of the power between the values measured in step 4 over step 5 for lower and upper E-$UTRA_{ACLR}$, respectively.
8. Calculated the ratios of the power between the values measured in step 4 over step 6 for lower and upper $UTRA_{ACLR1}$, $UTRA_{ACLR2}$, respectively.

6.6.2.3EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.2.3EA.5 Test requirement

6.6.2.3EA.5.1 Test requirements E-UTRA

- The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in [Table 6.2.3EA.5-1, 6.2.3EA.5-2 and 6.2.3EA.5-3 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured E-$UTRA_{ACLR}$, derived in step 7, shall be higher than the limits in table 6.6.2.3EA.5.1-1.

Table 6.6.2.3EA.5.1-1: E-UTRA UE ACLR

	Channel bandwidth / $E\text{-}UTRA_{ACLR1}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
$E\text{-}UTRA_{ACLR1}$	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB	29.2 dB
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UE channel	+1.4 MHz or -1.4 MHz	+3 MHz or -3 MHz	+5MHz or -5MHz	+10MHz or -10MHz	+15MHz or -15MHz	+20MHz or -20MHz

Test requirements UTRA

If the measured UTRA channel power is greater than –50dBm then the measured $UTRA_{ACLR1}$, $UTRA_{ACLR2}$, derived in step 8, shall be higher than the limits in table 6.6.2.3EA.5.2-1.

Table 6.6.2.3EA.5.2-1: UTRA UE ACLR

	Channel bandwidth / $UTRA_{ACLR1/2}$ / measurement bandwidth					
	1.4 MHz	**3.0 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
$UTRA_{ACLR1}$	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB	32.2 dB
Adjacent channel centre frequency offset (in MHz)	0.7+BW_{UTRA}/2 / -0.7-BW_{UTRA}/2	1.5+BW_{UTRA}/2 / -1.5-BW_{UTRA}/2	2.5+BW_{UTRA}/2 / -2.5-BW_{UTRA}/2	5+BW_{UTRA}/2 / -5-BW_{UTRA}/2	7.5+BW_{UTRA}/2 / -7.5-BW_{UTRA}/2	10+BW_{UTRA}/2 / -10-BW_{UTRA}/2
$UTRA_{ACLR2}$	-	-	35.2 dB	35.2 dB	35.2 dB	35.2 dB
Adjacent channel centre frequency offset (in MHz)	-	-	2.5+3*BW_{UTRA}/2 / -2.5-3*BW_{UTRA}/2	5+3*BW_{UTRA}/2 / -5-3*BW_{UTRA}/2	7.5+3*BW_{UTRA}/2 / -7.5-3*BW_{UTRA}/2	10+3*BW_{UTRA}/2 / -10-3*BW_{UTRA}/2
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5MHz channel Measurement bandwidth[1]	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth[2]	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz	1.28 MHz
Note 1: Applicable for E-UTRA FDD co-existence with UTRA FDD in paired spectrum. Note 2: Applicable for E-UTRA TDD co-existence with UTRA TDD in unpaired spectrum. Note 3: BW_{UTRA} for UTRA FDD is 5MHz and for UTRA TDD is 1.6MHz.						

6.6.2.3F Adjacent Channel Leakage power Ratio for category NB1

6.6.2.3F.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage power Ratio (ACLR).

6.6.2.3F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.6.2.3F.3 Minimum conformance requirements

Adjacent Channel Leakage power Ratio is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency. The assigned category NB1 channel power and adjacent channel power are measured with filters and measurement bandwidths specified in Table 6.6.2.3F-1. If the measured adjacent channel power is greater than –50dBm then the category NB1 UE ACLR shall be higher than the value specified in Table 6.6.2.3F-1. GSM_{ACLR} requirement is intended for protection of GSM system. $UTRA_{ACLR}$ requirement is intended for protection of UTRA and E-UTRA systems.

Table 6.6.2.3F-1: category NB1 UE ACLR requirements

	GSM_{ACLR}	**$UTRA_{ACLR}$**
ACLR	20 dB	37 dB
Adjacent channel centre frequency offset from category NB1 Channel edge	±200 kHz	±2.5 MHz
Adjacent channel measurement bandwidth	180 kHz	3.84 MHz
Measurement filter	Rectangular	RRC-filter α=0.22
Category NB1 channel measurement bandwidth	180 kHz	180 kHz
Category NB1 channel Measurement filter	Rectangular	Rectangular

The normative reference for this requirement is TS 36.101 subclause 6.6.2F.3.

6.6.2.3F.4 Test description

6.6.2.3F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters shown in table 6.6.2.3F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.6.2.3F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.2		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1		QPSK	1@0	3.75kHz
2		QPSK	1@47	3.75kHz
3		QPSK	1@0	15kHz
4		QPSK	1@11	15kHz
5 (Note 1)		QPSK	3@0	15kHz
6 (Note 1)		QPSK	3@3	15kHz
7 (Note 1)		QPSK	3@9	15kHz
8 (Note 1)		QPSK	6@0	15kHz
9 (Note 1)		QPSK	6@6	15kHz
10 (Note 1)		QPSK	12@0	15kHz
Note 1: Applicable to UE supporting UL multi-tone transmissions				

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.3 using only main Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1.1 and H.4.0.
4. The UL Reference Measurement channels are set according to Table 6.6.2.3F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.6.2.3F.4.3.

6.6.2.3F.4.2 Test procedure

1. SS sends uplink scheduling information for the UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.6.2.3F.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. (UE should be already transmitting P_{UMAX} after Initial Conditions setting).
2. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3F.5-1. The measurement period is at least one sub-frame **(**1ms) for 15 KHz channel spacing, and at least a 2ms slot (excluding the 2304Ts gap when UE is not transmitting) respectively for the 3.75 KHz channel spacing.
3. Measure the rectangular filtered mean power for category NB1 UE channel.
4. Measure the rectangular filtered mean power of the GSM adjacent channel on both lower and upper side of the category NB1 UE channel, respectively.
5. Measure the RRC filtered mean power of UTRA adjacent channel on both lower and upper side of the category NB1 UE channel, respectively.
6. Calculate the ratios of the power between the value measured in step 3 over step 4 for lower and upper GSM_{ACLR}.
7. Calculated the ratio of the power between the value measured in step 3 over step 5 for lower and upper $UTRA_{ACLR}$.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.6.2.3F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.6.2.3F.5 Test requirement

- The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.3F.5-1 as appropriate,

and

- if the measured adjacent channel power is greater than –50 dBm then the measured GSM_{ACLR} derived in step 7 and $UTRA_{ACLR}$ derived in step 8 shall be higher than the limits in table 6.6.2.3F.5-1.

Table 6.6.2.3F.5-1: Category NB1 UE ACLR Test requirements

	GSM_{ACLR}	**$UTRA_{ACLR}$**
ACLR	19.2 dB	36.2 dB
Adjacent channel centre frequency offset from category NB1 Channel edge	±200 kHz	±2.5 MHz
Adjacent channel measurement bandwidth	180 kHz	3.84 MHz
Measurement filter	Rectangular	RRC-filter α=0.22
Category NB1 channel measurement bandwidth	180 kHz	180 kHz
Category NB1 channel Measurement filter	Rectangular	Rectangular

6.6.2.4 Void

6.6.3 Spurious emissions

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions. The spurious emission limits are specified in terms of general requirements inline with SM.329 [3] and E-UTRA operating band requirement to address UE co-existence.

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) in Table6.6.3.1.3-1 from the edge of the channel bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.3.1 Transmitter Spurious emissions

6.6.3.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.6.3.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.6.3.1.3 Minimum conformance requirements

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table 6.6.3.1.3-2.

The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3.1.3-1: Δf_{OOB} boundary between E-UTRA channel and spurious emission domain

Channel bandwidth	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Δf_{OOB} (MHz)	2.8	6	10	15	20	25

The spurious emission limits in Table 6.6.3.1.3-2 apply for all transmitter band configurations (RB) and channel bandwidths.

Table 6.6.3.1.3-2: Spurious emissions limits

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	Note 1
Note 1: Applies for Band 22, Band 42, Band 43 and Band 48.			

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3.1.

6.6.3.1.4 Test description

6.6.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3.1.4.1-1. The details of the uplink reference measurement

channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	N/A for Spurious Emissions testing			QPSK	6	6
1.4MHz				QPSK	1	1
3MHz				QPSK	15	15
3MHz				QPSK	1	1
5MHz				QPSK	25	25
5MHz				QPSK	1	1
10MHz				QPSK	50	50
10MHz				QPSK	1	1
15MHz				QPSK	75	75
15MHz				QPSK	1	1
20MHz				QPSK	100	100
20MHz				QPSK	1	1
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.						

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.7.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.1.4.3.

6.6.3.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3.1.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3.1.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.3.1.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in Table 6.6.3.1.5-1.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in Table 6.6.3.1.5-1.

The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth shown in Table 6.6.3.1.3-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3.1.5-1: General spurious emissions test requirements

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	Note 1
Note 1: Applies for Band 22, Band 42 and Band 43			

6.6.3.1_1 Transmitter Spurious emissions for Multi-Cluster PUSCH

6.6.3.1_1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions for Multi-Cluster PUSCH transmission.

6.6.3.1_1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support multi cluster PUSCH within a component carrier for the tested band.

6.6.3.1_1.3 Minimum conformance requirements

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table 6.6.3.1_1.3-2.

The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3.1_1.3-1: Δf_{OOB} boundary between E-UTRA channel and spurious emission domain

Channel bandwidth	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Δf_{OOB} (MHz)	2.8	6	10	15	20	25

The spurious emission limits in Table 6.6.3.1_1.3-2 apply for all transmitter band configurations (RB) and channel bandwidths.

Table 6.6.3.1_1.3-2: Spurious emissions limits

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	Note 1
Note 1: Applies for Band 22, Band 42 and Band 43			

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3.1.

6.6.3.1_1.4 Test description

6.6.3.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3.1_1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.1_1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal	
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Highest	
Test Parameters for Channel Bandwidths		
Configuration ID	**Downlink Configuration**	**Uplink Configuration**

	Ch BW	N/A for SEM testing	Mod'n	Cluster1 RB allocations (L_{CRB} @ RB_{start})	Cluster2 RB allocations (L_{CRB} @ RB_{start})
1	5MHz		16QAM	2@0	1@24
2	5MHz		16QAM	18@0	2@22
3	5MHz		16QAM	2@0	18@6
4	10MHz		16QAM	3@0	2@48
5	10MHz		16QAM	42@0	3@45
6	10MHz		16QAM	3@0	42@6
7	15MHz		16QAM	8@0	7@68
8	15MHz		16QAM	60@0	4@68
9	15MHz		16QAM	4@0	60@12
10	20MHz		16QAM	4@0	4@96
11	20MHz		16QAM	92@0	4@96
12	20MHz		16QAM	4@0	92@8
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.7.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3.1_1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.1_1.4.3.

6.6.3.1_1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.1_1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3.1_1.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3.1_1.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.3.1_1.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table 6.6.3.1_1.5-1.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in Table 6.6.3.1_1.5-1.

The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth shown in Table 6.6.3.1_1.5-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3.1_1.5-1: General spurious emissions test requirements

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	Note 1
Note 1: Applies for Band 22, Band 42 and Band 43			

6.6.3.1A Transmitter Spurious emissions for CA

6.6.3.1A.0 Minimum conformance requirements

This clause specifies the spurious emission requirements for carrier aggregation.

NOTE 1: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the spurious emission requirement Table 6.6.3.1.3-2 apply for the frequency ranges that are more than F_{OOB} as defined in Table 6.6.3.1.3-1 away from edges of the assigned channel bandwidth on a component carrier. If for some frequency a spurious emission requirement of individual component carrier overlaps with the spectrum emission mask or channel bandwidth of another component carrier then it does not apply.

NOTE 2: For inter-band carrier aggregation with uplink assigned to two E-UTRA bands the requirements in Table 6.6.3.1.3-2 could be verified by measuring spurious emissions at the specific frequencies where second and third order intermodulation products generated by the two transmitted carriers can occur; in that case, the requirements for remaining applicable frequencies in Table 6.6.3.1.3-2 would be considered to be verified by the measurements verifying the one uplink inter-band CA spurious emission requirement.

For intra-band contiguous carrier aggregation the spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in Table 6.6.3.1A.0-1 from the edge of the aggregated channel bandwidth (Table 5.4.2A-1). For frequencies ΔfOOB greater than FOOB as specified in Table 6.6.3.1A.0-1the spurious emission requirements in Table 6.6.3.1.3-2 are applicable.

Table 6.6.3.1A.0-1: Boundary between E-UTRA out of band and spurious emission domain for intra-band contiguous carrier aggregation

CA Bandwidth Class	OOB boundary F_{OOB} (MHz)
A	Table 6.6.3.1.3-1
B	$BW_{Channel_CA}$ + 5
C	$BW_{Channel_CA}$ + 5

For intra-band non-contiguous carrier aggregation transmission the spurious emission requirement is defined as a composite spurious emission requirement. Composite spurious emission requirement applies to frequency ranges that are more than F_{OOB} away from the edges of the sub-blocks. Composite spurious emission requirement is defined as follows

a) Composite spurious emission requirement is a combination of individual sub-block spurious emission requirements

b) In case the sub-block consist of one component carrier the sub-lock spurious emission requirement and F_{OOB} are defined in subclause 6.6.3.1.3

c) If for some frequency an individual sub-block spurious emission requirement overlaps with the general spectrum emission mask or the sub-block bandwidth of another sub-block then it does not apply

The normative reference for this requirement is TS 36.101[2] clause 6.6.3.1A

6.6.3.1A.1 Transmitter Spurious emissions for CA (intra-band contiguous DL CA and UL CA)

6.6.3.1A.1.1 Test purpose

To verify that transmitter of UE that support CA does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.6.3.1A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.6.3.1A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.3.1A.0.

6.6.3.1A.1.4 Test description

6.6.3.1A.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA bands specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA configuration, and are shown in table 6.6.3.1A.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.1A.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.		Low range, High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration		Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50	N/A for Spurious Emissions testing	QPSK	25	P_25@0	S_0@0	-	-
25	50		QPSK	1	P_1@0	S_0@0	-	-
25	50		QPSK	1	P_1@24	S_0@0	-	-
25	50		QPSK	2	P_1@0	S_1@49	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	50	P_50@0	S_0@0	-	-
50	50		QPSK	1	P_1@0	S_0@0	-	-
50	50		QPSK	1	P_1@49	S_0@0	-	-
50	50		QPSK	2	P_1@0	S_1@49	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
75	75		QPSK	75	P_75@0	S_0@0	-	-
75	75		QPSK	1	P_1@0	S_0@0	-	-
75	75		QPSK	1	P_1@74	S_0@0	-	-
75	75		QPSK	2	P_1@0	S_1@74	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	25		QPSK	25	P_25@0	S_0@0		
100	25		QPSK	1	P_1@0	S_0@0		
100	25		QPSK	1	P_1@99	S_0@0		
100	25		QPSK	2	P_1@0	S_1@24		
100	25		QPSK	125	P_100@0	S_25@0		
100	50		QPSK	50	P_50@0	S_0@0	-	-
100	50		QPSK	1	P_1@0	S_0@0	-	-
100	50		QPSK	1	P_1@99	S_0@0	-	-
100	50		QPSK	2	P_1@0	S_1@49	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	75		QPSK	75	P_75@0	S_0@0		
100	75		QPSK	1	P_1@0	S_0@0		
100	75		QPSK	1	P_1@99	S_0@0		
100	75		QPSK	2	P_1@0	S_1@74		
100	75		QPSK	175	P_100@0	S_75@0		
100	100		QPSK	100	P_100@0	S_0@0	-	-
100	100		QPSK	1	P_1@0	S_0@0	-	-
100	100		QPSK	1	P_1@99	S_0@0	-	-
100	100		QPSK	2	P_1@0	S_1@99	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.33 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channel is set according to Table 6.6.3.1A.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.1A.1.4.3.

6.6.3.1A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.3.1A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.1A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control “up” commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.3.1A.1.5-1 for each component carrier. The centre frequency of the filter shall be stepped in contiguous steps according to Table 6.6.3.1A.1.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3.1A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.3.1A.1.5 Test Requirements

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table 6.6.3.1A.1.5-1.

For frequencies Δf_{OOB} greater than F_{OOB} as specified in Table 6.6.3.1A.0-1the measured average power of spurious emission, derived in step 6, shall not exceed the described value in Table 6.6.3.1A.1.5-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3.1A.1.5-1: Spurious emissions limits

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	Note 1
Note1: Applicability of this test requirement is FFS.			

6.6.3.1A.2 Transmitter Spurious emissions for CA (inter-band DL CA and UL CA)

6.6.3.1A.2.1 Test purpose

To verify that transmitter of UE that support CA does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.6.3.1A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.6.3.1A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.3.1A.0.

6.6.3.1A.2.4 Test description

6.6.3.1A.2.4.1 Initial condition

Same as in clause 6.6.3.1A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.6.3.1A.1.4.1-1 → use Table 6.6.3.1A.2.4.1-1.
- Instead of clause 6.6.3.1A.1.4.3 use clause 6.6.3.1A.2.4.3.

Table 6.6.3.1A.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Low range for PCC and SCC High range for PCC and SCC						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	N/Afor this test	QPSK	2	P_1@0	S_1@0	-	-
6	25		QPSK	2	P_1@5	S_1@24	-	-
6	25		QPSK	31	P_6@0	S_25@0	-	-
6	50		QPSK	2	P_1@0	S_1@0	-	-
6	50		QPSK	2	P_1@5	S_1@49	-	-
6	50		QPSK	56	P_6@0	S_50@0	-	-
25	15		QPSK	2	P_1@0	S_1@0	-	-
25	15		QPSK	2	P_1@24	S_1@14	-	-
25	15		QPSK	40	P_25@0	S_15@0	-	-
25	25		QPSK	2	P_1@0	S_1@0	-	-
25	25		QPSK	2	P_1@24	S_1@24	-	-
25	25		QPSK	50	P_25@0	S_25@0	-	-
25	50		QPSK	2	P_1@0	S_1@0	-	-
25	50		QPSK	2	P_1@24	S_1@49	-	-
25	50		QPSK	75	P_25@0	S_50@0	-	-
50	50		QPSK	2	P_1@0	S_1@0	-	-
50	50		QPSK	2	P_1@49	S_1@49	-	-
50	50		QPSK	100	P_50@0	S_50@0	-	-
50	100		QPSK	2	P_1@0	S_1@0	-	-
50	100		QPSK	2	P_1@49	S_1@99	-	-
50	100		QPSK	150	P_50@0	S_100@0	-	-
75	75		QPSK	2	P_1@0	S_1@0	-	-
75	75		QPSK	2	P_1@74	S_1@74	-	-
75	75		QPSK	150	P_75@0	S_75@0	-	-
100	75		QPSK	2	P_1@0	S_1@0	-	-
100	75		QPSK	2	P_1@99	S_1@74	-	-
100	75		QPSK	175	P_100@0	S_75@0	-	-
100	50		QPSK	2	P_1@0	S_1@0	-	-
100	50		QPSK	2	P_1@99	S_1@49	-	-
100	50		QPSK	150	P_100@0	S_50@0	-	-
100	100		QPSK	2	P_1@0	S_1@0	-	-

100	100		QPSK	2	P_1@99	S_1@99	-	-
100	100		QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.								
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

6.6.3.1A.2.4.2 Test procedure

Same test procedure as in clause 6.6.3.1A.1.4.2.

- Instead of Table 6.6.3.1A.1.4.1-1→ use Table 6.6.3.1A.2.4.1-1.
- Instead of Table 6.6.3.1A.1.5-1 → use Table 6.6.3.1A.2.5-1.
- Instead of clause 6.6.3.1A.1.4.3 use clause 6.6.3.1A.2.4.3.

6.6.3.1A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with exceptions as in clause 6.6.3.1A.1.4.3.

6.6.3.1A.2.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table 6.6.3.1A.2.5-1.

For frequencies Δf_{OOB} greater than F_{OOB} as specified in Table 6.6.3.1A.0-1the measured average power of spurious emission, derived in step 6, shall not exceed the described value in Table 6.6.3.1A.2.5-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3.1A.2.5-1: Spurious emissions limits

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
Test requirements for CA_1A-3A Configuration			
135 MHz ≤ f ≤ 270 MHz	-36 dBm	100 kHz	
1440 MHz ≤ f ≤ 1650 MHz 2055 MHz ≤ f ≤ 2250 MHz 3630 MHz ≤ f ≤ 3765 MHz 5340 MHz ≤ f ≤ 5745 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-5A Configuration			
222 MHz ≤ f ≤ 332 MHz	-36 dBm	100 kHz	
1071 MHz ≤ f ≤ 1156 MHz 2744 MHz ≤ f ≤ 2829 MHz 2991 MHz ≤ f ≤ 3136 MHz 3568 MHz ≤ f ≤ 3678 MHz 4664 MHz ≤ f ≤ 4809 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-7A Configuration			
520 MHz ≤ f ≤ 650 MHz	-36 dBm	100 kHz	
1270 MHz ≤ f ≤ 1460 MHz 3020 MHz ≤ f ≤ 3220 MHz 4420 MHz ≤ f ≤ 4550 MHz 6340 MHz ≤ f ≤ 6530 MHz 6920 MHz ≤ f ≤ 7120 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-8A Configuration			
90 MHz ≤ f ≤ 220 MHz	-36 dBm	100 kHz	
1005 MHz ≤ f ≤ 1100 MHz 2800 MHz ≤ f ≤ 2895 MHz 2925 MHz ≤ f ≤ 3080 MHz 3680 MHz ≤ f ≤ 3810 MHz 4720 MHz ≤ f ≤ 4875 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-18A Configuration			
260 MHz ≤ f ≤ 350 MHz	-36 dBm	100 kHz	
1090 MHz ≤ f ≤ 1165 MHz 2735 MHz ≤ f ≤ 2810 MHz 3010 MHz ≤ f ≤ 3145 MHz 3550 MHz ≤ f ≤ 3640 MHz 4655 MHz ≤ f ≤ 4790 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-19A Configuration			
230 MHz ≤ f ≤ 320 MHz	-36 dBm	100 kHz	
1075 MHz ≤ f ≤ 1150 MHz 2750 MHz ≤ f ≤ 2825 MHz 2995 MHz ≤ f ≤ 3130 MHz 3580 MHz ≤ f ≤ 3670 MHz 4670 MHz ≤ f ≤ 4805 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-21A Configuration			
457.1 MHz ≤ f ≤ 532.1 MHz 915.8 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1000 MHz ≤ f ≤ 1005.8 MHz 2377.1 MHz ≤ f ≤ 2512.1 MHz 3367.9 MHz ≤ f ≤ 3442.9 MHz 4515.8 MHz ≤ f ≤ 4905.8 MHz 5287.9 MHz ≤ f ≤ 5422.9 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-26A Configuration			
222 MHz ≤ f ≤ 352 MHz	-36 dBm	100 kHz	
1071 MHz ≤ f ≤ 1166 MHz 2734 MHz ≤ f ≤ 2829 MHz 2991 MHz ≤ f ≤ 3146 MHz 3548 MHz ≤ f ≤ 3678 MHz 4654 MHz ≤ f ≤ 4809 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-28A Configuration			
424 MHz ≤ f ≤ 574 MHz	-36 dBm	100 kHz	

1172 MHz ≤ f ≤ 1277 MHz 2623 MHz ≤ f ≤ 2728 MHz 3092 MHz ≤ f ≤ 3257 MHz 3326 MHz ≤ f ≤ 3476 MHz 4543 MHz ≤ f ≤ 4708 MHz	-30 dBm	1 MHz	
Test requirements for CA_1A-42A Configuration			
240 MHz ≤ f ≤ 560 MHz	-36 dBm	100 kHz	
1420 MHz ≤ f ≤ 1680 MHz 4820 MHz ≤ f ≤ 5280 MHz 5320 MHz ≤ f ≤ 5580 MHz 7240 MHz ≤ f ≤ 7560 MHz 8720 MHz ≤ f ≤ 9180 MHz	-30 dBm	1 MHz	
Test requirements for CA_2A-4A Configuration			
95 MHz ≤ f ≤ 200 MHz	-36 dBm	100 kHz	
1510 MHz ≤ f ≤ 1660 MHz 1945 MHz ≤ f ≤ 2110 MHz 3560 MHz ≤ f ≤ 3665 MHz 5270 MHz ≤ f ≤ 5575 MHz	-30 dBm	1 MHz	
Test requirements for CA_2A-5A Configuration			
152 MHz ≤ f ≤ 262 MHz	-36 dBm	100 kHz	
1001 MHz ≤ f ≤ 1086 MHz 2674 MHz ≤ f ≤ 2759 MHz 2851 MHz ≤ f ≤ 2996 MHz 3498 MHz ≤ f ≤ 3608 MHz 4524 MHz ≤ f ≤ 4669 MHz	-30 dBm	1 MHz	
Test requirements for CA_2A-7A Configuration			
590 MHz ≤ f ≤ 720 MHz	-36 dBm	100 kHz	
1130 MHz ≤ f ≤ 1320 MHz 3090 MHz ≤ f ≤ 3290 MHz 4350 MHz ≤ f ≤ 4480 MHz 6200 MHz ≤ f ≤ 6390 MHz 6850 MHz ≤ f ≤ 7050 MHz	-30 dBm	1 MHz	
Test requirements for CA_2A-12A Configuration			
418 MHz ≤ f ≤ 512 MHz	-36 dBm	100 kHz	
1134 MHz ≤ f ≤ 1211 MHz 2549 MHz ≤ f ≤ 2626 MHz 2984 MHz ≤ f ≤ 3121 MHz 3248 MHz ≤ f ≤ 3342 MHz 4399 MHz ≤ f ≤ 4536 MHz	-30 dBm	1 MHz	
Test requirements for CA_2A-13A Configuration			
276 MHz ≤ f ≤ 356 MHz	-36 dBm	100 kHz	
1063 MHz ≤ f ≤ 1133 MHz 2627 MHz ≤ f ≤ 2697 MHz 2913 MHz ≤ f ≤ 3043 MHz 3404 MHz ≤ f ≤ 3484 MHz 4477 MHz ≤ f ≤ 4607 MHz	-30 dBm	1 MHz	
Test requirements for CA_2A-30A Configuration			
395 MHz ≤ f ≤ 465 MHz	-36 dBm	100 kHz	
1385 MHz ≤ f ≤ 1515 MHz 2700 MHz ≤ f ≤ 2780 MHz 4155 MHz ≤ f ≤ 4225 MHz 6005 MHz ≤ f ≤ 6135 MHz 6460 MHz ≤ f ≤ 6540 MHz	-30 dBm	1 MHz	
Test requirements for CA_2A-66A Configuration			
70 MHz ≤ f ≤ 200 MHz	-36 dBm	100 kHz	
1510 MHz ≤ f ≤ 1710 MHz 1920 MHz ≤ f ≤ 2110 MHz 3560 MHz ≤ f ≤ 3690 MHz 5270 MHz ≤ f ≤ 5600 MHz	-30 dBm	1 MHz	
Test requirements for CA_3A-5A Configuration			
12 MHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f ≤ 137 MHz	-36 dBm	100 kHz	

861 MHz ≤ f ≤ 961 MHz			
2534 MHz ≤ f ≤ 2746 MHz 3358 MHz ≤ f ≤ 3483 MHz 4244 MHz ≤ f ≤ 4419 MHz	-30 dBm	1 MHz	
Test requirements for CA_3A-7A Configuration			
715 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1000 MHz ≤ f ≤ 1070 MHz 3215 MHz ≤ f ≤ 3430 MHz 4210 MHz ≤ f ≤ 4355 MHz 5920 MHz ≤ f ≤ 6140 MHz 6710 MHz ≤ f ≤ 6925 MHz	-30 dBm	1 MHz	
Test requirements for CA_3A-8A Configuration			
25 MHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f ≤ 120 MHz 795 MHz ≤ f ≤ 905 MHz	-36 dBm	100 kHz	
2505 MHz ≤ f ≤ 2700 MHz 3470 MHz ≤ f ≤ 3615 MHz 4300 MHz ≤ f ≤ 4485 MHz	-30 dBm	1 MHz	
Test requirements for CA_3A-19A Configuration			
20 MHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f ≤ 125 MHz 865 MHz ≤ f ≤ 955 MHz	-36 dBm	100 kHz	
2540 MHz ≤ f ≤ 2740 MHz 3370 MHz ≤ f ≤ 3475 MHz 4250 MHz ≤ f ≤ 4415 MHz	-30 dBm	1 MHz	
Test requirements for CA_3A-20A Configuration			
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f ≤ 121 MHz 848 MHz ≤ f ≤ 953 MHz	-36 dBm	100 kHz	
2542 MHz ≤ f ≤ 2738 MHz 3374 MHz ≤ f ≤ 3509 MHz 4252 MHz ≤ f ≤ 4432 MHz	-30 dBm	1 MHz	
Test requirements for CA_3A-26A Configuration			
12 MHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f ≤ 157 MHz	-36 dBm	100 kHz	
861 MHz ≤ f ≤ 971 MHz	-36 dBm	100 kHz	
2524 MHz ≤ f ≤ 2756 MHz 3338 MHz ≤ f ≤ 3483 MHz 4234 MHz ≤ f ≤ 4419 MHz	-30 dBm	1 MHz	
Test requirements for CA_4A-5A Configuration			
12 MHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f ≤ 107 MHz 861 MHz ≤ f ≤ 931 MHz	-36 dBm	100 kHz	
2534 MHz ≤ f ≤ 2686 MHz 3358 MHz ≤ f ≤ 3453 MHz 4244 MHz ≤ f ≤ 4359 MHz	-30 dBm	1 MHz	
Test requirements for CA_4A-7A Configuration			
745 MHz ≤ f ≤ 1000 MHz	-36 dBm	100 kHz	
1000 MHz ≤ f ≤ 1010 MHz 3245 MHz ≤ f ≤ 3430 MHz 4210 MHz ≤ f ≤ 4325 MHz 5920 MHz ≤ f ≤ 6080 MHz 6710 MHz ≤ f ≤ 6895 MHz	-30 dBm	1 MHz	
Test requirements for CA_4A-12A Configuration			
278 MHz ≤ f ≤ 357 MHz 994 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1000 MHz ≤ f ≤ 1056 MHz 2409 MHz ≤ f ≤ 2471 MHz 2704 MHz ≤ f ≤ 2811 MHz 3108 MHz ≤ f ≤ 3187 MHz 4119 MHz ≤ f ≤ 4226 MHz	-30 dBm	1 MHz	

Test requirements for CA_4A-13A Configuration			
136 MHz ≤ f ≤ 201 MHz 923 MHz ≤ f ≤ 978 MHz	-36 dBm	100 kHz	
2487 MHz ≤ f ≤ 2542 MHz 2633 MHz ≤ f ≤ 2733 MHz 3264 MHz ≤ f ≤ 3329 MHz 4197 MHz ≤ f ≤ 4297 MHz	-30 dBm	1 MHz	
Test requirements for CA_4A-17A Configuration			
278 MHz ≤ f ≤ 347 MHz 994 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1000 MHz ≤ f ≤ 1056 MHz 2414 MHz ≤ f ≤ 2471 MHz 2704 MHz ≤ f ≤ 2806 MHz 3118 MHz ≤ f ≤ 3187 MHz 4124 MHz ≤ f ≤ 4226 MHz	-30 dBm	1 MHz	
Test requirements for CA_5A-7A Configuration			
802 MHz ≤ f ≤ 922 MHz	-36 dBm	100 kHz	
1651 MHz ≤ f ≤ 1746 MHz 3324 MHz ≤ f ≤ 3419 MHz 4148 MHz ≤ f ≤ 4316 MHz 5824 MHz ≤ f ≤ 5989 MHz	-30 dBm	1 MHz	
Test requirements for CA_5A-12A Configuration			
108 MHz ≤ f ≤ 150 MHz 549 MHz ≤ f ≤ 608 MHz 932 MHz ≤ f ≤ 999 MHz	-36 dBm	100 kHz	
1523 MHz ≤ f ≤ 1565 MHz 2222 MHz ≤ f ≤ 2281 MHz 2347 MHz ≤ f ≤ 2414 MHz	-30 dBm	1 MHz	
Test requirements for CA_5A-17A Configuration			
108 MHz ≤ f ≤ 145 MHz 559 MHz ≤ f ≤ 608 MHz 932 MHz ≤ f ≤ 99e4 MHz	-36 dBm	100 kHz	
1528 MHz ≤ f ≤ 1565 MHz 2232 MHz ≤ f ≤ 2281 MHz 2352 MHz ≤ f ≤ 2414 MHz	-30 dBm	1 MHz	
Test requirements for CA_5A-30A Configuration			
607 MHz ≤ f ≤ 667 MHz	-36 dBm	100 kHz	
1456 MHz ≤ f ≤ 1491 MHz 3129 MHz ≤ f ≤ 3164 MHz 3761 MHz ≤ f ≤ 3806 MHz 3953 MHz ≤ f ≤ 4013 MHz 5434 MHz ≤ f ≤ 5479 MHz	-30 dBm	1 MHz	
Test requirements for CA_5A-66A Configuration			
12 MHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f ≤ 132 MHz 861 MHz ≤ f ≤ 956 MHz	-36 dBm	100 kHz	
2534 MHz ≤ f ≤ 2736 MHz 3358 MHz ≤ f ≤ 3478 MHz 4244 MHz ≤ f ≤ 4409 MHz	-30 dBm	1 MHz	
Test requirements for CA_7A-20A Configuration			
776 MHz ≤ f ≤ 906 MHz	-36 dBm	100 kHz	
1638 MHz ≤ f ≤ 1738 MHz 3332 MHz ≤ f ≤ 3432 MHz 4138 MHz ≤ f ≤ 4308 MHz 5832 MHz ≤ f ≤ 6002 MHz	-30 dBm	1 MHz	
Test requirements for CA_7A-28A Configuration			
1004 MHz ≤ f ≤ 1164 MHz 1752 MHz ≤ f ≤ 1867 MHz 3203 MHz ≤ f ≤ 3318 MHz 3906 MHz ≤ f ≤ 4066 MHz 4252 MHz ≤ f ≤ 4437 MHz 5703 MHz ≤ f ≤ 5888 MHz	-30 dBm	1 MHz	

Test requirements for CA_12A-30A Configuration			
873 MHz ≤ f ≤ 917 MHz	-36 dBm	100 kHz	
1589 MHz ≤ f ≤ 1616 MHz 3004 MHz ≤ f ≤ 3031 MHz 3703 MHz ≤ f ≤ 3747 MHz 3894 MHz ≤ f ≤ 3931 MHz 5009 MHz ≤ f ≤ 5046 MHz	-30 dBm	1 MHz	
Test requirements for CA_18A-28A Configuration			
82 MHz ≤ f ≤ 127 MHz 576 MHz ≤ f ≤ 651 MHz 897 MHz ≤ f ≤ 957 MHz	-36 dBm	100 kHz	
1518 MHz ≤ f ≤ 1563 MHz 2221 MHz ≤ f ≤ 2296 MHz 2333 MHz ≤ f ≤ 2393 MHz	-30 dBm	1 MHz	
Test requirements for CA_19A-21A Configuration			
197.1 MHz ≤ f ≤ 242.1 MHz 602.9 MHz ≤ f ≤ 632.9 MHz	-36 dBm	100 kHz	
2050.8 MHz ≤ f ≤ 2095.8 MHz 2277.9 MHz ≤ f ≤ 2307.9 MHz 3107.9 MHz ≤ f ≤ 3152.9 MHz 3725.8 MHz ≤ f ≤ 3770.8 MHz	-30 dBm	1 MHz	
Test requirements for CA_39A-41A Configuration			
576 MHz ≤ f ≤ 810 MHz	-36 dBm	100 kHz	
1070 MHz ≤ f ≤ 1344 MHz 3072 MHz ≤ f ≤ 3500 MHz 4376 MHz ≤ f ≤ 4610 MHz 6256 MHz ≤ f ≤ 6530 MHz 6872 MHz ≤ f ≤ 7300 MHz	-30 dBm	1 MHz	
Test requirements for CA_41A-42A Configuration			
710 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1000 MHz ≤ f ≤ 1104 MHz 1392 MHz ≤ f ≤ 1980 MHz 4110 MHz ≤ f ≤ 4704 MHz 5896 MHz ≤ f ≤ 6290 MHz 8392 MHz ≤ f ≤ 8980 MHz 9296 MHz ≤ f ≤ 9890 MHz	-30 dBm	1 MHz	

6.6.3.1A.3 Transmitter Spurious emissions for CA (intra-band non-contiguous DL CA and UL CA)

6.6.3.1A.3.1 Test purpose

To verify that transmitter of UE that support CA does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.6.3.1A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.6.3.1A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.3.1A.0.

6.6.3.1A.3.4 Test description

6.6.3.1A.3.4.1 Initial condition

Same as in clause 6.6.3.1A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-3 for CA configurations.
- Instead of Table 6.6.3.1A.1.4.1-1 → use Table 6.6.3.1A.3.4.1-1.
- Instead of clause 6.6.3.1A.1.4.3 → use clause 6.6.3.1A.3.4.3.

Table 6.6.3.1A.3.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Refer to test points A: N/A (Range is not relevant), Maximum Wgap						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Refer to test point Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC						
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A		QPSK	P_1@0	QPSK	S_1@0
2	25	25	35			QPSK	P_1@24	QPSK	S_1@24
3	25	25	35			QPSK	P_25@0	QPSK	S_25@0
4	50	50	25			QPSK	P_1@0	QPSK	S_1@0
5	50	50	25			QPSK	P_1@49	QPSK	S_1@49
6	50	50	25			QPSK	P_50@0	QPSK	S_50@0
7	100	100	5			QPSK	P_1@0	QPSK	S_1@0
8	100	100	5			QPSK	P_1@99	QPSK	S_1@99
9	100	100	5			QPSK	P_100@0	QPSK	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: The measurements need to be executed for in-gap interferer positions when the sub-block gap size W_{gap} allows.									

6.6.3.1A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.3.1A.3.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.1A.3.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.3.1A.3.5-1 for each component carrier. The centre frequency of the filter shall be stepped in contiguous steps according to Table 6.6.3.1A.3.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

7. Repeat the measurement for in-gap interferer positions when the sub-block gap size W_{gap} allows.

6.6.3.1A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.3.1A.3.5 Test Requirements

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table 6.6.3.1A.3.5-1.

For frequencies Δf_{OOB} greater than F_{OOB} as specified in Table 6.6.3.1A.0-1the measured average power of spurious emission, derived in step 6, shall not exceed the described value in Table 6.6.3.1A.3.5-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3.1A.3.5-1: Spurious emissions limits

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	

6.6.3.2 Spurious emission band UE co-existence

Editor's note: This test case contains different requirements for different UE releases

6.6.3.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions.

6.6.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.6.3.2.3 Minimum conformance requirements

This clause specifies the requirements for the specified E-UTRA band for coexistence with protected bands as indicated in Table 6.6.3.2.3-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3.2.3-1: Spurious emission band UE co-existence limits Rel-8

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Comment
1	E-UTRA Band 1, 3, 7, 8, 9, 11, 34, 38, 40	FDL_low	-	FDL_high	-50	1	
	Frequency range	860	-	895	-50	1	
	Frequency range	1475.9	-	1510.9	-50	1	
	Frequency range	1895	-	1915	-15.5	5	Note[14], Note[17]
	Frequency range	1915	-	1920	+1.6	5	Note[14], Note[17]
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17	FDL_low	-	FDL_high	-50	1	
	E-UTRA Band 2	FDL_low	-	FDL_high	-50		Note[14]
3	E-UTRA Band 1, 7, 8, 33, 34, 38	FDL_low	-	FDL_high	-50	1	
	E-UTRA Band 3	FDL_low	-	FDL_high	-50		Note[14]
	Frequency range	860	-	895	-50	1	Note[13]
	Frequency range	1475.9	-	1510.9	-50	1	Note[13]
	Frequency range	1884.5	-	1915.7	-41	0.3	Note[13]
4	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17	FDL_low	-	FDL_high	-50	1	
5	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17	FDL_low	-	FDL_high	-50	1	
6	E-UTRA Band 1, 9, 11, 34	FDL_low	-	FDL_high	-50	1	
	Frequency range	860	-	875	-37	1	
	Frequency range	875	-	895	-50	1	
	Frequency range	1884.5	-	1919.6	-41	0.3	Note[7]
		1884.5	-	1915.7			Note[8]
7	E-UTRA Band 1, 3, 7, 8, 33, 34	FDL_low	-	FDL_high	-50	1	
	Frequency range	2570	-	2575	+1.6	5	Note[14] , Note[15], Note[18]
	Frequency range	2575	-	2595	-15.5	5	Note[14], Note[15], Note[18]
8	E-UTRA Band 1, 33, 34, 38, 39, 40	FDL_low	-	FDL_high	-50	1	
	E-UTRA band 3	FDL_low	-	FDL_high	-50	1	Note [2]
	E-UTRA band 7	FDL_low	-	FDL_high	-50	1	Note [2]
	E-UTRA Band 8	FDL_low	-	FDL_high	-50	1	Note[14]
9	E-UTRA Band 1, 9, 11, 34	FDL_low	-	FDL_high	-50	1	
	Frequency range	860	-	895	-50	1	
	Frequency range	1475.9	-	1510.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	Note[8]
10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17	FDL_low	-	FDL_high	-50	1	
11	E-UTRA Band 1, 9, 11, 34	FDL_low	-	FDL_high	-50	1	
	Frequency range	1457.9	-	1510.9	-50	1	
	Frequency range	860	-	895	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	Note[8]
12	E-UTRA Band 2, 5, 13, 14, 17	FDL_low	-	FDL_high	-50	1	
	E-UTRA Band 4, 10	FDL_low	-	FDL_high	-50	1	Note[2]
	E-UTRA Band 12	FDL_low	-	FDL_high	-50	1	Note[14]
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17	FDL_low	-	FDL_high	-50	1	
	E-UTRA Band 14	FDL_low	-	FDL_high	-50	1	Note[14]

	Frequency range	769	-	775	-35	0.00625	Note[14]
	Frequency range	799	-	805	-35	0.00625	Note[11], Note[14]
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17	FDL_low	-	FDL_high	-50	1	
	Frequency range	769	-	775	-35	0.00625	Note[12] Note[14]
	Frequency range	799	-	805	-35	0.00625	Note[11], Note[12] Note[14]
17	E-UTRA Band 2, 5, 13, 14, 17	FDL_low	-	FDL_high	-50	1	
	E-UTRA Band 4, 10	FDL_low	-	FDL_high	-50	1	Note[2]
	E-UTRA Band 12	FDL_low	-	FDL_high	-50	1	Note[14]
…							
33	E-UTRA Band 1, 7, 8, 34, 38, 40	FDL_low	-	FDL_high	-50	1	Note[5]
	E-UTRA Band 3	FDL_low	-	FDL_high	-50	1	Note[14]
34	E-UTRA Band 1, 3, 7, 8, 9, 11, 33, 38, 39, 40	FDL_low	-	FDL_high	-50	1	Note[5]
	Frequency range	860	-	895	-50	1	
	Frequency range	1475.9	-	1510.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	Note[8]
35							
36							
37			-				
38	E-UTRA Band 1, 3, 8, 33, 34	FDL_low	-	FDL_high	-50	1	
	Frequency range	2620	-	2645	-15.5	5	Note[14], Note[16], Note[18]
39	E-UTRA Band 34, 40	FDL_low	-	FDL_high	-50	1	
40	E-UTRA Band 1, 3, 33, 34, 39	FDL_low	-	FDL_high	-50	1	

Note 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.2-1

Note 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd or 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RE within the transmission bandwidth (see Figure 5.4.2-1) for which the 2nd or 3rd harmonic, i.e. the frequency equal to two or three times the frequency of that RE, is within the measurement bandwidth (MBW).

Note 3: To meet these requirements some restriction will be needed for either the operating band or protected band

Note 4: N/A

Note 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band

Note 6: N/A.

Note 7: Applicable when co-existence with PHS system operating in 1884.5-1919.6MHz.

Note 8: Applicable when co-existence with PHS system operating in 1884.5-1915.7MHz.

Note 9: N/A

Note 10: N/A

Note 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD

Note 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB

Note 13: Applicable when UE transmits anywhere within 1749.9 – 1784.9MHz.Applicable when the assigned E-UTRA UL operating channel is ≥1 749.9MHz and ≤ 1 784.9MHz.

Note 14: These requirements also apply for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Note 15: This requirement is applicable for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz. This requirement is applicable without any other uplink transmission bandwidth restriction for channel bandwidths within the range 2500 - 2570 MHz.

Note 16: This requirement is applicable for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 – 2605 MHz. This requirement is applicable without any other uplink transmission bandwidth restriction for channel bandwidths within the range 2570 – 2615 MHz. For assigned carriers with bandwidths overlapping the frequency range 2615-2620 MHz the requirements apply with the maximum output power configured to +19 dBm in the IE *P-Max*.

Note 17: This requirement is applicable for an uplink transmission bandwidth less than or equal to 54 RB for carriers of

15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz. This requirement is applicable without any other uplink transmission bandwidth restriction for channel bandwidths within the range 1920 - 1980 MHz.

Note 18: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE: The restriction on the maximum uplink transmission to 54 RB in Notes 15, 16, and 17 of Table 6.6.3.2.3-1 is intended for conformance testing and may be applied to network operation to facilitate coexistence when the aggressor and victim bands are deployed in the same geographical area. The applicable spurious emission requirement of -15.5 dBm/5MHz is a least restrictive technical condition for FDD/TDD coexistence and may have to be revised in the future.

Table 6.6.3.2.3-1A: Spurious emission band UE co-existence limits Rel-9

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum level (dBm)	MBW (MHz)	NOTE
1	E-UTRA Band 1, 3, 7, 8, 11, 20, 21, 34, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	895	-50	1	
	Frequency range	1880	-	1895	-40	1	14,18
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1895	-	1915	-15.5	5	14,18,19
	Frequency range	1915	-	1920	+1.6	5	14,18,19
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2	F_{DL_low}	-	F_{DL_high}	-50	1	14
3	E-UTRA Band 1, 7, 8, 20, 33, 34, 38	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	14
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	Frequency range	860	-	895	-50	1	13
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17	F_{DL_low}	-	F_{DL_high}	-50	1	
5	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17	F_{DL_low}	-	F_{DL_high}	-50	1	
6	E-UTRA Band 1, 9, 11, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	875	-37	1	
	Frequency range	875	-	895	-50	1	
	Frequency range	1884.5	-	1919.6	-41	0.3	7
	Frequency range	1884.5	-	1915.7			8
7	E-UTRA Band 1, 3, 7, 8, 20, 33, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	-+1.6	5	14, 15, 19
	Frequency range	2575	-	2595	-15.5	5	14, 15, 19
	Frequency range	2595	-	2620	-40	1	14, 15
8	E-UTRA Band 1, 20, 33, 34, 38, 39, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 7	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	14
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	17
	Frequency range	860	-	890	-40	1	14, 17
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 17
9	E-UTRA Band 1, 11, 21, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	895	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17	F_{DL_low}	-	F_{DL_high}	-50	1	
11	E-UTRA Band 1, 9, 11, 21, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	895	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
12	E-UTRA Band 2, 5, 13, 14, 17	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	14
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	14
	Frequency range	769	-	775	-35	0.00625	14
	Frequency range	799	-	805	-35	0.00625	11, 14
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	12, 14
	Frequency range	799	-	805	-35	0.00625	11, 12, 14
17	E-UTRA Band 2, 5, 13, 14, 17	F_{DL_low}	-	F_{DL_high}	-50	1	

	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	14
18	E-UTRA Band 1, 11, 21, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	895	-40	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
19	E-UTRA Band 1, 11, 21, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
20	E-UTRA Band 1, 3, 7, 8, 33, 34,	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	14
	E-UTRA Band 38	F_{DL_low}	-	F_{DL_high}	-50	1	2
21	E-UTRA Band 1, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	895	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
33	E-UTRA Band 1, 7, 8, 20, 34, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	14
34	E-UTRA Band 1, 3, 7, 8, 11, 20, 21, 33, 38,39, 40	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	860	-	895	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	1839.9	-	1879.9	-50	1	
35			-				
36			-				
37			-				
38	E-UTRA Band 1,3, 8, 20, 33, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2620	-	2645	-15.5	5	14, 16, 19
	Frequency range	2645	-	2690	-40	1	14, 16
39	E-UTRA Band 34, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
40	E-UTRA Band 1, 3, 33, 34, 39	F_{DL_low}	-	F_{DL_high}	-50	1	

Note 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.2-1

Note 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd or 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RE within the transmission bandwidth (see Figure 5.4.2-1) for which the 2nd or 3rd harmonic, i.e. the frequency equal to two or three times the frequency of that RE, is within the measurement bandwidth (MBW).

Note 3: To meet these requirements some restriction will be needed for either the operating band or protected band

Note 4: N/A

Note 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band

Note 6: N/A

Note 7: Applicable when co-existence with PHS system operating in 1884.5-1919.6MHz.

Note 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.

Note 9: N/A

Note 10: N/A

Note 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD

Note 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB

Note 13: Applicable when the assigned E-UTRA UL operating channel is ≥1744.9MHz and ≤ 1784.9MHz.

Note 14: These requirements also apply for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Note 15: This requirement is applicable for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz. This requirement is applicable without any other uplink transmission bandwidth restriction for channel bandwidths within the range 2500 - 2570 MHz.

Note 16: This requirement is applicable for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 – 2605 MHz. This requirement is

	applicable without any other uplink transmission bandwidth restriction for channel bandwidths within the range 2570 – 2615 MHz. For assigned carriers with bandwidths overlapping the frequency range 2615-2620 MHz the requirements apply with the maximum output power configured to +19 dBm in the IE *P-Max*.
Note 17:	For carriers of 5 MHz channel bandwidth with carrier centre frequencies (F_c) in the range 902.5MHz ≤ F_c < 907.5 MHz, the requirement applies for uplink transmission bandwidths less than or equal to 20 RB. No restrictions apply in the range 907.5 MHz ≤ F_c ≤ 912.5 MHz. For carriers of 10 MHz channel bandwidth, the requirement only applies for F_c = 910 MHz and uplink transmission bandwidths less than or equal to 32 RB with RB_{start} > 3.
Note 18:	This requirement is applicable for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz. This requirement is applicable without any other uplink transmission bandwidth restriction for channel bandwidths within the range 1920 - 1980 MHz.
Note 19:	For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE: The restriction on the maximum uplink transmission to 54 RB in Notes 15, 16 and 18 of Table 6.6.3.2.3-1A is intended for conformance testing and may be applied to network operation to facilitate coexistence when the aggressor and victim bands are deployed in the same geographical area. The applicable spurious emission requirement of -15.5 dBm/5MHz is a least restrictive technical condition for FDD/TDD coexistence and may have to be revised in the future.

Table 6.6.3.2.3-1B: Spurious emission band UE co-existence limits Rel-10

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
1	E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	15
	Frequency range	1880	-	1895	-40	1	15,19
	Frequency range	1895	-	1915	-15.5	5	15,19,20
	Frequency range	1915	-	1920	+1.6	5	15,19,20
	Frequency range	1839.9	-	1879.9	-50	1	15
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 7, 8, 20, 33, 34, 38, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
5	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
6	E-UTRA Band 1, 9, 11, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	875	-37	1	
	Frequency range	875	-	895	-50	1	
	Frequency range	1884.5	-	1919.6	-41	0.3	7
		1884.5	-	1915.7			8
7	E-UTRA Band 1, 3, 7, 8, 20, 22, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	15, 16, 20
	Frequency range	2575	-	2595	-15.5	5	15, 16, 20
	Frequency range	2595	-	2620	-40	1	15, 16
8	E-UTRA Band 1, 20, 33, 34, 38, 39, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 7	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	18
	Frequency range	860		890	-40	1	15, 18
	Frequency range	1884.5		1915.7	-41	0.3	8, 18
9	E-UTRA Band 1, 11, 18, 19, 21, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
11	E-UTRA Band 1, 11, 18, 19, 21, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
12	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23, 25, 41	F_{DL_low}	-	F_{DL_high}	-50	1	

	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24	F_{DL_low}	-	F_{DL_high}	-50	1	2
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	12, 15
	Frequency range	799	-	805	-35	0.00625	11, 12, 15
17	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
18	E-UTRA Band 1, 11, 21, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	890	-40	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
19	E-UTRA Band 1, 11, 21, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
20	E-UTRA Band 1, 3, 7, 8, 20, 22, 33, 34, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
21							
	E-UTRA Band 1, 18, 19, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
22	E-UTRA Band 1, 3, 7, 8, 20, 33, 34, 38, 39, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	3510	-	3525	-40	1	15
	Frequency range	3525	-	3590	-50	1	
23	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
24	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
25	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
…							
33	E-UTRA Band 1, 7, 8, 20, 22, 34, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
34	E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 33, 38, 39, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	1839.9	-	1879.9	-50	1	
35							
36							
37			-				
38	E-UTRA Band 1, 3, 8, 20, 22, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2620	-	2645	-15.5	5	15, 17, 20
	Frequency range	2645	-	2690	-40	1	15, 17
39	E-UTRA Band 22, 34, 40, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
40	E-UTRA Band 1, 3, 7, 8, 20, 22, 33, 34, 38, 39, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	

41	E-UTRA Band 2, 4, 5, 10, 12, 13 , 14, 17, 23, 24, 25	F_{DL_low}	-	F_{DL_high}	-50	1	
42	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 33, 34, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
43	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 33, 34, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 22	F_{DL_low}	-	F_{DL_high}	[-50]	[1]	3

Note 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1

Note 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

Note 3: To meet these requirements some restriction will be needed for either the operating band or protected band

Note 4: N/A

Note 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band

Note 6: N/A

Note 7: Applicable when co-existence with PHS system operating in 1884.5-1919.6MHz.

Note 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.

Note 9: N/A

Note 10: N/A

Note 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD

Note 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB

Note 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

Note 14: N/A

Note 15: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

NOTE 16: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 17: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.

NOTE 18: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.

NOTE 19: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

Note 20: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

Note 21 N/A

Note 22 N/A

NOTE: The restriction on the maximum uplink transmission to 54 RB in Notes 16, 17, and 19 of Table 6.6.3.2.3-1B is intended for conformance testing and may be applied to network operation to facilitate coexistence when the aggressor and victim bands are deployed in the same geographical area. The applicable spurious emission requirement of -15.5 dBm/5MHz is a least restrictive technical condition for FDD/TDD coexistence and may have to be revised in the future.

Table 6.6.3.2.3-1C: Spurious emission band UE co-existence limits Rel-11

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
1	E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 38, 40, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	15
	Frequency range	1880		1895	-40	1	15,27
	Frequency range	1895		1915	-15.5	5	15, 26, 27
	Frequency range	1915		1920	+1.6	5	15, 26, 27
	Frequency range	1839.9	-	1879.9	-50	1	15
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 26, 27, 28, 29, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 7, 8, 20, 26, 27, 28, 33, 34, 38, 41, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 26, 27, 28, 29, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
5	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 28, 29,42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 26	859	-	869	-27	1	
6	E-UTRA Band 1, 9, 11, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	875	-37	1	
	Frequency range	875	-	895	-50	1	
		1884.5	-	1919.6	-41	0.3	7
	Frequency range	1884.5	-	1915.7			8
7	E-UTRA Band 1, 3, 7, 8, 20, 22, 27, 28, 29, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	15, 21, 26
	Frequency range	2575	-	2595	-15.5	5	15, 21, 26
	Frequency range	2595	-	2620	-40	1	15, 21
8	E-UTRA Band 1, 20, 28, 33, 34, 38, 39, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 7	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
9	E-UTRA Band 1, 11, 18, 19, 21, 26, 28, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
11	E-UTRA Band 1, 11, 18, 19, 21, 28, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8

	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
12	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23, 25, 26, 27, 29, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24	F_{DL_low}	-	F_{DL_high}	-50	1	2
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	12, 15
	Frequency range	799	-	805	-35	0.00625	11, 12, 15
17	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
18	E-UTRA Band 1, 11, 21, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	890	-40	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
19	E-UTRA Band 1, 11, 21, 28, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
20	E-UTRA Band 1, 3, 7, 8, 20, 22, 33, 34, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
21							
	E-UTRA Band 1, 18, 19, 28, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
22	E-UTRA Band 1, 3, 7, 8, 20, 26, 27, 28, 33, 34, 38, 39, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	3510	-	3525	-40	1	15
	Frequency range	3525	-	3590	-50	1	
23	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 29, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
24	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 29, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
25	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18, 19, 21, 23, 24, 25, 26, 29, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	703	-	799	-50	1	
		799	-	803	-40	1	15

	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
27	E-UTRA Band 1, 2, 3, 4, 5, 7, 10, 12, 13, 14, 17, 23, 25, 26, 27, 29, 38, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	799	-	805	-35	0.00625	
	E-UTRA Band 28	F_{DL_low}	-	790	-50	1	
28	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 25, 26, 27, 34, 38, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 4, 10, 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	19, 25
	Frequency range	470	-	694	-42	8	15, 32
	Frequency range	470	-	710	-26.2	6	31
	Frequency range	758	-	773	-32	1	15
	Frequency range	773	-	803	-50	1	
	Frequency range	662	-	694	-26.2	6	15
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
	Frequency range	1839.9	-	1879.9	-50	1	
…							
33	E-UTRA Band 1, 7, 8, 20, 22, 28, 34, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
34	E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 33, 38, 39, 40, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	1839.9	-	1879.9	-50	1	
35							
36							
37			-				
38	E-UTRA Band 1,3, 8, 20, 22, 27, 28, 29, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2620	-	2645	-15.5	5	15, 22, 26
	Frequency range	2645	-	2690	-40	1	15, 22
39	E-UTRA Band 22, 34, 40, 41, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
40	E-UTRA Band 1, 3, 7, 8, 20, 22, 26, 27, 28, 33, 34, 38, 39, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
41	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 34, 39, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	30
	Frequency range	1839.9		1879.9	-50	1	30
	Frequency range	1884.5		1915.7	-41	0.3	8, 30
42	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 26, 27, 28, 33, 34, 38, 40, 41, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
43	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 33, 34, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 22	F_{DL_low}	-	F_{DL_high}	[-50]	[1]	3
44	E-UTRA Band 3, 5, 8, 34, 39, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 40, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2

Note 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1

Note 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

Note 3: To meet these requirements some restriction will be needed for either the operating band or protected band

Note 4: N/A

Note 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band

Note 6: N/A

Note 7: Applicable when co-existence with PHS system operating in 1884.5 -1919.6MHz.

Note 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.

Note 9: N/A

Note 10: N/A

Note 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD

Note 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB

Note 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

Note 14: N/A

Note 15: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

Note 16: N/A

Note 17: N/A

Note 18: N/A

Note 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

Note 20: N/A

Note 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

Note 22: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.

Note 23: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.

Note 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).

Note 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

Note 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

Note 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink

transmission bandwidth less than or equal to 54 RB.

Note 28: N/A

Note 29: N/A

Note 30: This requirement applies when the E-UTRA carrier is confined within 2545-2575 MHz and the channel bandwidth is 10 or 20 MHz

Note 31: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.

Note 32: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

Table 6.6.3.2.3-1D: Spurious emission band UE co-existence limits Rel-12

E-UTRA Band	Spurious emission						
	Protected band	**Frequency range (MHz)**			**Maximum Level (dBm)**	**MBW (MHz)**	**Note**
1	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	15
	Frequency range	1880		1895	-40	1	15,27
	Frequency range	1895		1915	-15.5	5	15, 26, 27
	Frequency range	1915		1920	+1.6	5	15, 26, 27
	Frequency range	1839.9	-	1879.9	-50	1	15
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 26, 27, 28, 29, 30, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 41, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 26, 27, 28, 29, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
5	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 23, 24, 25, 28, 29, 30, 31, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 26	859	-	869	-27	1	
6	E-UTRA Band 1, 9, 11, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	875	-37	1	
	Frequency range	875	-	895	-50	1	
		1884.5	-	1919.6	-41	0.3	7
	Frequency range	1884.5	-	1915.7			8
7	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	15, 21, 26
	Frequency range	2575	-	2595	-15.5	5	15, 21, 26
	Frequency range	2595	-	2620	-40	1	15, 21
8	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 7	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
9	E-UTRA Band 1, 11, 18, 19, 21, 26, 28, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	

	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
11	E-UTRA Band 1, 11, 18, 19, 21, 28, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
12	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23, 25, 26, 27, 29, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	2
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	12, 15
	Frequency range	799	-	805	-35	0.00625	11, 12, 15
17	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
18	E-UTRA Band 1, 11, 21, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	890	-40	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

19	E-UTRA Band 1, 11, 21, 28, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
20	E-UTRA Band 1, 3, 7, 8, 20, 22, 31, 32, 33, 34, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
21	E-UTRA Band 1, 18, 19, 28, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
22	E-UTRA Band 1, 3, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	3510	-	3525	-40	1	15
	Frequency range	3525	-	3590	-50	1	
23	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 29, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
24	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 29, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
25	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 30, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18, 19, 21, 23, 24, 25, 26, 29, 30, 31, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	703	-	799	-50	1	
		799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
27	E-UTRA Band 1, 2, 3, 4, 5, 7, 10, 12, 13, 14, 17, 23, 25, 26, 27, 29, 30, 31, 38, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	799	-	805	-35	0.00625	
	E-UTRA Band 28	F_{DL_low}	-	790	-50	1	
28	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 4, 10, 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	19, 25
	Frequency range	470	-	694	-42	8	15, 35
	Frequency range	470	-	710	-26.2	6	34
	Frequency range	758	-	773	-32	1	15
	Frequency range	773	-	803	-50	1	
	Frequency range	662	-	694	-26.2	6	15
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
	Frequency range	1839.9	-	1879.9	-50	1	
30	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 38, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
31	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28,31, 32, 33, 34, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
…							
33	E-UTRA Band 1, 7, 8, 20, 22, 28, 31, 32,	F_{DL_low}	-	F_{DL_high}	-50	1	5

	34, 38, 40, 42, 43						
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
34	E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 31, 32, 33, 38, 39, 40, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	1839.9	-	1879.9	-50	1	
35							
36							
37			-				
38	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2620	-	2645	-15.5	5	15, 22, 26
	Frequency range	2645	-	2690	-40	1	15, 22
39	E-UTRA Band 22, 34, 40, 41, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805		1855	-40	1	33
	Frequency range	1855		1880	-15.5	5	15,26,33
40	E-UTRA Band 1, 3, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
41	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	30
	Frequency range	1839.9		1879.9	-50	1	30
	Frequency range	1884.5		1915.7	-41	0.3	8, 30
42	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
43	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 22	F_{DL_low}	-	F_{DL_high}	[-50]	[1]	3
44	E-UTRA Band 3, 5, 8, 34, 39, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 40, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2

Note 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1

Note 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

Note 3: To meet these requirements some restriction will be needed for either the operating band or protected band

Note 4: N/A

Note 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band

Note 6: N/A

Note 7: Applicable when co-existence with PHS system operating in 1884.5 -1919.6MHz.

Note 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.

Note 9: N/A

Note 10: N/A

Note 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD

Note 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB

Note 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

Note 14: N/A

Note 15: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

Note 16: N/A

Note 17: N/A

Note 18: N/A

Note 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

Note 20: N/A

Note 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

Note 22: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.

Note 23 This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.

Note 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).

Note 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

Note 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

Note 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink

transmission bandwidth less than or equal to 54 RB.

Note 28: N/A

Note 29: N/A

Note 30: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz

Note 31: N/A

Note 32: Void.

Note 33: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to [54 RB] for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

Note 34: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.

Note 35: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

Table 6.6.3.2.3-1E: Spurious emission band UE co-existence limits Rel-13

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
1	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	15
	Frequency range	1839.9	-	1879.9	-50	1	15
	Frequency range	1880		1895	-40	1	15, 27
	Frequency range	1895		1915	-15.5	5	15, 26, 27
	Frequency range	1915		1920	+1.6	5	15, 26, 27
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 30, 41, 42, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 41, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
5	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 23, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 18, 19	F_{DL_low}	-	F_{DL_high}	-40	1	38
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	38
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 38
6	E-UTRA Band 1, 9, 11, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	875	-37	1	
	Frequency range	875	-	895	-50	1	
	Frequency range	1884.5	-	1919.6	-41	0.3	7
		1884.5	-	1915.7			8
7	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 20, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 66, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	15, 21, 26
	Frequency range	2575	-	2595	-15.5	5	15, 21, 26
	Frequency range	2595	-	2620	-40	1	15, 21
8	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
9	E-UTRA Band 1, 11, 18, 19, 21, 26, 28, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 41, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
11	E-UTRA Band 1, 11, 18, 19, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
12	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23, 25, 26, 27, 29, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	12, 15
	Frequency range	799	-	805	-35	0.00625	11, 12, 15
17	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
18	E-UTRA Band 1, 11, 21, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
19	E-UTRA Band 1, 11, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

20	E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
21	E-UTRA Band 1, 18, 19, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
22	E-UTRA Band 1, 3, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	3510	-	3525	-40	1	15
	Frequency range	3525	-	3590	-50	1	
23	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 29, 30, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
24	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 29, 30, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
25	E-UTRA Band 4, 5, 10,12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 30, 41, 42, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18,19, 21, 23, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	703	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
27	E-UTRA Band 1, 2, 3, 4, 5, 7, 10, 12, 13, 14, 17, 23, 25, 26, 27, 29, 30, 31, 38, 40, 41, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 28	F_{DL_low}	-	790	-50	1	
	Frequency range	799	-	805	-35	0.00625	
28	E-UTRA Band 1, 4, 10, 22, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	19, 25
	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24
	Frequency range	470	-	694	-42	8	15, 35
	Frequency range	470	-	710	-26.2	6	34
	Frequency range	662	-	694	-26.2	6	15
	Frequency range	758	-	773	-32	1	15
	Frequency range	773	-	803	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
30	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 38, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
31	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
…							
33	E-UTRA Band 1, 7, 8, 20, 22, 28, 31, 32, 34, 38, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
34	E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 31, 32, 33, 38,39, 40, 41, 42, 43, 44, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	1839.9	-	1879.9	-50	1	
35							

36							
37			-				
38	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 66, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2620	-	2645	-15.5	5	15, 22, 26
	Frequency range	2645	-	2690	-40	1	15, 22
39	E-UTRA Band 1, 8, 22, 26, 34, 40, 41, 42, 44, 45	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805		1855	-40	1	33
	Frequency range	1855		1880	-15.5	5	15,26,33
40	E-UTRA Band 1, 3, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
41	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 45, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	30
	Frequency range	1839.9		1879.9	-50	1	30
	Frequency range	1884.5		1915.7	-41	0.3	8, 30
42	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 45, 65, 66, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
43	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 31,32, 33, 34, 38, 40, 65, 66, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22	F_{DL_low}	-	F_{DL_high}	[-50]	[1]	3
44	E-UTRA Band 1, 40, 42, 45	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 3, 5, 8, 34, 39, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
45	E-UTRA Band 1, 3, 5, 8, 34, 39, 40, 41, 42.44	F_{DL_low}	-	F_{DL_high}	-50	1	
65	E-UTRA Band 1, 7, 8, 20, 22, 28, 31, 32, 38, 40, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 5, 11, 18, 19, 21, 26, 27, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	36
	Frequency range	1884.5	-	1915.7	-41	0.3	37
	Frequency range	1900	-	1915	-15.5	5	15, 26, 27
	Frequency range	1915	-	1920	+1.6	5	15, 26, 27
66	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2

Note 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1.

Note 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

Note 3: To meet these requirements some restriction will be needed for either the operating band or protected band.

Note 4: N/A

Note 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band.

Note 6: N/A

Note 7: Applicable when co-existence with PHS system operating in 1884.5 -1919.6MHz.

Note 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.

Note 9: N/A

Note 10: N/A

Note 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD

Note 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation <

0.5 dB

Note 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

Note 14: N/A

Note 15: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth.

Note 16: N/A

Note 17: N/A

Note 18: N/A

Note 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

Note 20: N/A

Note 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

Note 22: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.

Note 23: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.

Note 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).

Note 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

Note 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

Note 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

Note 28: N/A

Note 29: N/A

Note 30: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz.

Note 31: N/A

Note 32: Void.

Note 33: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

Note 34: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.

Note 35: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

Note 36: This requirement is applicable for E-UTRA channel bandwidth allocated within 1920-1980 MHz.

Note 37: Applicable when the upper edge of the channel bandwidth frequency is greater than 1980MHz.

Note 38: Applicable only for UE category M1 and NB1.

Table 6.6.3.2.3-1F: Spurious emission band UE co-existence limits Rel-14

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
1	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	15
	Frequency range	1839.9	-	1879.9	-50	1	15
	Frequency range	1880		1895	-40	1	15, 27
	Frequency range	1895		1915	-15.5	5	15, 26, 27
	Frequency range	1915		1920	+1.6	5	15, 26, 27
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 41, 43, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
5	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
6	E-UTRA Band 1, 9, 11, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	875	-37	1	
	Frequency range	875	-	895	-50	1	
	Frequency range	1884.5	-	1919.6	-41	0.3	7
		1884.5	-	1915.7			8
7	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 20, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 66, 67, 68	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	15, 21, 26
	Frequency range	2575	-	2595	-15.5	5	15, 21, 26
	Frequency range	2595	-	2620	-40	1	15, 21
8	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
9	E-UTRA Band 1, 11, 18, 19, 21, 26, 28, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 41, 43, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
11	E-UTRA Band 1, 11, 18, 19, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
12	E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 48	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 25, 26, 27, 29, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	12, 15
	Frequency range	799	-	805	-35	0.00625	11, 12, 15
17	E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 48	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
18	E-UTRA Band 1, 11, 21, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
19	E-UTRA Band 1, 11, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

20	E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42, 69	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
21	E-UTRA Band 1, 18, 19, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
22	E-UTRA Band 1, 3, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 43, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	3510	-	3525	-40	1	15
	Frequency range	3525	-	3590	-50	1	
23	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 29, 30, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
24	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
25	E-UTRA Band 4, 5, 10,12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18,19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	703	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
27	E-UTRA Band 1, 2, 3, 4, 5, 7, 10, 12, 13, 14, 17, 25, 26, 27, 29, 30, 31, 38, 40, 41, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 28	F_{DL_low}	-	790	-50	1	
	Frequency range	799	-	805	-35	0.00625	
28	E-UTRA Band 1, 4, 10, 22, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	19, 25
	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24
	Frequency range	470	-	694	-42	8	15, 35
	Frequency range	470	-	710	-26.2	6	34
	Frequency range	662	-	694	-26.2	6	15
	Frequency range	758	-	773	-32	1	15
	Frequency range	773	-	803	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
30	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
31	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 40, 42, 43, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
…							
33	E-UTRA Band 1, 7, 8, 20, 22, 28, 31, 32, 34, 38, 40, 42, 43, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
34	E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 31, 32, 33, 38,39, 40, 41, 42, 43, 44, 45, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	1839.9	-	1879.9	-50	1	

35							
36							
37			-				
38	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 66, 67, 68	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2620	-	2645	-15.5	5	15, 22, 26
	Frequency range	2645	-	2690	-40	1	15, 22
39	E-UTRA Band 1, 8, 22, 26, 34, 40, 41, 42, 44, 45	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805		1855	-40	1	33
	Frequency range	1855		1880	-15.5	5	15,26,33
40	E-UTRA Band 1, 3, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
41	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 45, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	30
	Frequency range	1839.9		1879.9	-50	1	30
	Frequency range	1884.5		1915.7	-41	0.3	8, 30
42	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 45, 65, 66, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
43	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 31,32, 33, 34, 38, 40, 65, 66, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22	F_{DL_low}	-	F_{DL_high}	[-50]	[1]	3
44	E-UTRA Band 1, 40, 42, 45	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 3, 5, 8, 34, 39, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
45	E-UTRA Band 1, 3, 5, 8, 34, 39, 40, 41, 42.44	F_{DL_low}	-	F_{DL_high}	-50	1	
…							
47	E-UTRA Band 1, 3, 5, 7, 8, 22, 26, 28, 34, 39, 40, 41, 42, 44, 45, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	5925	-	5950	-30	1	38
	Frequency range	5815	-	5855	-30	1	38
	Frequency range	5795	-	5815	[-65]	1	38
48	E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70	FD_{L_low}	-	FD_{L_high}	-50	1	
65	E-UTRA Band 1, 7, 8, 20, 22, 28, 31, 32, 38, 40, 42, 43, 65, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 5, 11, 18, 19, 21, 26, 27, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	36
	Frequency range	1884.5	-	1915.7	-41	0.3	37
	Frequency range	1900	-	1915	-15.5	5	15, 26, 27
	Frequency range	1915	-	1920	+1.6	5	15, 26, 27
66	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42, 48	F_{DL_low}	-	F_{DL_high}	-50	1	2
68	E-UTRA Band 3, 7, 8, 28, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	2
…							
70	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1
NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.
NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band
NOTE 4: N/A
NOTE 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band
NOTE 6: N/A
NOTE 7: Applicable when co-existence with PHS system operating in 1884.5 -1919.6MHz.
NOTE 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.
NOTE 9: N/A
NOTE 10: N/A
NOTE 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD
NOTE 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB
NOTE 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.
NOTE 14: N/A
NOTE 15: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth.
NOTE 16: N/A
NOTE 17: N/A
NOTE 18: N/A
NOTE 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.
NOTE 20: N/A
NOTE 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
NOTE 22: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.
NOTE 23: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.
NOTE 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
NOTE 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink

transmission bandwidth less than or equal to 54 RB.
NOTE 28: N/A
NOTE 29: N/A
NOTE 30: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz
NOTE 31: N/A
NOTE 32: Void
NOTE 33: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.
NOTE 34: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.
NOTE 35: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.
NOTE 36: This requirement is applicable for E-UTRA channel bandwidth allocated within 1920-1980 MHz.
NOTE 37: Applicable when the upper edge of the channel bandwidth frequency is greater than 1980MHz.
NOTE 38: Applicable when NS_XX is configured by the pre-configured radio parameters.

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3.2.

This test use minimum requirements from many releases of TS 36.101 [2] due to release independence defined in TS 36.307 [16]

6.6.3.2.4 Test description

6.6.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) (Note 6, Note 7)				Low range, Mid range, High range (Note 6, 13, 16)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, Highest (Note 13, 16)		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Spurious Emissions testing			QPSK	6	6
1.4MHz				QPSK	1	1
3MHz				QPSK	15	15
3MHz				QPSK	1	1
5MHz				QPSK	25	25[12]
5MHz				QPSK	1	1[12]
5MHz				QPSK	20[8]	-
10MHz				QPSK	50	50
10MHz				QPSK	1	1
10MHz				QPSK	30[15]	
10MHz				QPSK	32[9]	-
10MHz				QPSK	1[10, 14]	-
15MHz				QPSK	75	75
15MHz				QPSK	54[3, 11]	54[4, 18]
15MHz				QPSK	1	1[5]
20MHz				QPSK	100	100
20MHz				QPSK	54[3, 11]	54[4, 18]
20MHz				QPSK	1	1[5]

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 3: To be used for requirements under note 15 in table 6.6.3.2.3-1 and table 6.6.3.2.3-1A, note 16 in table 6.6.3.2.3-1B, note 21 in table 6.6.3.2.3-1C in high range at RB#(full allocation – 54), instead of full allocation.
Note 4: To be used for requirements under note 16 in table 6.6.3.2.3-1 and table 6.6.3.2.3-1A, note 17 in table 6.6.3.2.3-1B, note 22 in table 6.6.3.2.3-1C in high range - 5MHz at RB#(full allocation – 54), instead of full allocation.
Note 5: For requirements under note 16 in table 6.6.3.2.-1 and table 6.6.3.2.3-1A, note 17 in table 6.6.3.2.3-1B, note 22 in table 6.6.3.2.3-1C (high range – 5MHz) is tested instead of high channel.
Note 6: Do not apply for requirements under Note 13 in Tables 6.6.3.2.3-1 to 6.6.3.2.3-1C. Test frequencies for these requirements are defined in Table 6.6.3.2.4.1-2.
Note 7: Void
Note 8: For requirements under note 17 in table 6.6.3.2.3-1A, note 18 in table 6.6.3.2.3-1B, note 23 in table 6.6.3.2.3-1C (high range – 10MHz) is tested with RB #0 to RB #19 used.
Note 9: For requirements under note 17 in table 6.6.3.2.3-1A, note 18 in table 6.6.3.2.3-1B, note 23 in table 6.6.3.2.3-1C high range is tested with RB #4 to RB #35 used.
Note 10: For requirements under note 17 in table 6.6.3.2.3-1A, note 18 in table 6.6.3.2.3-1B, note 23 in table 6.6.3.2.3-1C high range is tested with RB #4 and (RB#max -4) used.
Note 11: To be used for requirements under note 17 in table 6.6.3.2.3-1, note 18 in table 6.6.3.2.3-1A, note 19 in table 6.6.3.2.3-1B and note 27 in table 6.6.3.2.3-1C in low range at RB#0, instead of full allocation.
Note 12: For requirements under note 16 in table 6.6.3.2.3-1 and table 6.6.3.2.3-1A, note 17 in table 6.6.3.2.3-1B, note 22 in table 6.6.3.2.3-1C, the message exception in Table 6.6.3.2.4.3-1 is used to test with the high range.
Note 13: For requirements under note 31 in table 6.6.3.2.3-1C and note 34 in table 6.6.3.2.3-1D only 720.5 MHz is tested with 5 MHz and only 723 MHz is tested with 10 MHz.
Note 14: For requirements under note 31 in table 6.6.3.2.3-1C and note 34 in table 6.6.3.2.3-1D RB #2 and RB #47 used.
Note 15: To be used for requirements under note 31 in table 6.6.3.2.3-1C and note 34 in table 6.6.3.2.3-1D at RB#2, instead of full allocation.
Note 16: For requirements under note 32 in table 6.6.3.2.3-1C and note 35 in table 6.6.3.2.3-1D only low range and 728 MHz with 10 MHz is tested.
Note 17: Void.
Note 18: To be used for requirements under note 33 in table 6.6.3.2.3-1D, table 6.6.3.2.3-1E or table 6.6.3.2.3-1F (high range-18 MHz for 15MHz channel bandwidth and high range-7 MHz for 20MHz channel bandwidth), instead of full allocation and high range. RB allocation shall start at RBstart=0.

Table 6.6.3.2.4.1-2: Test frequencies for E-UTRA channel bandwidth for operating band 3 with Note 13 (in Tables 6.6.3.2.3-1 to 6.6.3.2.3-1E)

Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
1.4	19942	1784.2	1942	1879.2
3	19934	1783.4	1934	1878.4
5	19924	1782.4	1924	1877.4
10	19899	1779.9	1899	1874.9
15	19874	1777.4	1874	1872.4
20	19849	1774.9	1849	1869.9
Note: 1.4 and 3 MHz only tested for Rel8 and Rel9.				

1. Connect the SS to the UE to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.7.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.2.4.3.

6.6.3.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3.2.3-1 to 6.6.3.2.3-1E. For band 14 measurements made in a bandwidth of 6.25kHz, measurement parameter settings defined in table 6.6.3.2.4.2-1 shall be used. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3.2.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

Table 6.6.3.2.4.2-1: Measurement setup for band 14

	Option 1: Measurement with No RMS VBW available	**Option2 Measurement with VBW Filtering on Power scale**
VBW	>=62.5 kHz (10 times or more the RBW)	<=43Hz
RBW	<=6.25kHz	<=6.25kHz
Detector type	Averages signal envelope during each measurement point, such as "RMS detector"	Peak
Averaging mode (Trace averaging)	Power (RMS voltage)	Power (RMS voltage), as controlled by "Average Type"
Average Type (applies to detector)	Power (RMS voltage) (automatically occurs with "RMS detector")	Not applicable
Average Type (applies to VBW filter)	Not applicable	Power (RMS voltage)
Number of averages	30, to reduce variance as required, or use an even longer sweep time	1 or use an even narrower VBW filter, thus a longer sweep time
Sweep time	[Don't specify]	Sweep rate (span divided by sweep time) <= 0.8 * RBW*VBW

6.6.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.6.3.2.4.3-1: SystemInformationBlockType1 for Note 16 in table 6.6.3.2.3-1 and table 6.6.3.2.3-1A, Note 17 in table 6.6.3.2.3-1B, Note 22 in table 6.6.3.2.3-1C, table 6.6.3.2.3-1D and table 6.6.3.2.3-1E

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	19		

6.6.3.2.5 Test requirement

Test requirements for Spurious Emissions UE Co-existence are the same as the minimum requirements and are not repeated in this section.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in tables 6.6.3.2.3-1 to 6.6.3.2.3-1E according to the following rule:

The requirements for the UE are release specific and can be found in Tables 6.6.3.2.3-1 to 6.6.3.2.3-1E. If the UE support a band, which is not defined in the table corresponding UE's release, the requirements for this band are taken from the table of earliest release where requirements for this band are defined. This has been described in following Table 6.6.3.2.5-1.

Table 6.6.3.2.5-1: UE Requirements according to UE E-UTRA release and supported E-UTRA band

Band	UE Requirements per release						
	Rel-8	Rel-9	Rel-10	Rel-11	Rel-12	Rel-13	Rel-14
1	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
2	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
3	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
4	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
5	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
6	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
7	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
8	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
9	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
10	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
11	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
12	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
13	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
14	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
…							
17	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
18	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
19	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
20	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
21	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
22	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
23	Table 6.6.3.2.3-	Table 6.6.3.2.3-	Table 6.6.3.2.3-	Table 6.6.3.2.3-	Table 6.6.3.2.3-	Table 6.6.3.2.3-	Table 6.6.3.2.3-

	1B	1B	1B	1C	1D	1E	1F
24	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
25	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
26	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
27	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
28	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
30	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
31	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
…							
33	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
34	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
35							
36							
37							
38	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
39	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
40	Table 6.6.3.2.3-1	Table 6.6.3.2.3-1A	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
41	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
42	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
43	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
44	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
45	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
…							
48	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F
…..							
65	N/A [1]	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
66	N/A [2]	N/A [2]	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F

Note 1:	Operating band with number > 64 requires Rel-9 signalling (refer to TS 36.307 Ch. 3A.1 [16]) and tests can only be done from Rel-9 and onwards.	
Note 2:	Asymmetric operating band is release independent from release 10 (refer to TS 36.307 Ch. 3A.1 [16]) and tests can only be done from Rel-10 and onwards.	
Note 3:	Protected bands with Note 38 in Table 6.6.3.2.3-1E are tested in 6.6.3EA.2 or 6.6.3F.2.	

NOTE 1: The frequency range applicable with network signalled values of NS_05, NS_08, NS_09, NS_15,NS_16 and NS_27 are covered in 6.6.3.3 Additional Spurious Emissions.

NOTE 2: The following is applied to Note2 in Table 6.6.3.2.3-1, Table 6.6.3.2.3-1A, Table 6.6.3.2.3-1B, Table 6.6.3.2.3-1C and Table 6.6.3.2.3-1E. For frequency with 2nd, 3rd or 4th harmonic spurious emissions, the measurements are covered in 6.6.3.1.

NOTE 2: The restriction on the maximum uplink transmission to 54 RB in Notes 14 and 15 of Table 6.6.3.2.5-1 is intended for conformance testing and may be applied to network operation to facilitate coexistence when the aggressor and victim bands are deployed in the same geographical area. The applicable spurious emission requirement of -15.5 dBm/5MHz is a least restrictive technical condition for FDD/TDD coexistence and may have to be revised in the future.

6.6.3.2_1 Void

6.6.3.2A Spurious emission band UE co-existence for CA

Editor's note: This test case contains different requirements for different UE releases

6.6.3.2A.0 Minimum conformance requirements

This clause specifies the requirements for the specified carrier aggregation configurations for coexistence with protected bands.

NOTE 1: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

For inter-band carrier aggregation with the uplink assigned to two E-UTRA bands, the requirements in Table 6.6.3.2A.0-1a to 6.6.3.2A.0-1c apply on each component carrier with both component carriers are active.

NOTE 2: For inter-band carrier aggregation with uplink assigned to two E-UTRA bands the requirements in Table 6.6.3.2A.0-1a to 6.6.3.2A.0-1c could be verified by measuring spurious emissions at the specific frequencies where second and third order intermodulation products generated by the two transmitted carriers can occur; in that case, the requirements for remaining applicable frequencies in Table 6.6.3.2A.0-1a to 6.6.3.2A.0-1c would be considered to be verified by the measurements verifying the one uplink inter-band CA UE to UE co-existence requirements.

Table 6.6.3.2A.0-1a: Requirements for dual-uplink inter-band carrier aggregation limits for Rel-11 and Rel-12

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
CA_1A-3A	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 38, 40, 41, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11,18,19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	7, 10
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
CA_1A-5A	E-UTRA Band 1, 5, 7, 8, 22, 28, 31, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3,34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_1A-7A	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_1A-8A	E-UTRA Band 1, 20, 26, 28, 31, 32, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2,3
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	11
	Frequency range	860	-	890	-40	1	3, 11
	Frequency range	1884.5	-	1915.7	-41	0.3	7, 11
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
CA_1A-19A	E-UTRA Band 1, 11, 21, 28, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	3
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 7
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_1A-21A	E-UTRA Band 11	F_{DL_low}	-	F_{DL_high}	-35	1	3, 16
	E-UTRA Band 1, 18, 19, 28, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 21	F_{DL_low}	-	F_{DL_high}	-50	1	16
	Frequency range	1884.5	-	1915.7	-41	0.3	7
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_2A-4A	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 26, 27, 28, 29, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2

CA_2A-13A	E-UTRA Band 4, 5,10,12,13,17, 22, 23, 26, 27, 29, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2,14, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 24, 30, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	3
	Frequency range	799	-	805	-35	0.00625	3, 9
CA_3A-5A	E-UTRA Band 1, 5, 7, 8, 22, 28, 31, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3,34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 26	859	-	869	-27	1	
CA_3A-7A	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_3A-8A	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 8	F_{DL_low}	-	F_{DL_high}	-50	1	2, 3
	E-UTRA band 11, , , 21	F_{DL_low}	-	F_{DL_high}	-50	1	10,11
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 10, 11
	Frequency range	860	-	890	-40	1	3,11,17
CA_3A-19A	E-UTRA Band 1, 11, 21, 28	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 4
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_3A-20A	E-UTRA Band 1, 7, 8, 31, 32, 33, 34, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 22, 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
CA_3A-26A	E-UTRA Band 1, 5, 7, 26, 34, 39, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA band 22, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 10
	Frequency range	703	-	799	-50	1	
		799	-	803	-40	1	3
	Frequency range	851	-	859	-53	0.00625	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
CA_4A-7A	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 26, 27, 28, 29, 30, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_4A-12A	E-UTRA Band 2, 5, 7,13, 14, 17, 22, 23, 24, 25, 26, 27, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_4A-13A	E-UTRA Band 2,4, 5, 7, 10,12,13,17, 22, 23,25, 26, 27, 29, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 24, 30, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2

	Frequency range	769	-	775	-35	0.00625	3
	Frequency range	799	-	805	-35	0.00625	3, 9
CA_4A-17A	E-UTRA Band 2, 5, 7,13, 14, 17, 22, 23, 24, 25, 26, 27, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_5A-7A	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 22, 28, 29, 30, 31, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_5A-12A	E-UTRA Band 2, 5, 13, 14, 17, 22, 23, 24, 25, 30, 31, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 4, 10, 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_5A-17A	E-UTRA Band 2, 5, 13, 14, 17, 22, 23, 24, 25, 30, 31, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 4, 10, 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_7A-20A	E-UTRA Band 1,3, 7, 8, 22, 28, 31,32, 33, 34, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_7A-28A	E-UTRA Band 2, 3, 5, 7,8, 20, 26, 27,31,34, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 4, 10, 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	5, 6
	Frequency range	758	-	773	-32	1	3
	Frequency range	773	-	803	-50	1	
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_19A-21A	E-UTRA Band 1, 18, 19, 28, 34, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11	F_{DL_low}	-	F_{DL_high}	-50	1	3, 16
	E-UTRA Band 21	F_{DL_low}	-	F_{DL_high}	-50	1	16
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	4
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA 39A-41A	E-UTRA Band 1, 8, 26, 34, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805	-	1855	-40	1	20
	Frequency range	1855	-	1880	-15.5	5	3, 13, 20
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 18

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1
NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.4.2-1) for which the 2nd, 3rd or 4th harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 3: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.0-1 from the edge of the aggregated channel bandwidth.
NOTE 4: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.
NOTE 5: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

NOTE 6: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 7: Applicable when NS_05 in section 6.6.3.3.3.2 is signalled by the network.
NOTE 8: Applicable when NS_08 in subclause 6.6.3.3.3.4 is signalled by the network
NOTE 9: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD.
NOTE10: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.
NOTE 11: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.
NOTE 12: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
NOTE13: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
NOTE 14: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
NOTE 15: Applicable when NS_15 in subclause 6.6.3.3.3.10 is signalled by the network.
NOTE 16: Applicable when NS_09 in subclause 6.6.3.3.3.5 is signalled by the network
NOTE 17: This requirement is applicable only when Band 3 transmission frequency is less than or equal to 1765 MHz.
NOTE 18: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz
NOTE 19: Void.
NOTE 20: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

Table 6.6.3.2A.0-1b: Requirements for dual-uplink inter-band carrier aggregation limits for Rel-13

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
CA_1A-3A	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 38, 40, 41, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11,18,19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	7, 10
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
CA_1A-5A	E-UTRA Band 1, 5, 7, 8, 22, 28, 31, 38, 40, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3,34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_1A-7A	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31,32, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_1A-8A	E-UTRA Band 1, 20, 26, 28, 31, 32, 38, 40, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2,3
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	11
	Frequency range	860	-	890	-40	1	3, 11
	Frequency range	1884.5	-	1915.7	-41	0.3	7, 11
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
CA_1A-18A	E-UTRA Band 1, 11, 21, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	3
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 7
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_1A-19A	E-UTRA Band 1, 11, 21, 28, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 7
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_1A-21A	E-UTRA Band 11	F_{DL_low}	-	F_{DL_high}	-35	1	3, 16
	E-UTRA Band 1, 18, 19, 28, 34,	F_{DL_low}	-	F_{DL_high}	-50	1	

	42, 65						
	E-UTRA Band 21	F_{DL_low}	-	F_{DL_high}	-50	1	16
	Frequency range	1884.5	-	1915.7	-41	0.3	7
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_1A-26A	E-UTRA Band 1,5, 7, 11, 18, 19, 20, 21, 22, 26, 27, 31, 38, 40, 42, 43, 44, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1880	-	1895	-40	1	3, 12
	Frequency range	1895	-	1915	-15.5	5	3, 12, 13
	Frequency range	1915	-	1920	+1.6	5	3, 12, 13
	Frequency range	1884.5	-	1915.7	-41	0.3	7
	Frequency range	945	-	960	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	703	-	799	-50	1	
		799	-	803	-40	1	3
	Frequency range	1839.9	-	1879.9	-50	1	3
CA_1A-28A	E-UTRA Band 5, 7, 8, 18, 19, 20, 26, 27, 31, 32, 38, 40, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	5, 21
	E-UTRA Band 1, 65	F_{DL_low}	-	F_{DL_high}	-50	1	5, 6
	Frequency range	470	-	694	-42	8	3, 22
	Frequency range	470	-	710	-26.2	6	23
	Frequency range	758	-	773	-32	1	3
	Frequency range	773	-	803	-50	1	
	Frequency range	662	-	694	-26.2	6	3
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	1884.5	-	1915.7	-41	0.3	5, 7
CA_1A-42A	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 7
CA_2A-4A	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 26, 27, 28, 29, 30, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-5A	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 28, 29, 30, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-12A	E-UTRA Band 5, 13, 14, 17, 23, 24, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 12, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 4, 10	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-13A	E-UTRA Band 4, 5,10,12,13,17, 22, 23, 26, 27, 29, 41, 42, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2,14, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 24, 30, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	3

	Frequency range	799	-	805	-35	0.00625	3, 9
CA_3A-5A	E-UTRA Band 1, 5, 7, 8, 22, 28, 31, 38, 40, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3,34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 26	859	-	869	-27	1	
CA_3A-7A	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_3A-8A	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 8	F_{DL_low}	-	F_{DL_high}	-50	1	2, 3
	E-UTRA band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10,11
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 10, 11
	Frequency range	860	-	890	-40	1	3,11,17
CA_3A-19A	E-UTRA Band 1, 11, 21, 28, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	3
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 4, 7
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_3A-20A	E-UTRA Band 1, 7, 8, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 22, 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
CA_3A-26A	E-UTRA Band 1, 5, 7, 26, 34, 39, 40, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA band 22, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 10
	Frequency range	703	-	799	-50	1	
		799	-	803	-40	1	3
	Frequency range	851	-	859	-53	0.00625	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
CA_4A-5A	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 23, 24, 25, 28, 29, 30, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_4A-7A	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 26, 27, 28, 29, 30, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_4A-12A	E-UTRA Band 2, 5, 7,13, 14, 17, 22, 23, 24, 25, 26, 27, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10. 42, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_4A-13A	E-UTRA Band 2,4, 5, 7, 10,12,13,17, 22, 23,25, 26, 27, 29, 41, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	3

	E-UTRA Band 24, 30, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	3
	Frequency range	799	-	805	-35	0.00625	3, 9
CA_4A-17A	E-UTRA Band 2, 5, 7,13, 14, 17, 22, 23, 24, 25, 26, 27, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10. 42, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_5A-7A	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 22, 28, 29, 30, 31, 40, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_5A-12A	E-UTRA Band 2, 5, 13, 14, 17, 22, 23, 24, 25, 30, 31, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 4, 10, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_5A-17A	E-UTRA Band 2, 5, 13, 14, 17, 22, 23, 24, 25, 30, 31, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 4, 10, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_7A-20A	E-UTRA Band 1,3, 7, 8, 22, 28, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_7A-28A	E-UTRA Band 2, 3, 5, 7, 8, 20, 26, 27, 31, 34, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 4, 10, 22, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	5, 6
	Frequency range	758	-	773	-32	1	3
	Frequency range	773	-	803	-50	1	
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_18A-28A	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	5, 21
	E-UTRA Band 1, 65	F_{DL_low}	-	F_{DL_high}	-50	1	5, 6
	E-UTRA Band 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	470	-	710	-26.2	6	23
	Frequency range	758	-	773	-32	1	3
	Frequency range	773	-	799	-50	1	
	Frequency range	799	-	803	-40	1	3
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	3
	Frequency range	1884.5	-	1915.7	-41	0.3	4
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_19A-21A	E-UTRA Band 1, 18, 19, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11	F_{DL_low}	-	F_{DL_high}	-50	1	3, 16
	E-UTRA Band 21	F_{DL_low}	-	F_{DL_high}	-50	1	16
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	4
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	

	Frequency range	2595	-	2645	-50	1	
CA 39A-41A	E-UTRA Band 1, 8, 26, 34, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805	-	1855	-40	1	20
	Frequency range	1855	-	1880	-15.5	5	3, 13, 20
CA 39A-41C	E-UTRA Band 1, 8, 26, 34, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805	-	1855	-40	1	20
	Frequency range	1855	-	1880	-15.5	5	3, 13, 20
CA 39C-41A	E-UTRA Band 34, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. In case the exceptions are allowed due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3 or 4 for the 2nd, 3rd or 4th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.

NOTE 4: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.

NOTE 5: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

NOTE 6: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 7: Applicable when NS_05 in section 6.6.3.3.3.2 is signalled by the network.

NOTE 8: Applicable when NS_08 in subclause 6.6.3.3.3.4 is signalled by the network

NOTE 9: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD.

NOTE10: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

NOTE 11: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.

NOTE 12: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE13: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE 14: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 15: Applicable when NS_15 in subclause 6.6.3.3.3.10 is signalled by the network.

NOTE 16: Applicable when NS_09 in subclause 6.6.3.3.3.5 is signalled by the network

NOTE 17: This requirement is applicable only when Band 3 transmission frequency is less than or equal to 1765 MHz.

NOTE 18: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz

NOTE 19: Void.

NOTE 20: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to [54 RB] for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

NOTE 21: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic

	spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 22:	This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.
NOTE 23:	This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.

Table 6.6.3.2A.0-1c: Requirements for dual-uplink inter-band carrier aggregation limits for Rel-14

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
CA_1A-3A	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 38, 40, 41, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11,18,19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	7, 10
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
CA_1A-5A	E-UTRA Band 1, 5, 7, 8, 22, 28, 31, 38, 40, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3,34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_1A-7A	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31,32, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_1A-8A	E-UTRA Band 1, 20, 26, 28, 31, 32, 38, 40, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2,3
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	11
	Frequency range	860	-	890	-40	1	3, 11
	Frequency range	1884.5	-	1915.7	-41	0.3	7, 11
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
CA_1A-18A	E-UTRA Band 1, 11, 21, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	3
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 7
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_1A-19A	E-UTRA Band 1, 11, 21, 28, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 7
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_1A-21A	E-UTRA Band 11	F_{DL_low}	-	F_{DL_high}	-35	1	3, 16
	E-UTRA Band 1, 18, 19, 28, 34,	F_{DL_low}	-	F_{DL_high}	-50	1	

	42, 65						
	E-UTRA Band 21	F_{DL_low}	-	F_{DL_high}	-50	1	16
	Frequency range	1884.5	-	1915.7	-41	0.3	7
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_1A-26A	E-UTRA Band 1,5, 7, 11, 18, 19, 20, 21, 22, 26, 27, 31, 38, 40, 42, 43, 44, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1880	-	1895	-40	1	3, 12
	Frequency range	1895	-	1915	-15.5	5	3, 12, 13
	Frequency range	1915	-	1920	+1.6	5	3, 12, 13
	Frequency range	1884.5	-	1915.7	-41	0.3	7
	Frequency range	945	-	960	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	703	-	799	-50	1	
		799	-	803	-40	1	3
	Frequency range	1839.9	-	1879.9	-50	1	3
CA_1A-28A	E-UTRA Band 5, 7, 8, 18, 19, 20, 26, 27, 31, 32, 38, 40, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	5, 21
	E-UTRA Band 1, 65	F_{DL_low}	-	F_{DL_high}	-50	1	5, 6
	Frequency range	470	-	694	-42	8	3, 22
	Frequency range	470	-	710	-26.2	6	23
	Frequency range	758	-	773	-32	1	3
	Frequency range	773	-	803	-50	1	
	Frequency range	662	-	694	-26.2	6	3
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	1884.5	-	1915.7	-41	0.3	5, 7
CA_1A-42A	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	Frequency range	1880		1895	-40	1	3,12
	Frequency range	1895		1915	-15.5	5	3, 12, 13
	Frequency range	1915		1920	+1.6	5	3, 12, 13
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 7
CA_2A-4A	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 24, 26, 27, 28, 29, 30, 41, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-5A	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 28, 29, 30, 42, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-7A	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 26, 27, 29, 30, 42, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-12A	E-UTRA Band 5, 13, 14, 17, 24, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 12, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 4, 10, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-13A	E-UTRA Band 4, 5,10,12,13,17,	F_{DL_low}	-	F_{DL_high}	-50	1	

	22, 26, 27, 29, 41, 42, 66, 70						
	E-UTRA Band 2,14, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 24, 30, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	3
	Frequency range	799	-	805	-35	0.00625	3, 9
CA_3A-5A	E-UTRA Band 1, 5, 7, 8, 22, 28, 31, 38, 40, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3,34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 26	859	-	869	-27	1	
CA_3A-7A	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_3A-8A	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 8	F_{DL_low}	-	F_{DL_high}	-50	1	2, 3
	E-UTRA band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10,11
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 10, 11
	Frequency range	860	-	890	-40	1	3,11,17
CA_3A-19A	E-UTRA Band 1, 11, 21, 28, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 4
	Frequency range	1839.9	-	1879.9	-50	1	3
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_3A-20A	E-UTRA Band 1, 7, 8, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 22, 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
CA_3A-21A	E-UTRA Band 1, 18, 19, 28, 34, 65	FDL_low	-	FDL_high	-50	1	
	E-UTRA Band 42	FDL_low	-	FDL_high	-50	1	2
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	4
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_3A-26A	E-UTRA Band 1, 5, 7, 26, 34, 39, 40, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA band 22, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 10
	Frequency range	703	-	799	-50	1	
		799	-	803	-40	1	3
	Frequency range	851	-	859	-53	0.00625	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
CA_3A-42A	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13

	Frequency range	1884.5	-	1915.7	-41	0.3	8, 13
CA_4A-5A	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 43, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_4A-7A	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 26, 27, 28, 29, 30, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_4A-12A	E-UTRA Band 2, 5, 7,13, 14, 17, 22, 24, 25, 26, 27, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10. 42, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_4A-13A	E-UTRA Band 2,4, 5, 7, 10,12,13,17, 22, 25, 26, 27, 29, 41, 43, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 24, 30, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	3
	Frequency range	799	-	805	-35	0.00625	3, 9
CA_4A-17A	E-UTRA Band 2, 5, 7,13, 14, 17, 22, 24, 25, 26, 27, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10. 42, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_5A-7A	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 22, 28, 29, 30, 31, 40, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_5A-12A	E-UTRA Band 2, 5, 13, 14, 17, 22, 24, 25, 30, 31, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 4, 10, 41, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_5A-17A	E-UTRA Band 2, 5, 13, 14, 17, 22, 24, 25, 30, 31, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 4, 10, 41, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 12	F_{DL_low}	-	F_{DL_high}	-50	1	3
CA_7A-20A	E-UTRA Band 1,3, 7, 8, 22, 28, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_7A-28A	E-UTRA Band 2, 3, 5, 7, 8, 20, 26, 27, 31, 34, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 4, 10, 22, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	5, 6
	Frequency range	758	-	773	-32	1	3
	Frequency range	773	-	803	-50	1	
	Frequency range	2570	-	2575	+1.6	5	3, 13, 14
	Frequency range	2575	-	2595	-15.5	5	3, 13, 14
	Frequency range	2595	-	2620	-40	1	3, 14
CA_8A-41A	E-UTRA Band 1, 28, 34, 39, 40, 45, 65,	FDL_low	-	FDL_high	-50	1	
	E-UTRA band 3, 42	FDL_low	-	FDL_high	-50	1	2

	E-UTRA band 11, 21	FDL_low	-	FDL_high	-50	1	23, 30
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23, 30
CA_18A-28A	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	5, 21
	E-UTRA Band 1, 65	F_{DL_low}	-	F_{DL_high}	-50	1	5, 6
	E-UTRA Band 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	470	-	710	-26.2	6	23
	Frequency range	758	-	773	-32	1	3
	Frequency range	773	-	799	-50	1	
	Frequency range	799	-	803	-40	1	3
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	3
	Frequency range	1884.5	-	1915.7	-41	0.3	4
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_19A-21A	E-UTRA Band 1, 18, 19, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11	F_{DL_low}	-	F_{DL_high}	-50	1	3, 16
	E-UTRA Band 21	F_{DL_low}	-	F_{DL_high}	-50	1	16
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	4
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_19A-42A	E-UTRA Band 1, 11, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	4
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_21A-42A	E-UTRA Band 1, 18, 19, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	4
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA 39A-41A	E-UTRA Band 1, 8, 26, 34, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805	-	1855	-40	1	20
	Frequency range	1855	-	1880	-15.5	5	3, 13, 20
CA_39A-41C	E-UTRA Band 1, 8, 26, 34, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805	-	1855	-40	1	20
	Frequency range	1855	-	1880	-15.5	5	3, 13, 20
CA_39C-41A	E-UTRA Band 34, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_41A-42A	E-UTRA Band 1, 3, 5, 8, 26, 28, 33, 34, 39, 40, 44, 45, 65,	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	18
	Frequency range	1839.9		1879.9	-50	1	18
	Frequency range	1884.5		1915.7	-41	0.3	4, 18

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. In case the exceptions are allowed due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3 or 4 for the 2nd, 3rd or 4th harmonic respectively. The exception is allowed if the

measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.

NOTE 4: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.

NOTE 5: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

NOTE 6: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 7: Applicable when NS_05 in section 6.6.3.3.3.2 is signalled by the network.

NOTE 8: Applicable when NS_08 in subclause 6.6.3.3.3.4 is signalled by the network

NOTE 9: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD.

NOTE10: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

NOTE 11: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.

NOTE 12: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE13: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE 14: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 15: Applicable when NS_15 in subclause 6.6.3.3.3.10 is signalled by the network.

NOTE 16: Applicable when NS_09 in subclause 6.6.3.3.3.5 is signalled by the network

NOTE 17: This requirement is applicable only when Band 3 transmission frequency is less than or equal to 1765 MHz.

NOTE 18: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz

NOTE 19: Void

NOTE 20: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

NOTE 21: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 22: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

NOTE 23: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.

Table 6.6.3.2A.0-2a: Spurious emission band UE co-existence for intraband carrier aggregation limits for Rel10

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
CA_1C	E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	8
CA_40C	E-UTRA Band 1, 3, 7, 8, 20, 22, 33, 34, 38, 39, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2^{nd} , 3^{rd} , 4^{th} , [or 5^{th}] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2^{nd}, 3^{rd}, 4^{th} [or 5^{th}] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band

NOTE 4: N/A

NOTE 5: N/A

NOTE 6: N/A

NOTE 7: N/A

NOTE 8: The requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

NOTE 9: N/A.

Table 6.6.3.2A.0-2b: Spurious emission band UE co-existence for intraband carrier aggregation limits for Rel11

E-UTRA CA Configuration	Spurious emission					
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
CA_1C	E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 38, 40, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	10
CA_7C	E-UTRA Band 1, 3, 7, 8, 20, 22, 27, 28, 29, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_38C	E-UTRA Band 1,3, 8, 20, 22, 27, 28, 29, 33, 34, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_40C	E-UTRA Band 1, 3, 7, 8, 20, 22, 26, 27, 33, 34, 38, 39, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_41C	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 34, 39, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2^{nd} , 3^{rd} , 4^{th} [or 5^{th}] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2^{nd}, 3^{rd}, 4^{th} or [5^{th}] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band

NOTE 4: N/A

NOTE 5: N/A

NOTE 6: N/A

NOTE 7: N/A

NOTE 8: N/A

NOTE 9: N/A

NOTE 10: The requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.1.3-1 from the edge of the aggregated channel bandwidth.

NOTE 11: N/A

NOTE 12: N/A

Table 6.6.3.2A.0-2c: Spurious emission band UE co-existence for intraband carrier aggregation limits for Rel12

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
CA_1C	E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 38, 40, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	10
CA_3C	E-UTRA Band 1, 7, 8, 20, 26, 27, 28, 31, 33, 34, 38, 41, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_7C	E-UTRA Band 1, 3, 7, 8, 20, 22, 27, 28, 29, 30, 31, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_38C	E-UTRA Band 1,3, 8, 20, 22, 27, 28, 29, 30, 31, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_39C	E-UTRA Band 22, 34, 40, 41, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_40C	E-UTRA Band 1, 3, 7, 8, 20, 22, 26, 27, 33, 34, 38, 39, 41, 42, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_41C	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_42C	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 33, 34, 38, 40, 41, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	

NOTE 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.2-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval

NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band

NOTE 4: N/A

NOTE 5: N/A

NOTE 6: N/A

NOTE 7: N/A

NOTE 8: N/A

NOTE 9: N/A

NOTE 10: The requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.0-1 from the edge of the aggregated channel bandwidth.

NOTE 11: N/A

NOTE 12: N/A

NOTE 13: N/A

NOTE 14: N/A

Table 6.6.3.2A.0-2d: Spurious emission band UE co-existence for intraband carrier aggregation limits for Rel13

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
CA_1C	E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	10
CA_3C	E-UTRA Band 1, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 41, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_7C	E-UTRA Band 1, 3, 7, 8, 20, 22, 27, 28, 29, 30. 31, 32, 33, 34, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_8B	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 7	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA Band 22, 41, 42, 43	F_{DL_low}		F_{DL_high}	-50	1	2
CA_38C	E-UTRA Band 1,3, 8, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_39C	E-UTRA Band 22, 34, 40, 41, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_40C	E-UTRA Band 1, 3, 7, 8, 20, 22, 26, 27, 32, 33, 34, 38, 39, 41, 42, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_41C	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_42C	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 65, 66, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	

NOTE 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.5-1.
NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.
NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band.
NOTE 4: N/A
NOTE 5: N/A
NOTE 6: N/A
NOTE 7: N/A
NOTE 8: N/A
NOTE 9: N/A
NOTE 10: The requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.
NOTE 11: N/A
NOTE 12: N/A
NOTE 13: N/A
NOTE 14: N/A

Table 6.6.3.2A.0-2e: Spurious emission band UE co-existence for intraband carrier aggregation limits for Rel14

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
CA_1C	E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	10
CA_3C	E-UTRA Band 1, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 41, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_5B	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_7C	E-UTRA Band 1, 3, 7, 8, 20, 22, 27, 28, 29, 30. 31, 32, 33, 34, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_8B	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 7	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	10
	E-UTRA Band 22, 41, 42, 43	F_{DL_low}		F_{DL_high}	-50	1	2
CA_38C	E-UTRA Band 1,3, 8, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_39C	E-UTRA Band 22, 34, 40, 41, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_40C	E-UTRA Band 1, 3, 7, 8, 20, 22, 26, 27, 32, 33, 34, 38, 39, 41, 42, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_40D	E-UTRA Band 1, 3, 7, 8, 20, 22, 26, 27, 32, 33, 34, 38, 39, 41, 42, 43, 44, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_41C	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_42C	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 65, 66, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	

NOTE 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.5-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval

NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band

NOTE 4: N/A

NOTE 5: N/A

NOTE 6: N/A

NOTE 7: N/A

NOTE 8: N/A

NOTE 9: N/A

NOTE 10: The requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.

NOTE 11: N/A

NOTE 12: N/A

NOTE 13: N/A

NOTE 14: N/A

Table 6.6.3.2A.0-3: Requirements for intraband non-contiguous CA

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
CA_4A-4A	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 22, 23, 24, 25, 26, 27, 28, 29, 30, 41, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1 NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd or 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RE within the transmission bandwidth (see Figure 5.4.2-1) for which the 2nd or 3rd harmonic, i.e. the frequency equal to two or three times the frequency of that RE, is within the measurement bandwidth (MBW).							

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3.2A.

This test use minimum requirements from many releases of TS 36.101 [2] due to release independence defined in TS 36.307 [16].

6.6.3.2A.1 Spurious emission band UE co-existence for CA (intra-band contiguous DL CA and UL CA)

6.6.3.2A.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions for intra-band contiguous DL CA and UL CA.

6.6.3.2A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

6.6.3.2A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.3.2A.0.

6.6.3.2A.1.4 Test description

6.6.3.2A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3.2A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.2A.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] clause 4.1			NC					
Test Frequencies as specified in TS36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Low range, High range					
Test CC Combination setting (NRB_agg) as specified in clause 5.4.2A.1 for the CA Configuration			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50		QPSK	2	P_1@0	S_1@49		
25	50		QPSK	75	P_25@0	S_50@0		
50	50		QPSK	2	P_1@0	S_1@49		
50	50		QPSK	100	P_50@0	S_50@0		
75	75		QPSK	2	P_1@0	S_1@74		
75	75		QPSK	150	P_75@0	S_75@0		
100	25		QPSK	2	P_1@0	S_1@24		
100	25		QPSK	125	P_100@0	S_25@0		
100	50		QPSK	2	P_1@0	S_1@49		
100	50		QPSK	150	P_100@0	S_50@0		
100	75		QPSK	2	P_1@0	S_1@74		
100	75		QPSK	175	P_100@0	S_75@0		
100	100		QPSK	2	P_1@0	S_1@99		
100	100		QPSK	200	P_100@0	S_100@0		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.								
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.33 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3.2A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.2A.1.4.3.

6.6.3.2A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.3.2A.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.2A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.3.2A.0-2a to 6.6.3.2A.0-2e. The centre frequency of the filter shall be stepped in contiguous steps according to Table 6.6.3.2A.0-2a to 6.6.3.2A.0-2e. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3.2A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.3.2A.1.5 Test requirement

Test requirements for Spurious Emissions UE Co-existence are the same as the minimum requirements and are not repeated in this section.

The measured average power of spurious emission, derived in step 6, shall not exceed the described value in Tables 6.6.3.2A.1.5-1.

The requirements for the UE are release specific and can be found in Tables 6.6.3.2A.0-2a to 6.6.3.2A.0-2e. If the UE support a band, which is not defined in the table corresponding UE's release, the requirements for this band are taken from the table of earliest release where requirements for this band are defined. This has been described in following Table 6.6.3.2A.1.5-1.

Table 6.6.3.2A.1.5-1: UE Requirements according to UE E-UTRA release and supported E-UTRA CA configuration

E-UTRA CA Configuration	UE Requirements per release				
	Rel-10	**Rel-11**	**Rel-12**	**Rel-13**	**Rel-14**
CA_1C	Table 6.6.3.2A.0-2a	Table 6.6.3.2A.0-2b	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d
CA_3C	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d
CA_7C	Table 6.6.3.2A.0-2b	Table 6.6.3.2A.0-2b	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d
CA_8B	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d
CA_38C	Table 6.6.3.2A.0-2b	Table 6.6.3.2A.0-2b	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d
CA_39C	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d
CA_40C	Table 6.6.3.2A.0-2a	Table 6.6.3.2A.0-2b	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d
CA_41C	Table 6.6.3.2A.0-2b	Table 6.6.3.2A.0-2b	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2e
CA_42C	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2c	Table 6.6.3.2A.0-2d	Table 6.6.3.2A.0-2d

6.6.3.2A.2 Spurious emission band UE co-existence for CA (inter-band DL CA and UL CA)

6.6.3.2A.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions for inter-band DL CA and UL CA.

6.6.3.2A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.6.3.2A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.3.2A.0.

6.6.3.2A.2.4 Test description

6.6.3.2A.2.4.1 Initial conditions

Same as in clause 6.6.3.2A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.6.3.2A.1.4.1-1 → use Table 6.6.3.2A.2.4.1-1.
- Instead of clause 6.6.3.2A.1.4.3 use clause 6.6.3.2A.2.4.3.

Table 6.6.3.2A.2.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns.
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC N_{RB}”and “SCC N_{RB} ” columns

Test Parameters for CA Configurations											
ID	CA Configuration / N_{RB_agg} (Note 4)				PCC N_{RB}	SCC N_{RB}	DL Allocation		UL Allocation (Note 2,3)		
	CA Configuration						CC MOD	PCC & SCC RB allocation		CC MOD	PCC & SCC RB allocations (L_{CRB} @ RB_{start})
	PCC		SCC					PCC	SCC		
	Band	Range	Band	Range							
Default Test Settings for a CA_XA-YA Configuration											
1	X	Low	Y	Low	Highest N_{RB}	Highest N_{RB}	QPSK	NA		QPSK	1@0	1@0
2	X	High	Y	High	Highest N_{RB}	Highest N_{RB}	QPSK	NA		QPSK	1@RB_{max}	1@RB_{max}
Test Settings for CA_1A-3A Configuration											
1	1	Low	3	Low	100	100	QPSK	NA		QPSK	1@0	1@0
2	1	Low	3	Low	100	100	QPSK	NA		QPSK	1@99	1@0
3	1	High	3	High	100	100	QPSK	NA		QPSK	1@99	1@99
4	1	High	3	Note 7	100	100	QPSK	NA		QPSK	1@99	1@0
Test Settings for CA_1A-7A Configuration											
1	1	High	7	Low	100	100	QPSK	NA		QPSK	1@99	1@0
Test Settings for CA_1A-8A Configuration											
1	1	Low	8	Low	50	50	QPSK	NA		QPSK	1@0	1@0
2	1	Low	8	Low	100	50	QPSK	NA		QPSK	1@0	1@0
Test Settings for CA_1A-18A Configuration											
1	1	Low	18	Low	100	75	QPSK	NA		QPSK	1@0	1@0
2	1	Low	18	Low	100	75	QPSK	NA		QPSK	1@99	1@74
Test Settings for CA_1A-19A Configuration											
1	1	Mid	19	Mid	25	25	QPSK	NA		QPSK	1@0	1@0
2	1	Mid	19	Mid	25	25	QPSK	NA		QPSK	25@0	25@0
3	1	Mid	19	Mid	100	75	QPSK	NA		QPSK	1@0	1@0
4	1	Mid	19	Mid	100	75	QPSK	NA		QPSK	100@0	75@0
Test Settings for CA_1A-21A Configuration											
1	1	Mid	21	Mid	25	25	QPSK	NA		QPSK	1@24	1@24
2	1	Mid	21	Mid	25	25	QPSK	NA		QPSK	1@24	1@12
3	1	Mid	21	Mid	25	25	QPSK	NA		QPSK	25@0	25@0
4	1	Mid	21	Mid	100	75	QPSK	NA		QPSK	1@99	1@74
5	1	Mid	21	Mid	100	75	QPSK	NA		QPSK	1@99	1@37
6	1	Mid	21	Mid	100	75	QPSK	NA		QPSK	100@0	75@0
Test Settings for CA_1A-28A Configuration											
1	1	Low	28	Mid	100	100	QPSK	NA		QPSK	1@0	1@49
2	1	Low	28	Low	100	100	QPSK	NA		QPSK	1@0	1@0
3	1	High	28	High	100	100	QPSK	NA		QPSK	1@99	1@99

4	1	Low	28	Mid	100	100	QPSK	NA	QPSK	1@25	1@49
5	1	Low	28	Low	100	100	QPSK	NA	QPSK	1@0	1@0
6	1	High	28	High	100	100	QPSK	NA	QPSK	1@49	1@49
Test Settings for CA_1A-42A Configuration											
1	1	Low	42	Low	100	100	QPSK	NA	QPSK	1@0	1@0
2	1	Low	42	Low	100	100	QPSK	NA	QPSK	1@0	1@99
3	1	High	42	Mid	100	100	QPSK	NA	QPSK	1@99	1@24
Test Settings for CA_2A-4A Configuration (Note 6)											
1	2	Low	4	Low	50	50	QPSK	NA	QPSK	1@0	1@0
2	2	High	4	High	50	50	QPSK	NA	QPSK	1@49	1@49
3	2	Low	4	Low	50	50	QPSK	NA	QPSK	1@49	1@49
4	2	High	4	Low	50	50	QPSK	NA	QPSK	1@49	1@0
5	2	High	4	Low	50	50	QPSK	NA	QPSK	1@49	1@49
6	2	Low	4	Low	100	100	QPSK	NA	QPSK	1@0	1@0
7	2	High	4	High	100	100	QPSK	NA	QPSK	1@99	1@99
8	2	Low	4	Low	100	100	QPSK	NA	QPSK	1@99	1@99
9	2	High	4	Low	100	100	QPSK	NA	QPSK	1@99	1@0
10	2	High	4	Low	100	100	QPSK	NA	QPSK	1@99	1@99
Test Settings for CA_2A-7A Configuration											
1	2	Low	7	High	100	100	QPSK	NA	QPSK	1@0	1@99
Test Settings for CA_3A-5A Configuration											
1	3	Low	5	Low	50	50	QPSK	NA	QPSK	1@0	1@0
2	3	High	5	High	50	50	QPSK	NA	QPSK	1@49	1@49
3	3	Low	5	High	50	50	QPSK	NA	QPSK	1@0	1@49
4	3	Low	5	Low	100	50	QPSK	NA	QPSK	1@0	1@0
5	3	High	5	High	100	50	QPSK	NA	QPSK	1@99	1@49
6	3	Low	5	High	100	50	QPSK	NA	QPSK	1@0	1@49
Test Settings for CA_3A-7A Configuration (Note 5)											
1	3	Low	7	Low	100	100	QPSK	NA	QPSK	1@0	1@0
2	3	High	7	High	100	100	QPSK	NA	QPSK	1@99	1@99
3	3	Low	7	Low	100	100	QPSK	NA	QPSK	1@75	1@99
4	3	High	7	High	100	100	QPSK	NA	QPSK	1@0	1@99
5	3	Low	7	High	100	100	QPSK	NA	QPSK	1@0	1@99
6	3	Low	7	High	100	100	QPSK	NA	QPSK	1@99	1@99
7	3	High	7	Low	100	100	QPSK	NA	QPSK	1@0	1@99
Test Settings for CA_3A-8A Configuration											
1	3	Low	8	Low	50	50	QPSK	NA	QPSK	1@0	1@0
2	3	High	8	High	50	50	QPSK	NA	QPSK	1@49	1@49
3	3	High	8	High	50	50	QPSK	NA	QPSK	1@0	1@0
4	3	Low	8	High	50	50	QPSK	NA	QPSK	1@0	1@49
5	3	Low	8	Low	100	50	QPSK	NA	QPSK	1@0	1@0
6	3	High	8	High	100	50	QPSK	NA	QPSK	1@99	1@49
7	3	Low	8	Low	100	50	QPSK	NA	QPSK	1@99	1@49
8	3	High	8	High	100	50	QPSK	NA	QPSK	1@0	1@0
9	3	Low	8	High	100	50	QPSK	NA	QPSK	1@0	1@49
Test Settings for CA_3A-19A Configuration											

1	3	High	19	Mid	25	25	QPSK	NA	QPSK	1@0	1@0
2	3	High	19	Mid	25	25	QPSK	NA	QPSK	1@24	1@0
3	3	High	19	Mid	25	25	QPSK	NA	QPSK	25@0	25@0
4	3	High	19	Mid	100	75	QPSK	NA	QPSK	1@0	1@0
5	3	High	19	Mid	100	75	QPSK	NA	QPSK	1@99	1@0
6	3	High	19	Mid	100	75	QPSK	NA	QPSK	100@0	75@0
Test Settings for CA_3A-20A Configuration											
1	3	Low	20	Low	100	50	QPSK	NA	QPSK	1@0	1@0
2	3	High	20	High	100	50	QPSK	NA	QPSK	1@99	1@49
3	3	High	20	High	100	50	QPSK	NA	QPSK	1@99	1@0
4	3	Low	20	Low	100	100	QPSK	NA	QPSK	1@0	1@0
5	3	High	20	High	100	100	QPSK	NA	QPSK	1@99	1@99
6	3	High	20	High	100	100	QPSK	NA	QPSK	1@99	1@0
Test Settings for CA_3A-26A Configuration											
1	3	Low	26	Low	50	50	QPSK	NA	QPSK	1@0	1@0
2	3	High	26	High	50	50	QPSK	NA	QPSK	1@49	1@49
3	3	Low	26	Low	50	50	QPSK	NA	QPSK	1@0	1@49
4	3	High	26	High	50	50	QPSK	NA	QPSK	1@49	1@0
5	3	Low	26	Low	100	75	QPSK	NA	QPSK	1@0	1@0
6	3	High	26	High	100	75	QPSK	NA	QPSK	1@99	1@74
7	3	Low	26	Low	100	75	QPSK	NA	QPSK	1@0	1@74
8	3	High	26	High	100	75	QPSK	NA	QPSK	1@99	1@0
Test Settings for CA_4A-5A Configuration											
1	4	Low	5	Low	50	50	QPSK	NA	QPSK	1@0	1@0
2	4	High	5	High	50	50	QPSK	NA	QPSK	1@49	1@49
3	4	Low	5	High	50	50	QPSK	NA	QPSK	1@0	1@49
4	4	Low	5	Low	100	50	QPSK	NA	QPSK	1@0	1@0
5	4	High	5	High	100	50	QPSK	NA	QPSK	1@99	1@49
6	4	Low	5	High	100	50	QPSK	NA	QPSK	1@0	1@49
Test Settings for CA_4A-7A Configuration											
1	4	Low	7	Low	50	100	QPSK	NA	QPSK	1@0	1@0
2	4	High	7	Low	50	100	QPSK	NA	QPSK	1@0	1@0
3	4	High	7	Low	50	100	QPSK	NA	QPSK	1@49	1@0
4	4	High	7	Low	50	100	QPSK	NA	QPSK	1@49	1@99
5	4	Low	7	High	50	100	QPSK	NA	QPSK	1@49	1@0
6	4	Low	7	High	50	100	QPSK	NA	QPSK	1@0	1@99
7	4	Low	7	Low	100	100	QPSK	NA	QPSK	1@0	1@0
8	4	High	7	Low	100	100	QPSK	NA	QPSK	1@99	1@0
9	4	High	7	Low	100	100	QPSK	NA	QPSK	1@99	1@99
10	4	High	7	Low	100	100	QPSK	NA	QPSK	1@99	1@49
11	4	Low	7	High	100	100	QPSK	NA	QPSK	1@99	1@99
12	4	Low	7	High	100	100	QPSK	NA	QPSK	1@0	1@99
Test Settings for CA_5A-7A Configuration											
1	5	High	7	High	50	100	QPSK	NA	QPSK	1@49	1@99
2	5	High	7	High	50	100	QPSK	NA	QPSK	1@24	1@0
3	5	High	7	Low	50	100	QPSK	NA	QPSK	1@49	1@0

Test Settings for CA_5A-12A Configuration											
1	5	Low	12	Low	50	50	QPSK	NA	QPSK	1@0	1@49
2	5	High	12	High	50	50	QPSK	NA	QPSK	1@0	1@0
Test Settings for CA_5A-17A Configuration											
1	5	Low	17	Low	50	50	QPSK	NA	QPSK	1@0	1@0
Test Settings for CA_7A-20A Configuration											
1	7	High	20	High	100	50	QPSK	NA	QPSK	1@99	1@49
2	7	Low	20	Low	100	50	QPSK	NA	QPSK	1@0	1@49
3	7	Low	20	High	100	50	QPSK	NA	QPSK	1@0	1@49
4	7	High	20	High	100	100	QPSK	NA	QPSK	1@99	1@99
5	7	Low	20	Low	100	100	QPSK	NA	QPSK	1@0	1@99
Test Settings for CA_7A-28A Configuration											
1	7	High	28	High	100	50	QPSK	NA	QPSK	1@0	1@49
2	7	High	28	High	100	100	QPSK	NA	QPSK	1@99	1@99
Test Settings for CA_18A-28A Configuration											
1	18	Low	28	Mid	15	10	QPSK	NA	QPSK	1@0	1@0
2	18	Low	28	Mid	15	10	QPSK	NA	QPSK	1@74	1@49
Test Settings for CA_39A-41A Configuration											
1	39	High	41	High	100	100	QPSK	NA	QPSK	1@99	1@99
Test Settings for CA_41A-42A Configuration											
1	41	Note 8	42	Low	100	100	QPSK	NA	QPSK	1@0	1@99
2	41	Note 9	42	Note 11	100	100	QPSK	NA	QPSK	1@22	1@99
3	41	Note 9	42	Low	100	100	QPSK	NA	QPSK	1@44	1@99
4	41	Note 8	42	Low	100	100	QPSK	NA	QPSK	1@99	1@99
5	41	Note 9	42	High	100	100	QPSK	NA	QPSK	1@0	1@99
6	41	Note 9	42	High	100	100	QPSK	NA	QPSK	1@44	1@99
7	41	Note 10	42	Low	100	100	QPSK	NA	QPSK	1@0	1@99
8	41	Note 8	42	Low	100	100	QPSK	NA	QPSK	1@99	1@0
9	41	Note 9	42	Mid	100	100	QPSK	NA	QPSK	1@99	1@99

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use the Default Test Settings test points.
Note 3: X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1A-19A,X=1,Y=19.
Note 4: For CA configurations CA_1A-18A, CA_1A-19A, CA_1A-21A , CA_3A-19A and CA_18A-28A each test point shall be tested. For all other CA configurations only test points with highest N_{RB_agg} , according to UE supported BCS shall be tested.
Note 5: Test Point ID 7 for CA_3A-7A is applicable only for a Rel-13 and forward UE.
Note 6: Test Point ID 3 and Test Point ID 8 for CA_2A-4A are applicable only for a Rel-14 and forward UE.
Note 7: Test Point ID 4 for CA_1A-3A has the centre carrier frequency 1849.9 MHz, i.e. DL E-ARFCN is 1649.
Note 8: Test Point ID 1, 4 and 8 for CA_41A-42A have the centre carrier frequency of 2635 MHz in Band 41 (EARFCN=41040).
Note 9: Test Point ID 2, 3, 5, 6 and 9 for CA_41A-42A has the centre carrier frequency of 2555 MHz in Band 41 (EARFCN=40240).
Note 10: Test Point ID 7 for CA_41A-42A has the centre carrier frequency of 2674 MHz in Band 41 (EARFCN=41430).
Note 11: Test Point ID 2 for CA_41A-42A has the centre carrier frequency of 3421 MHz in Band 42 (EARFCN=41800).

6.6.3.2A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.3.2A.2.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.2A.2.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.3.2A.2.5-1 to Table 6.3.2A.2.5-3. The centre frequency of the filter shall be stepped in contiguous steps according to Table 6.6.3.2A.2.5-1 to Table 6.6.3.2A.2.5-3. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3.2A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.3.2A.2.5 Test requirement

The measured average power of spurious emission, derived in step 6, shall not exceed the described value in Tables 6.6.3.2A.2.5-1 to 6.6.3.2A.2.5-3 according to the following rule:

The requirements for the UE are release specific and can be found in Tables 6.6.3.2A.2.5-1 to 6.6.3.2A.2.5-3. If the UE supports a CA configuration, which is not defined in the table corresponding to UE's release, the requirements for this CA configuration are taken from the table of earliest release where requirements for this CA Configuration are defined. This has been described in following Table 6.6.3.2A.2.5-0.

Table 6.6.3.2A.2.5-0: UE Requirements according to UE E-UTRA release and supported E-UTRA CA Configuration

E-UTRA CA Configuration	UE Requirements per release			
	Rel-11	Rel-12	Rel-13	Rel-14
CA_1A-3A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-5A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-7A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-8A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-18A	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-19A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-21A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-26A	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-28A	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_1A-42A	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_2A-4A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_2A-5A	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_2A-7A	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3
CA_2A-12A	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_2A-13A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.25-3
CA_3A-5A	Table 6.6.3.2A.25-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.25-2	Table 6.6.3.2A.2.5-3
CA_3A-7A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_3A-8A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_3A-19A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_3A-20A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_3A-21A	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3
CA_3A-26A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_3A-42A	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3
CA_4A-5A	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_4A-7A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_4A-12A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_4A-13A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_4A-17A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_5A-7A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_5A-12A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_5A-17A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3

CA_7A-20A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_7A-28A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_8A-41A	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3
CA_18A-28A	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA_19A-21A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA 19A-42A	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3
CA 21A-42A	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3
CA 39A-41A	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-1	Table 6.6.3.2A.2.5-2	Table 6.6.3.2A.2.5-3
CA 41A-42A	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3	Table 6.6.3.2A.2.5-3

Table 6.6.3.2A.2.5-1: Requirements for dual-uplink inter-band carrier aggregation for Rel-11 and Rel-12

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
CA_1A-3A	E-UTRA Band 1, 32, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
CA_1A-5A	E-UTRA Band 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-7A	E-UTRA Band 32	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-8A	E-UTRA band43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_1A-19A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-21A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
CA_2A-4A	E-UTRA Band 4, 10, 22, 24	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-13A	E-UTRA Band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_3A-5A	E-UTRA Band 5, 7, 8, 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
CA_3A-7A	E-UTRA Band 5,8, 20, 26, 27, 28, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_3A-8A	E-UTRA Band 20, 28, 38, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3,11,17
CA_3A-19A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_3A-20A	E-UTRA Band 7, 8	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_3A-26A	E-UTRA Band 5, 7, 26	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	945	-	960	-50	1	
CA_4A-7A	E-UTRA Band 5, 12, 13, 14, 17, 26, 27, 28	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_4A-12A	No requirement						
CA_4A-13A	E-UTRA Band 7, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_4A-17A	No requirement						
CA_5A-7A	E-UTRA Band 5, 28, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
CA_5A-12A	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_5A-17A	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_7A-20A	E-UTRA Band 28	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_7A-28A	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_19A-21A	No requirement						
CA_39A-41A	E-UTRA Band 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.4.2-1) for which the 2nd, 3rd or 4th harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 3: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.0-1 from the edge of the aggregated channel bandwidth.

NOTE 4: Void.

NOTE 5: Void.

NOTE 6: Void.
NOTE 7: Void.
NOTE 8: Applicable when NS_08 in subclause 6.6.3.3.3.4 is signalled by the network.
NOTE 9: Void.
NOTE10: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.
NOTE 11: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.
NOTE 12: Void.
NOTE13: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
NOTE 14: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
NOTE 15: Void.
NOTE 16: Void.
NOTE 17: This requirement is applicable only when Band 3 transmission frequency is less than or equal to 1765 MHz.
NOTE 18: Void.
NOTE 19: Void.
NOTE 20: Void.

Table 6.6.3.2A.2.5-2: Requirements for dual-uplink inter-band carrier aggregation for Rel-13

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
CA_1A-3A	E-UTRA Band 1, 32, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
CA_1A-5A	E-UTRA Band 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-7A	E-UTRA Band 32	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-8A	E-UTRA band43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_1A-18A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-19A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-21A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
CA_1A-26A	E-UTRA Band 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-28A	E-UTRA Band 7, 31, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	470	-	694	-42	8	3, 22
	Frequency range	470	-	710	-26.2	6	23
CA_1A-42A	E-UTRA Band 11, 21, 31, 32	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_2A-4A	E-UTRA Band 4, 10, 22, 24, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-5A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-12A	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_2A-13A	E-UTRA Band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_3A-5A	E-UTRA Band 5, 7, 8, 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
CA_3A-7A	E-UTRA Band 5, 8, 20, 26, 27, 28, 44, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_3A-8A	E-UTRA Band 20, 28, 38, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3,11,17
CA_3A-19A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_3A-20A	E-UTRA Band 7, 8	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_3A-26A	E-UTRA Band 5, 7, 26	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	945	-	960	-50	1	
CA_4A-5A	E-UTRA Band 5,7	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
	E-UTRA band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_4A-7A	E-UTRA Band 5, 12, 13, 14, 17, 26, 27, 28	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_4A-12A	No requirement						
CA_4A-13A	E-UTRA Band 7, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_4A-17A	No requirement						
CA_5A-7A	E-UTRA Band 5, 28, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
CA_5A-12A	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_5A-17A	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_7A-20A	E-UTRA Band 28	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2

CA_7A-28A	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_18A-28A	Frequency range	470	-	710	-26.2	6	23
CA_19A-21A	No requirement						
CA_39A-41A	E-UTRA Band 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.2-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.4.2-1) for which the 2nd, 3rd or 4th harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 3: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.0-1 from the edge of the aggregated channel bandwidth.

NOTE 4: Void.

NOTE 5: Void.

NOTE 6: Void.

NOTE 7: Void.

NOTE 8: Applicable when NS_08 in subclause 6.6.3.3.3.4 is signalled by the network.

NOTE 9: Void.

NOTE10: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

NOTE 11: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.

NOTE 12: Void.

NOTE13: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE 14: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 15: Void.

NOTE 16: Void.

NOTE 17: This requirement is applicable only when Band 3 transmission frequency is less than or equal to 1765 MHz.

NOTE 18: Void.

NOTE 19: Void.

NOTE 20: Void.

NOTE 21: Void.

NOTE 22: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

NOTE 23: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.

Table 6.6.3.2A.2.5-3: Requirements for dual-uplink inter-band carrier aggregation for Rel-14

E-UTRA CA Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
CA_1A-3A	E-UTRA Band 1, 32, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 21	F_{DL_low}	-	F_{DL_high}	-50	1	10
CA_1A-5A	E-UTRA Band 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-7A	E-UTRA Band 32	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-8A	E-UTRA band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_1A-18A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-19A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-26A	E-UTRA Band 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-28A	E-UTRA Band 7, 31, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	470	-	694	-42	8	3, 22
	Frequency range	470	-	710	-26.2	6	23
CA_1A-42A	E-UTRA Band 11, 21, 31, 32	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_1A-21A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
CA_2A-4A	E-UTRA Band 4, 10, 22, 24, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-5A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_2A-7A	E-UTRA Band 29	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_2A-12A	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_2A-13A	E-UTRA Band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_3A-5A	E-UTRA Band 5, 7, 8, 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
CA_3A-7A	E-UTRA Band 5, 8, 20, 26, 27, 28, 44, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_3A-8A	E-UTRA Band 20, 28, 38, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3,11,17
CA_3A-19A	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	860	-	890	-40	1	3, 8
	Frequency range	945	-	960	-50	1	
	Frequency range	2595	-	2645	-50	1	
CA_3A-20A	E-UTRA Band 7, 8	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_3A-26A	E-UTRA Band 5, 7, 26	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	945	-	960	-50	1	
CA_4A-5A	E-UTRA Band 5, 7	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA band 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_4A-7A	E-UTRA Band 5, 12, 13, 14, 17, 26, 27, 28	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_4A-12A	No requirement						
CA_4A-13A	E-UTRA Band 7, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_4A-17A	No requirement						
CA_5A-7A	E-UTRA Band 5, 28, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 26	859	-	869	-27	1	
CA_5A-12A	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_5A-17A	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_7A-20A	E-UTRA Band 28	F_{DL_low}	-	F_{DL_high}	-50	1	

	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	3
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
CA_7A-28A	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_18A-28A	Frequency range	470	-	710	-26.2	6	23
CA_19A-21A	No requirement						
CA_39A-41A	E-UTRA Band 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
CA_41A-42A	E-UTRA Band 3, 5, 8, 26, 28, 33, 39, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	18
	Frequency range	1839.9	-	1879.9	-50	1	18
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 18

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. In case the exceptions are allowed due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3 or 4 for the 2nd, 3rd or 4th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.

NOTE 4: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.

NOTE 5: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

NOTE 6: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 7: Applicable when NS_05 in section 6.6.3.3.3.2 is signalled by the network.

NOTE 8: Applicable when NS_08 in subclause 6.6.3.3.3.4 is signalled by the network

NOTE 9: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD.

NOTE10: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

NOTE 11: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.

NOTE 12: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE13: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE 14: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.

NOTE 15: Applicable when NS_15 in subclause 6.6.3.3.3.10 is signalled by the network.

NOTE 16: Applicable when NS_09 in subclause 6.6.3.3.3.5 is signalled by the network

NOTE 17: This requirement is applicable only when Band 3 transmission frequency is less than or equal to 1765 MHz.

NOTE 18: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz

NOTE 19: Void

NOTE 20: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

NOTE 21: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is

	permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 22:	This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.
NOTE 23:	This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.

6.6.3.2A.3 Spurious emission band UE co-existence for CA (intra-band non-contiguous DL CA and UL CA)

6.6.3.2A.3.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions for intra-band non-contiguous DL CA and UL CA.

6.6.3.2A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

6.6.3.2A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.3.2A.0.

6.6.3.2A.3.4 Test description

6.6.3.2A.3.4.1 Initial conditions

Same as in clause 6.6.3.2A.1.4.1 with the following exceptions:

- Instead of Table 6.6.3.2A.1.4.1-1 → use Table 6.6.3.2A.3.4.1-1.
- Instead of clause 6.6.3.2A.1.4.3 → use clause 6.6.3.2A.3.4.3.

Table 6.6.3.2A.3.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1	NC								
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	Refer to test points A: N/A (Range is not relevant), Maximum Wgap(low + high frequency)								
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to test points Test only test points with Lowest N_{RB} for PCC and SCC Highest N_{RB} for PCC and SCC								
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**			
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**
Test Parameters for CA_4A-4A Configurations									
1	25	25	35	N/A	N/A	QPSK	P_1@0	QPSK	S_1@24
2	25	25	35	N/A	N/A	QPSK	P_25@0	QPSK	S_25@0
3	100	100	5	N/A	N/A	QPSK	P_1@0	QPSK	S_1@99
4	100	100	5	N/A	N/A	QPSK	P_100@0	QPSK	S_100@0

6.6.3.2A.3.4.2 Test procedure

Same test procedure as in clause 6.6.3.2A.1.4.2 with the following exceptions:

- Instead of Table 6.6.3.2A.1.4.1-1 → use Table 6.6.3.2A.3.4.1-1.
- Instead of Table 6.6.3.2A.0-2a to 6.6.3.2A.0-2c → use Table 6.6.3.2A.0-3
- Instead of clause 6.6.3.2A.1.4.3 → use clause 6.6.3.2A.3.4.3.

6.6.3.2A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.6.3.2A.3.5 Test requirement

Test requirements for Spurious Emissions UE Co-existence are the same as the minimum requirements and are not repeated in this section.

The measured average power of spurious emission, derived in step 6, shall not exceed the described value in Table 6.6.3.2A.3.5-1.

The requirements for the UE are release specific and can be found in Table 6.6.3.2A.0-3. If the UE supports a band, which is not defined in the table corresponding UE's release, the requirements for this band are taken from the table of earliest release where requirements for this band are defined. This has been described in following Table 6.6.3.2A.3.5-1.

Table 6.6.3.2A.3.5-1: UE Requirements according to UE E-UTRA release and supported E-UTRA CA configuration

E-UTRA CA Configuration	UE Requirements per release
	Rel-12
CA_4A-4A	Table 6.6.3.2A.0-3

6.6.3.3 Additional spurious emissions

6.6.3.3.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions under the deployment scenarios where additional requirements are specified.

6.6.3.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 8 and forward.

6.6.3.3.3 Minimum conformance requirements

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

6.6.3.3.3.1 Minimum requirement (network signalled value “NS_04”)

When "NS 04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.1-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.1-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5, 10, 15, 20 MHz	
2490.5 ≤ f < 2495	-13	1 MHz
0 < f < 2490.5	-25	1 MHz

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.19.

6.6.3.3.3.2 Minimum conformance requirements (network signalled value "NS_05")

When "NS_05" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.2-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.2-1: Additional requirements (PHS)

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)				Measurement bandwidth
	5 MHz	10 MHz	15 MHz	20 MHz	
1884.5 ≤ f ≤1915.7[*1]	-41	-41	-41	-41	300 KHz
Note 1: Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the Channel BW assigned, where Channel BW is as defined in sub-clause 5.4.2. Additional restrictions apply for operations below this point.					

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.1.

6.6.3.3.3.3 Minimum conformance requirements (network signalled value "NS_07")

When "NS_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.3-1. These requirements also apply for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.3-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz	
769 ≤ f ≤ 775	-57	6.25 kHz
Note: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.2.

6.6.3.3.3.4 Minimum requirement (network signalled value "NS_08")

When "NS_08" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.4-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.4-1: Additional requirement

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)			Measurement bandwidth
	5MHz	10MHz	15MHz	
860 ≤ f ≤ 895	-40	-40	-40	1 MHz

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.3.

6.6.3.3.3.5 Minimum requirement (network signalled value "NS_09")

When "NS 09" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.5-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.5-1: Additional requirement

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)			Measurement bandwidth
	5MHz	10MHz	15MHz	
1475.9 ≤ f ≤ 1510.9	-35	-35	-35	1 MHz

NOTE 1: To improve measurement accuracy, A-MPR values for NS_09 specified in Table 6.2.4.3-1 in sub-clause 6.2.4 are derived based on 100 kHz RBW.

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.4.

6.6.3.3.3.6 Minimum requirement (network signalled value "NS_11")

When “NS_11” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.6-1. These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.6-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	1.4, 3, 5, 10, 15, 20 MHz		
E-UTRA Band 2	-50	1 MHz	
1998 ≤ f ≤ 1999	-21	1 MHz	
1997 ≤ f < 1998	-27	1 MHz	
1996 ≤ f < 1997	-32	1 MHz	
1995 ≤ f < 1996	-37	1 MHz	
1990 ≤ f < 1995	-40	1 MHz	

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.13.

6.6.3.3.3.7 Minimum requirement (network signalled value "NS_12")

When "NS 12" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.7-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.7-1: Additional requirements

Frequency band (MHz)	Channel bandwidth/ Spectrum emission limit (dBm)	Measurement bandwidth
	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz	
806 ≤ f ≤ 813.5	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 814.2 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.5.

6.6.3.3.3.8 Minimum requirement (network signalled value "NS_13")

When "NS 13" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.8-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.8-1: Additional requirements

Frequency band (MHz)	Channel bandwidth/ Spectrum emission limit (dBm)	Measurement bandwidth
	1.4, 3, 5 MHz	
806 ≤ f ≤ 816	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 819 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.6.

6.6.3.3.3.9 Minimum requirement (network signalled value "NS_14")

When "NS 14" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.9-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.9-1: Additional requirements

Frequency band (MHz)	Channel bandwidth/ Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz, 15 MHz	
806 ≤ f ≤ 816	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 824 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.7.

6.6.3.3.3.10 Minimum requirement (network signalled value "NS_15")

When "NS 15" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.10-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.10-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	1.4, 3, 5, 10, 15 MHz		
851 ≤ f ≤ 859	-53	6.25 kHz	1
Note 1: The emissions measurement shall be sufficiently power averaged to ensure standard deviation < 0.5 dB.			

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.8.

6.6.3.3.3.11 Minimum requirement (network signalled value "NS_16")

When “NS_16” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.11-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.11-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	1.4, 3, 5, 10 MHz		
790 ≤ f ≤ 803	-32	1 MHz	

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.9.

6.6.3.3.3.12 Minimum requirement (network signalled value "NS_17")

When “NS_17” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.12-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.12-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	5, 10 MHz		
470 ≤ f ≤ 710	-26.2	6 MHz	1
Note 1: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.			

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.10.

6.6.3.3.3.13 Minimum requirement (network signalled value "NS_18")

When “NS_18” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.13-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.13-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	5, 10, 15, 20 MHz		
692 ≤ f ≤ 698	-26.2	6 MHz	

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.11.

6.6.3.3.3.14 Minimum requirement (network signalled value "NS_19")

When “NS_19” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.14-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.14-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	3, 5, 10, 15, 20 MHz		
662 ≤ f ≤ 694	-25	8 MHz	

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.12.

6.6.3.3.3.15 Minimum requirement (network signalled value "NS_20")

When “NS_20” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.15-1. These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.15-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	5, 10, 15, 20 MHz		
1990 ≤ f < 1999	-40	1 MHz	
1999 ≤ f ≤ 2000	-40	Note 1	
Note 1: The measurement bandwidth is 1% of the applicable E-UTRA channel bandwidth (5.4.2.1-1).			

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.14.

6.6.3.3.3.16 Minimum requirement (network signalled value “NS_21”)

When “NS_21” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.16-1. These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.16-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5, 10 MHz	
2200 ≤ f < 2288	-40	1 MHz
2288 ≤ f < 2292	-37	1 MHz
2292 ≤ f < 2296	-31	1 MHz
2296 ≤ f < 2300	-25	1 MHz
2320 ≤ f < 2324	-25	1 MHz
2324 ≤ f < 2328	-31	1 MHz
2328 ≤ f < 2332	-37	1 MHz
2332 ≤ f ≤ 2395	-40	1 MHz

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.15.

6.6.3.3.3.17 Minimum requirement (network signalled value “NS_22”)

When "NS_22" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.17-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.17-1: Additional requirement

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	MBW
	5, 10, 15, 20 MHz	
3400 ≤ f ≤ 3800	-23 (NOTE 1, NOTE 3)	5 MHz
	-40 (NOTE 2)	1 MHz
NOTE 1: This requirement applies within an offset between 5 MHz and 25 MHz from the lower and from the upper edge of the channel bandwidth, whenever these frequencies overlap with the specified frequency band. NOTE 2: This requirement applies from 3400 MHz to 25 MHz below the lower E-UTRA channel edge and from 25 MHz above the upper E-UTRA channel edge to 3800 MHz. NOTE 3: This emission limit might imply risk of harmful interference to UE(s) operating in the protected operating band		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.16.

6.6.3.3.3.18 Minimum requirement (network signalled value “NS_23”)

When "NS_23" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.18-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

6.6.3.3.3.18-1: Additional requirement

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	MBW
	5, 10, 15, 20 MHz	
3400 ≤ f ≤ 3800	-23 (NOTE 1, NOTE 4)	5 MHz
	-40 (NOTE 2)	1 MHz
NOTE 1: This requirement applies within an offset between 5 MHz + $F_{offset_NS_23}$ and 25 MHz + $F_{offset_NS_23}$ from the lower and from the upper edges of the channel bandwidth, whenever these frequencies overlap with the specified frequency band. NOTE 2: This requirement applies from 3400 MHz to 25 MHz + $F_{offset_NS_23}$ below the lower E-UTRA channel edge and from 25 MHz + Foffset$_{NS_23}$ above the upper E-UTRA channel edge to 3800 MHz. NOTE 3: $F_{offset_NS_23}$ is: 0 MHz for 5 MHz channel BW, 5 MHz for 10 MHz channel BW, 9 MHz for 15 MHz channel BW and 12 MHz for 20 MHz channel BW. NOTE 4: This emission limit might imply risk of harmful interference to UE(s) operating in the protected operating band.		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.17.

6.6.3.3.3.19 Minimum requirement (network signalled value “NS_24”)

When "NS_24" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.19-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.19-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5 MHz, 10 MHz, 15 MHz, 20 MHz	
Band 34	-50	MHz
Note 1: This requirement applies at a frequency offset equal or larger than 5 MHz from the upper edge of the channel bandwidth, whenever these frequencies overlap with the specified frequency band.		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.20.

6.6.3.3.3.20 Minimum requirement (network signalled value “NS_25”)

When "NS_25" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.20-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.20-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5 MHz, 10 MHz, 15 MHz, 20 MHz	
Band 34	-40	MHz
Note 1: This requirement applies at a frequency offset equal or larger than 5 MHz from the upper edge of the channel bandwidth, whenever these frequencies overlap with the specified frequency band.		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.21.

6.6.3.3.3.21 Minimum requirement (network signalled value “NS_27”)

When "NS_27" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3.21-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Table 6.6.3.3.3.21-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5, 10, 15, 20 MHz	
$0 \le f \le 3530$	-40	1 MHz
$3720 \le f \le 5^{th}$ harmonic of the upper frequency edge of the UL operating band		

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3.23.

6.6.3.3.4 Test description

6.6.3.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3.3.4.1-1 through Table 6.6.3.3.4.1-22. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.3.4.1-1: Test Configuration Table (network signalled value "NS_04") (Power Class 2)

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range Additional test frequencies: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_05 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1 (Note 1)	5MHz	N/A for A-MPR testing		QPSK	1	0
2 (Note 1)	5MHz			QPSK	16	9
3 (Note 2)	5MHz			QPSK	25	0
4 (Note 1)	5MHz			16QAM	16	9
5 (Note 2)	5MHz			16QAM	25	0
6 (Note 1)	10MHz			QPSK	1	0
7 (Note 1)	10MHz			QPSK	1	49
8 (Note 1)	10MHz			QPSK	24	0
9 (Note 1)	10MHz			QPSK	40	10
10	10MHz			QPSK	50	0
11	10MHz			16QAM	50	0
12 (Note 1)	15MHz			QPSK	1	0
13 (Note 1)	15MHz			QPSK	1	74
14 (Note 1)	15MHz			QPSK	32	0
15 (Note 1)	15MHz			QPSK	60	15
16	15MHz			QPSK	75	0
17	15MHz			16QAM	75	0
18 (Note 1)	20MHz			QPSK	1	0
19 (Note 1)	20MHz			QPSK	1	99
20 (Note 1)	20MHz			QPSK	36	0
21 (Note 1)	20MHz			QPSK	75	25
22	20MHz			QPSK	100	0
23	20MHz			16QAM	100	0
Note 1: Only applicable for Low Range. Note 2: Only applicable for additional test frequencies.						

Table 6.6.3.3.4.1-2: Test Configuration Table (network signalled value "NS_04") (Power Class 3)

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0: For 5 MHz bandwidth: 2499.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866 Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39686 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10 MHz, 15 MHz, 20MHz		
Test Parameters for NS_04 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation TDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1 (Note 6)	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Note 6)	5MHz			QPSK	8	Note 3
3(Note 6)	5MHz			QPSK	6	Note 3
4 (Note 6)	5MHz			16QAM (Note 5)	25	0
5 (Note 6)	5MHz			16QAM (Note 5)	8	Note 3
6 (Note 6)	10MHz			QPSK	1	0
7 (Note 6)	10MHz			QPSK	12	0
8 (Note 6)	10MHz			QPSK	50	0
9 Note 6)	10MHz			16QAM (Note 5)	50 (Note 4)	0
10 (Note 6)	10MHz			QPSK	24	13
11 (Note 6)	10MHz			16QAM (Note 5)	24	13
12 (Note 6)	10MHz			QPSK	36	13
13 (Note 6)	10MHz			QPSK	12	37
14 (Note 6)	10MHz			QPSK	1	49
15 (Note 6)	15MHz			QPSK	1	0
16 (Note 6)	15MHz			QPSK	16	0
17 (Note 6)	15MHz			QPSK	75	0

18 (Note 6)	15MHz		16QAM (Note 5)	75 (Note 4)	0
19 (Note 6)	15MHz		QPSK	36	19
20 (Note 6)	15MHz		16QAM (Note 5)	36 (Note 4)	19
21 (Note 6)	15MHz		QPSK	50	19
22 (Note 6)	15MHz		QPSK	18	56
23 (Note 6)	15MHz		QPSK	1	74
24 (Note 6)	20MHz		QPSK	1	0
25 (Note 6)	20MHz		QPSK	18	0
26 (Note 6)	20MHz		QPSK	100	0
27 (Note 6)	20MHz		16QAM (Note 5)	100 (Note 4)	0
28 (Note 6)	20MHz		QPSK	50	25
29 (Note 6)	20MHz		16QAM (Note 5)	50 (Note 4)	25
30 (Note 6)	20MHz		QPSK	75	25
31 (Note 6)	20MHz		QPSK	25	75
32 (Note 6)	20MHz		QPSK	1	99
33 (Note 8)	5MHz		QPSK	1	0
34 (Note 8)	5MHz		QPSK	16	9
35 (Note 9)	5MHz		QPSK	25	0
36 (Note 8)	5MHz		16QAM (Note 5)	16	9
37 (Note 9)	5MHz		16QAM (Note 5)	25	0
38 (Note 8)	10MHz		QPSK	1	0
39 (Note 8)	10MHz		QPSK	1	49
40 (Note 8)	10MHz		QPSK	24	0
41 (Note 8)	10MHz		QPSK	40	10
42 (Note 7)	10MHz		QPSK	50	0
43 (Note 7)	10MHz		16QAM (Note 5)	50	0
44 (Note 8)	15MHz		QPSK	1	0
45 (Note 8)	15MHz		QPSK	1	74
46 (Note 8)	15MHz		QPSK	32	0
47 (Note 8)	15MHz		QPSK	60	15
48 (Note 7)	15MHz		QPSK	75	0
49 (Note 7)	15MHz		16QAM (Note 5)	75	0
50 (Note 8)	20MHz		QPSK	1	0
51 (Note 8)	20MHz		QPSK	1	99
52 (Note 8)	20MHz		QPSK	36	0
53 (Note 8)	20MHz		QPSK	75	25
54 (Note 7)	20MHz		QPSK	100	0
55 (Note 7)	20MHz		16QAM (Note 5)	100	0

Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in subclause 6.2.4 as not all combinations are necessarily required based on the applicability of the UE.
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 4: Applies only for UE-Categories ≥2.
Note 5: The 16QAM configurations shall not apply to UEs which support UL 64QAM.
Note 6: Applies only for Rel-11 and earlier.
Note 7: Applies only for Rel-12 and later.
Note 8: Applies only for Rel-12 and later and Low Range.
Note 9: Applies only for Rel-12 and later and Mid, High Range and additional test frequencies.

Table 6.6.3.3.4.1-3: Test Configuration Table (network signalled value "NS_05")

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range In case of Low range: - For 5MHz Channel Bandwidth: 1927.2MHz (N_{UL} = 18072) - For 10MHz Channel Bandwidth: 1934.7MHz (N_{UL} = 18147) - For 15MHz Channel Bandwidth: 1932.5MHz (N_{UL} = 18125) - For 20MHz Channel Bandwidth: 1930MHz (N_{UL} = 18100)						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, 10MHz, 15MHz, 20MHz						
Test Parameters for Channel Bandwidths							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**		**RB_{start}**
		FDD	**TDD**		**FDD**	**TDD**	**FDD**
5MHz	N/A for Additional Spurious Emissions testing			QPSK	1	N/A	0
5MHz				QPSK	1		24
5MHz				QPSK	25		0
10MHz				QPSK	1		0
10MHz				QPSK	1		49
10MHz				QPSK	12		0
10MHz				QPSK	12		38
10MHz				QPSK	48		0
10MHz				QPSK	48		2
10MHz (Note 7)				QPSK	50		0
10MHz (Note 7)				16QAM (Note 6)	50 (Note 3)		0
15MHz (Note 8)				QPSK	1		8
15MHz (Note 8)				QPSK	1		66
15MHz (Note 8)				QPSK	16		8
15MHz (Note 8)				QPSK	16		51
15MHz (Note 8)				QPSK	30		8
15MHz (Note 8)				QPSK	30		37
20MHz (Note 8)				QPSK	1		24
20MHz (Note 8)				QPSK	1		75
20MHz (Note 8)				QPSK	18		24
20MHz (Note 8)				QPSK	18		58
20MHz (Note 8)				QPSK	24		24
20MHz (Note 8)				QPSK	24		52
15MHz (Note 9)				QPSK	1		0
15MHz (Note 9)				QPSK	1		74
15MHz (Note 9)				QPSK	16		0
15MHz (Note 9)				QPSK	16		59
15MHz (Note 9)				QPSK	48		0
15MHz (Note 9)				QPSK	48		27

15MHz (Note 9)		QPSK	75		0
15MHz (Note 9)		16QAM (Note 6)	75 (Note 3)		0
20MHz (Note 9)		QPSK	1		0
20MHz (Note 9)		QPSK	1		99
20MHz (Note 9)		QPSK	18		0
20MHz (Note 9)		QPSK	18		82
20MHz (Note 9)		QPSK	48		0
20MHz (Note 9)		QPSK	48		52
20MHz (Note 9)		QPSK	100		0
20MHz (Note 9)		16QAM (Note 6)	100 (Note 3)		0
10MHz (Note 10)		QPSK	50		0
10MHz (Note 10)		16QAM (Note 6)	50 (Note 3)		0
15MHz (Note 10)		QPSK	1		0
15MHz (Note 10)		QPSK	75		0
15MHz (Note 10)		QPSK	16		8
15MHz (Note 10)		QPSK	30		8
15MHz (Note 10)		QPSK	54		8
15MHz (Note 10)		QPSK	64		8
15MHz (Note 10)		QPSK	1		74
15MHz (Note 10)		QPSK	6		69
15MHz (Note 10)		QPSK	8		67
20MHz (Note 10)		QPSK	1		0
20MHz (Note 10)		QPSK	100		0
20MHz (Note 10)		QPSK	18		24
20MHz (Note 10)		QPSK	24		24
20MHz (Note 10)		QPSK	40		24
20MHz (Note 10)		QPSK	50		24
20MHz (Note 10)		QPSK	72		24
20MHz (Note 10)		QPSK	1		99
20MHz (Note 10)		QPSK	6		94
20MHz (Note 10)		QPSK	24		76
10MHz (Note 11)		QPSK	50		0
10MHz (Note 11)		16QAM (Note 6)	50 (Note 3)		0

15MHz (Note 11)		QPSK	1		0
15MHz (Note 11)		QPSK	1		74
15MHz (Note 11)		QPSK	16		0
15MHz (Note 11)		QPSK	16		59
15MHz (Note 11)		QPSK	48		0
15MHz (Note 11)		QPSK	48		27
15MHz (Note 11)		QPSK	75		0
15MHz (Note 11)		16QAM (Note 6)	75 (Note 3)		0
20MHz (Note 11)		QPSK	1		0
20MHz (Note 11)		QPSK	1		99
20MHz (Note 11)		QPSK	18		0
20MHz (Note 11)		QPSK	18		82
20MHz (Note 11)		QPSK	48		0
20MHz (Note 11)		QPSK	48		52
20MHz (Note 11)		QPSK	100		0
20MHz (Note 11)		16QAM (Note 6)	100 (Note 3)		0

Note 1: Void
Note 2: Void
Note 3: Applies only for UE-Categories ≥2.
Note 4: Void.
Note 5: Void.
Note 6: The 16QAM configurations shall not apply to UEs which support UL 64QAM.
Note 7: Applies when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 8: Applies for low range and when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 9: Applies for mid range and when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 10: Applies only for low range and when bit number 1 in modifiedMPRbehavior = 1 (Rel-12 minimum requirements apply) for Band1 and low range for Band65.
Note 11: Applies only for mid range and when bit number 1 in modifiedMPRbehavior = 1 (Rel-12 minimum requirements apply) for Band1 and mid range for Band65.
Note 12: ModifiedMPRbehavior is defined in annex J.1

Table 6.6.3.3.4.1-4: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	RB_{start}
1	10MHz	N/A for Additional Spurious Emissions testing.		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			16QAM (Note 2)	36 (Note 1)	13
7	10MHz			QPSK	16	19
8	10MHz			QPSK	12	19
9	10MHz			16QAM (Note 2)	16	19
10	10MHz			QPSK	30	19
11	10MHz			16QAM (Note 2)	30 (Note 1)	19
12	10MHz			QPSK	6	43
13	10MHz			QPSK	2	48
14	10MHz			QPSK	50	0
15	10MHz			QPSK	12	0
16	10MHz			16QAM (Note 2)	50 (Note 1)	0
Note 1: Applies only for UE-Categories ≥2. Note 2: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.6.3.3.4.1-5: Test Configuration Table (network signalled value "NS_08")

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1		High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		5MHz, 10MHz, 15MHz				
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
5MHz	N/A for Additional Spurious Emissions testing			QPSK	1	N/A
5MHz				QPSK	8	
5MHz				QPSK	25	
10MHz				QPSK	1	
10MHz				QPSK	12	
10MHz				QPSK	40	
10MHz				QPSK	50	
10MHz				16QAM (Note 4)	50 (Note 3)	
15MHz				QPSK	1	
15MHz				QPSK	16	
15MHz				QPSK	40	
15MHz				QPSK	75	
15MHz				16QAM (Note 4)	75 (Note 3)	
Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.						
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth						
Note 3: Applies only for UE-Categories ≥2.						
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.6.3.3.4.1-6: Test Configuration Table (network signalled value "NS_09")

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, 10MHz, 15MHz					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
5MHz	N/A for Additional Spurious Emissions testing			QPSK	1	N/A
5MHz				QPSK	8	
5MHz				QPSK	25	
10MHz				QPSK	1	
10MHz				QPSK	12	
10MHz				QPSK	40	
10MHz				QPSK	50	
10MHz				16QAM (Note 4)	50 (Note 3)	
15MHz				QPSK	1	
15MHz				QPSK	16	
15MHz				QPSK	40	
15MHz				QPSK	54	
15MHz				QPSK	75	
15MHz				16QAM (Note 4)	75 (Note 3)	
Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.						
Note 2: The RB_{start} of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth						
Note 3: Applies only for UE-Categories ≥2.						
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.6.3.3.4.1-7: Test Configuration Table (network signalled value "NS_11")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 3 MHz Channel Bandwidth: a. 2001.5 MHz (N_{UL} = 25515) b. 2004.5 MHz (N_{UL} = 25545) For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2004.5 MHz (N_{UL} = 25545) c. 2007.5 MHz (N_{UL} = 25575) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2005.5 MHz (N_{UL} = 25555) c. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2007.5 MHz (N_{UL} = 25575) b. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				3MHz, 5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_11 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	3MHz	N/A for A-MPR testing		QPSK	6
2	3MHz			QPSK	15
3	3MHz			16QAM (Note 4)	6
4	3MHz			16QAM (Note 4)	15
5	5MHz			QPSK	1
6	5MHz			QPSK	8
7	5MHz			QPSK	25
8	5MHz			16QAM (Note 4)	8
9	5MHz			16QAM (Note 4)	25
10	10MHz			QPSK	1
11	10MHz			QPSK	12
12	10MHz			QPSK	50
13	10MHz			16QAM (Note 4)	12
14	10MHz			16QAM (Note 4)	50 (Note 3)
15	15MHz			QPSK	1
16	15MHz			QPSK	8

17	15MHz		QPSK	25
18	15MHz		QPSK	30
19	15MHz		QPSK	75
20	15MHz		16QAM (Note 4)	8
21	15MHz		16QAM (Note 4)	25
22	15MHz		16QAM (Note 4)	30
23	15MHz		16QAM (Note 4)	75
24	20MHz		QPSK	1
25	20MHz		QPSK	10
26	20MHz		QPSK	25
27	20MHz		QPSK	100
28	20MHz		16QAM (Note 4)	10
29	20MHz		16QAM (Note 4)	25
30	20MHz		16QAM (Note 4)	100

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-8: Test Configuration Table (network signalled value "NS_12")

Initial Conditions			
Test Environment (as specified in TS 36.508 [7] subclause 4.1)			NC
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)			For 1.4 MHz Channel Bandwidth: UL 814.9 MHz (NUL = 26699) For 3 MHz Channel Bandwidth: UL 815.7 MHz (NUL = 26707) For 5 MHz Channel Bandwidth: UL 816.7 MHz (NUL = 26717) For 10 MHz Channel Bandwidth: UL 819.2 MHz (NUL = 26742) For 15 MHz Channel Bandwidth: UL 821.7 MHz (NUL = 26767)
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)			1.4 MHz, 3 MHz, 5 MHz, 10 MHz and 15 MHz
Test Parameters for Channel Bandwidths			
		Downlink Configuration	**Uplink Configuration**

Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1	1.4 MHz	N/A for Additional Spurious Emissions testing		QPSK	1	0
2	1.4 MHz			QPSK	6	0
3	1.4 MHz			QPSK	1	1
4	1.4 MHz			QPSK	5	1
5	1.4 MHz			16QAM (Note 3)	6	0
6 (Note 1)	3 MHz			QPSK	4	0
7 (Note 1)	3 MHz			QPSK	10	0
8	3 MHz			QPSK	4	4
9	3 MHz			QPSK	10	4
10 (Note 1)	3 MHz			16QAM (Note 3)	15	0
11	5 MHz			QPSK	8	0
12	5 MHz			QPSK	15	0
13	5 MHz			QPSK	8	7
14 (Note 1)	5 MHz			QPSK	15	7
15	5 MHz			16QAM (Note 3)	25	0
16 (Note 2)	10 MHz			QPSK	18	0
17 (Note 2)	10 MHz			QPSK	18	16
18 (Note 2)	10 MHz			16QAM (Note 3)	50	0
19 (Note 2)	15 MHz			QPSK	30	0
20 (Note 2)	15 MHz			QPSK	30	31
21 (Note 2)	15 MHz			16QAM (Note 3)	75	0

Note 1: Only for UEs of Rel-11 and earlier.
Note 2: Only for UEs of Rel-12 and later.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-9: Test Configuration Table (network signalled value "NS_13")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)			NC			
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)			For 1.4 MHz Channel Bandwidth: UL 819.7 MHz (NUL = 26747) For 3 MHz Channel Bandwidth: UL 820.5 MHz (NUL = 26755) For 5 MHz Channel Bandwidth: UL 821.5 MHz (NUL = 26765)			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)			1.4 MHz, 3MHz and 5 MHz			
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD

1 (Note 1)	1.4 MHz	N/A for Additional Spurious Emissions testing	QPSK	6	0
2 (Note 1)	3 MHz		QPSK	15	0
3	5 MHz		QPSK	1	0
4	5 MHz		QPSK	25	0
5	5 MHz		QPSK	15	0
6	5 MHz		QPSK	15	7
7	5 MHz		16QAM (Note 2)	25	0

Note 1: Only for UEs of Rel-12 and later
Note 2: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-10: Test Configuration Table (network signalled value "NS_14")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)			NC			
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)			For 10 MHz Channel Bandwidth: UL 829 MHz (N_{UL} = 26840) For 15 MHz Channel Bandwidth: Mid range			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)			10 MHz, 15 MHz			
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1	10 MHz	N/A for Additional Spurious Emissions testing		QPSK	1	0
2	10 MHz			QPSK	25	0
3	10 MHz			QPSK	50	0
4	10 MHz			QPSK	25	1
5 (Note 1)	10 MHz			16QAM (Note 2)	50	0
6	15 MHz			QPSK	8	0
7	15 MHz			QPSK	25	0
8	15 MHz			QPSK	75	0
9	15 MHz			QPSK	50	15
10 (Note 1)	15 MHz			16QAM (Note 2)	75	0

Note 1: Applies only for UE-Categories ≥2.
Note 2: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-11: Test Configuration Table (network signalled value "NS_15")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	For 1.4 MHz Channel Bandwidth: High range For 3 MHz Channel Bandwidth: UL 843.5 MHz (N_{UL} = 26985) or High range For 5 MHz Channel Bandwidth: UL 842.5 MHz (N_{UL} = 26975) or High range For 10 MHz Channel Bandwidth: UL 840 MHz (NUL = 26950) or High range For 15 MHz Channel Bandwidth: UL 837.5 MHz (NUL = 26925) or High range
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz

Test Parameters for Channel Bandwidths						
		Downlink Configuration		Uplink Configuration		
Configuration ID	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1 (note 3)	1.4 MHz	N/A for Additional Spurious Emissions testing		QPSK	4	0
2 (note 3)	1.4 MHz			16QAM (Note 4)	6	0
3 (note 3)	3 MHz			QPSK	6	7
4 (note 3)	3 MHz			QPSK	12	1
5 (note 3)	3 MHz			16QAM (Note 4)	15	0
6 (note 2)	3 MHz			QPSK	15	0
7 (note 3)	5 MHz			QPSK	6	14
8 (note 3)	5 MHz			QPSK	20	0
9 (note 3)	5 MHz			16QAM (Note 4)	25	0
10 (note 2)	5 MHz			QPSK	16	9
11 (note 2)	5 MHz			QPSK	25	0
12 (note 3)	10 MHz			QPSK	1	39
13 (note 3)	10 MHz			QPSK	1	10
14 (note 3)	10 MHz			QPSK	3	0
15 (note 3)	10 MHz			QPSK	20	3
16 (note 3)	10 MHz			QPSK	36	1
17 (note 3)	10 MHz			QPSK	50	0
18 (note 1, 3)	10 MHz			16QAM (Note 4)	50	0
19 (note 2)	10 MHz			QPSK	20	25
20 (note 2)	10 MHz			QPSK	45	0
21 (note 3)	15 MHz			QPSK	18	36
22 (note 3)	15 MHz			QPSK	25	1

23 (note 3)	15 MHz		QPSK	54	0
24 (note 1, 3)	15 MHz		16QAM (Note 4)	75	0
25 (note 2)	15 MHz		QPSK	18	44
26 (note 2)	15 MHz		QPSK	60	2

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only test frequency < high range
Note 3: Applicable only to high range frequency testing.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-12: Test Configuration Table (network signalled value "NS_16")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: Low range For 3 MHz Channel Bandwidth: Low range, 810 MHz (N_{UL}= 27070) For 5 MHz Channel Bandwidth: Low range, 811 MHz (N_{UL}= 27080) , 814.5 MHz (N_{UL}= 27115) For 10 MHz Channel Bandwidth: Low range, 813.5 MHz (N_{UL}= 27105), 817 MHz (N_{UL}= 27140)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for Additional Spurious Emissions testing.		QPSK	1	0
2	1.4 MHz			QPSK	6	0
3 (Note 1)	1.4 MHz			16QAM (Note 4)	6	0
4	3 MHz			QPSK	1	0
5	3 MHz			QPSK	12	1
6	3 MHz			QPSK	15	0
7 (Note 1)	3 MHz			16QAM (Note 4)	15	0
8	5 MHz			QPSK	1	0
9	5 MHz			QPSK	12	2
10	5 MHz			QPSK	18	2
11	5 MHz			QPSK	20	0
12	5 MHz			QPSK	20	2
13	5 MHz			QPSK	25	0
14 (Note 1)	5 MHz			16QAM (Note 4)	25	0
15	10 MHz			QPSK	1	0
16 (Note 2)	10 MHz			QPSK	1	10

17 (Note 2)	10 MHz		QPSK	20	0
18 (Note 2)	10 MHz		QPSK	27	15
19 (Note 2)	10 MHz		QPSK	32	15
20	10 MHz		QPSK	32	0
21	10 MHz		QPSK	50	0
22 (Note 1)	10 MHz		16QAM (Note 4)	50	0
23 (Note 3)	10 MHz		QPSK	40	0
24 (Note 3)	10 MHz		QPSK	40	1

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applies only for 10 MHz channel for Low Range, and 813.5 MHz.
Note 3: Applies only for 10 MHz channel for 817 MHz range.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-13: Test Configuration Table (network signalled value "NS_17")

Initial Conditions					
Test Environment (as specified in TS 36.508[7] subclause 4.1)				Normal	
Test Frequencies (as specified inTS36.508 [7] subclause 4.3.1)				Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for Additional Spurious Emissions testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	5MHz			16QAM (Note 4)	25 (Note 3)
5	10MHz			QPSK	1
6	10MHz			QPSK	12
7	10MHz			QPSK	50
8	10MHz			16QAM (Note 4)	50 (Note 3)

Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-14: Test Configuration Table (network signalled value "NS_18")

Initial Conditions					
Test Environment (as specified in TS 36.508[7] subclause 4.1)				Normal	
Test Frequencies (as specified inTS36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for Additional Spurious Emissions testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	5MHz			16QAM (Note 2)	25 (Note 3)
5	10MHz			QPSK	1
6	10MHz			QPSK	12
7	10MHz			QPSK	50
8	10MHz			16QAM (Note 2)	50 (Note 3)
9	15MHz			QPSK	1
10	15MHz			QPSK	16
11	15MHz			QPSK	75
12	15MHz			16QAM (Note 2)	75 (Note 3)
13	20MHz			QPSK	1
14	20MHz			QPSK	18
15	20MHz			QPSK	100
16	20MHz			16QAM (Note 2)	100 (Note 3)

Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 2: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-15: Test Configuration Table (network signalled value "NS_19")

Initial Conditions					
Test Environment (as specified in TS 36.508[7] subclause 4.1)				Normal	
Test Frequencies (as specified inTS36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				3MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**
1	3MHz	N/A		QPSK	15
2	3MHz			16QAM (Note 4)	15 (Note 3)
3	10MHz			QPSK	40
4	10MHz			16QAM (Note 4)	40 (Note 3)
5	15MHz			QPSK	1
6	15MHz			QPSK	18
7	15MHz			QPSK	36
8	15MHz			QPSK	45
9	15MHz			16QAM (Note 4)	45 (Note 3)
10	20MHz			QPSK	1
11	20MHz			QPSK	40
12	20MHz			QPSK	45
13	20MHz			QPSK	50
14	20MHz			16QAM (Note 4)	50 (Note 3)

Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-16: Test Configuration Table (network signalled value "NS_20")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2007.5 MHz (N_{UL} = 25575) c. 2012.5 MHz (N_{UL} = 25625) d. 2017.5 MHz (N_{UL} = 25675) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_20 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for A-MPR testing		QPSK	8
2	5MHz			QPSK	15
3	5MHz			QPSK	25
4	5MHz			16QAM (Note 4)	15
5	5MHz			16QAM (Note 4)	25
6	10MHz			QPSK	8
7	10MHz			QPSK	12
8	10MHz			QPSK	50
9	10MHz			16QAM (Note 4)	12
10	10MHz			16QAM (Note 4)	50 (Note 3)
11	15MHz			QPSK	6
12	15MHz			QPSK	25
13	15MHz			QPSK	36
14	15MHz			QPSK	75
15	15MHz			16QAM (Note 4)	25
16	15MHz			16QAM (Note 4)	36
17	15MHz			16QAM (Note 4)	75
18	20MHz			QPSK	8
19	20MHz			QPSK	18

20	20MHz		QPSK	25
21	20MHz		QPSK	75
22	20MHz		QPSK	100
23	20MHz		16QAM (Note 4)	18
24	20MHz		16QAM (Note 4)	25
25	20MHz		16QAM (Note 4)	75
26	20MHz		16QAM (Note 4)	100

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 3: Applies only for UE-Categories ≥2.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-17: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range or High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 2)	5 MHz			QPSK	1	0
2 (note 2)	5 MHz			QPSK	25	0
3 (note 2)	10 MHz			QPSK	1	0
4 (note 3)	10 MHz			QPSK	1	49
5 (note 2)	10 MHz			QPSK	15	0
6 (note 3)	10 MHz			QPSK	3	47
7 (note 3)	10 MHz			QPSK	50	0
8 (note 1, 3)	10 MHz			16QAM (Note 4)	50	0

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only to low range frequency testing.
Note 3: Applicable only to high range frequency testing.
Note 4: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-18: Test Configuration Table (network signalled value "NS_22")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_22 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	25	0
3	5MHz			QPSK	1	24
4	5MHz			16QAM	1	0
5	5MHz			16QAM	1	24
6	10MHz			QPSK	50	0
7	10MHz			QPSK	36	0
8	10MHz			QPSK	1	0
9	10MHz			QPSK	1	49
10	10MHz			16QAM	1	0
11	10MHz			16QAM	1	49
12	15MHz			QPSK	75	0
13	15MHz			QPSK	50	0
14	15MHz			QPSK	1	0
15	15MHz			QPSK	1	74
16	15MHz			16QAM	1	0
17	15MHz			16QAM	1	74
18	20MHz			QPSK	100	0
19	20MHz			QPSK	64	0
20	20MHz			QPSK	1	0
21	20MHz			QPSK	1	99
22	20MHz			16QAM	1	0
23	20MHz			16QAM	1	99
Note 1: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.6.3.3.4.1-19: Test Configuration Table (network signalled value "NS_23")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_23 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	1	24
3	5MHz			QPSK	25	0
4	5MHz			16QAM	1	0
5	5MHz			16QAM	1	24
6	10MHz			QPSK	50	0
7	15MHz			QPSK	75	0
8	20MHz			QPSK	100	0
Note 1: The 16QAM configurations shall not apply to UEs which support UL 64QAM.						

Table 6.6.3.3.4.1-20: Test Configuration Table (network signalled value "NS_24")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Refer to F_{UL} in test parameters with following: 5 MHz CH BW: - 1985 MHz (N_{UL} = 131722) - 2007.5 MHz (N_{UL} = high range) 10 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) - 2005 MHz (N_{UL} = high range) 15 MHZ CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) - 2002.5 MHz (N_{UL} = high range) 20 MHz CH BW: 2000 MHz (N_{UL} = high range) -
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_24 A-MPR

			Downlink Configuration		Uplink Configuration		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	2007.5	5MHz	N/A for A-MPR testing		QPSK	1	0
2	2007.5	5MHz			QPSK	8	17
3	2007.5	5MHz			QPSK	25	0
4 (Notes 2,3)	2007.5	5MHz			16QAM	25	0
5	1985	5MHz			QPSK	8	17
6	1980	10MHz			QPSK	12	1
7 (Notes 2,3)	1980	10MHz			16QAM	50	0
8	1980	10MHz			QPSK	48	2
9	1980	10MHz			QPSK	25	25
10	1980	10MHz			QPSK	1	49
11	1980	10MHz			QPSK	12	38
12 (Notes 2,3)	1980	10MHz			16QAM	12	38
13	1980	10MHz			QPSK	3	47
14	1980	10MHz			QPSK	8	1
15	1990	10MHz			QPSK	1	0
16	1990	10MHz			QPSK	12	38
17 (Notes 2,3)	1990	10MHz			16QAM	50	0
18	2005	10MHz			QPSK	12	38
19	2005	10MHz			QPSK	50	0
20 (Notes 2,3)	2005	10MHz			16QAM	50	0
21	1980	15MHz			QPSK	1	11
22	1980	15MHz			QPSK	16	11
23	1980	15MHz			QPSK	45	11
24 (Notes 2,3)	1980	15MHz			16QAM	50	0
25	1980	15MHz			QPSK	16	28
26	1980	15MHz			QPSK	16	59
27	1980	15MHz			QPSK	60	15
28	1980	15MHz			QPSK	30	12
29	2002.5	15MHz			QPSK	1	0
30	2002.5	15MHz			QPSK	16	59
31 (Notes 2,3)	2002.5	15MHz			16QAM	16	59
32 (Notes 2,3)	2002.5	15MHz			16QAM	75	0
33	2000	20MHz			QPSK	1	0
34	2000	20MHz			QPSK	18	82
35 (Notes 2,3)	2000	20MHz			16QAM	18	82
36 (Notes 2,3)	2000	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 2:	Applies only for UE-Categories ≥2.
Note 3:	The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-21: Test Configuration Table (network signalled value "NS_25")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Refer to F_{UL} in test parameters with following: 5 MHz CH BW: - 2007.5 MHz (N_{UL} = high range) 10 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) - 2005 MHz (N_{UL} = high range) 15 MHZ CH BW: - 1980 MHz (N_{UL} = 132672) - 1990 MHz (N_{UL} = 131772) - 2002.5 MHz (N_{UL} = high range) 20 MHz CH BW: 2000 MHz (N_{UL} = high range) -
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_25 A-MPR							
			Downlink Configuration		Uplink Configuration		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	2007.5	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Notes 2,3)	2007.5	5MHz			16QAM	25	0
3	2007.5	5MHz			QPSK	8	9
4	2007.5	5MHz			QPSK	1	24
5	2007.5	5MHz			QPSK	8	17
6 (Notes 2,3)	2007.5	5MHz			16QAM	8	17
7	1980	10MHz			QPSK	12	1
8 (Notes 2,3)	1980	10MHz			16QAM	50	0
9 (Notes 2,3)	1980	10MHz			16QAM	48	2
10	1980	10MHz			QPSK	25	25
11	1980	10MHz			QPSK	1	49
12	1980	10MHz			QPSK	12	38
13	1990	10MHz			QPSK	12	0
14	1990	10MHz			QPSK	25	0
15	1990	10MHz			QPSK	50	0
16 (Notes 2,3)	1990	10MHz			16QAM	25	0
17	1990	10MHz			QPSK	48	2
18	1990	10MHz			QPSK	30	19
19 (Notes 2,3)	1990	10MHz			16QAM	30	19
20	1990	10MHz			QPSK	12	31
21	2005	10MHz			QPSK	1	0
22	2005	10MHz			QPSK	12	6
23	2005	10MHz			QPSK	50	0
24 (Notes 2,3)	2005	10MHz			16QAM	50	0
25	2005	10MHz			QPSK	40	10
26 (Notes 2,3)	2005	10MHz			16QAM	40	10
27	2005	10MHz			QPSK	32	18
28 (Notes 2,3)	2005	10MHz			16QAM	32	18
29	2005	10MHz			QPSK	12	23
30	1980	15MHz			QPSK	16	4
31	1980	15MHz			QPSK	75	0
32	1980	15MHz			QPSK	60	15
33 (Notes 2,3)	1980	15MHz			16QAM	40	35
34	1980	15MHz			QPSK	1	74
35	1980	15MHz			QPSK	12	63
36	1980	15MHz			QPSK	16	55
37	2002.5	15MHz			QPSK	1	0
38	2002.5	15MHz			QPSK	16	0
39 (Notes 2,3)	2002.5	15MHz			16QAM	16	0
40 (Notes 2,3)	2002.5	15MHz			16QAM	1	0

41	1980	20MHz		QPSK	1	0
42	1980	20MHz		QPSK	18	0
43 (Notes 2,3)	1980	20MHz		16QAM	100	0
44	1980	20MHz		QPSK	64	36
45	1980	20MHz		QPSK	18	72
46 (Notes 2,3)	1980	20MHz		16QAM	54	46
47	1980	20MHz		QPSK	18	55
48	2000	20MHz		QPSK	1	0
49	2000	20MHz		QPSK	18	72
50 (Notes 2,3)	2000	20MHz		16QAM	18	72
51 (Notes 2,3)	2000	20MHz		16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3.3.4.1-22: Test Configuration Table (network signalled value "NS_27")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to Frequency column in test parameters		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid	5MHz	N/A for A-MPR testing		QPSK	1	0
2	High	5MHz			QPSK	1	24
3	Low/Mid/High	5MHz			QPSK	25	0
4	Low/Mid/High	5MHz			16QAM	25	0
5	Low/Mid	10MHz			QPSK	1	0
6	High	10MHz			QPSK	1	49
7	Low/Mid/High	10MHz			QPSK	50	0
8 (Note 2)	Low/Mid/High	10MHz			16QAM	50	0
9	Low/Mid	15MHz			QPSK	1	0
10	Low	15MHz			QPSK	1	7
11	Low/Mid	15MHz			QPSK	16	0
12	High	15MHz			QPSK	1	74
13	High	15MHz			QPSK	1	67
14	High	15MHz			QPSK	16	74
15	Low/Mid/High	15MHz			QPSK	75	0
16 (Note 2)	Low/Mid/High	15MHz			16QAM	75	0
17	Low/Mid	20MHz			QPSK	1	0
18	Low	20MHz			QPSK	1	13
19	Low	20MHz			QPSK	1	16
20	Low/Mid	20MHz			QPSK	21	0
21	High	20MHz			QPSK	1	99
22	High	20MHz			QPSK	1	86
23	High	20MHz			QPSK	1	83
24	High	20MHz			QPSK	21	0
25	Low/Mid/High	20MHz			QPSK	100	0
26 (Note 2)	Low/Mid/High	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Editor's note: The following lines belong at the end of section 6.2.4.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.7.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3.3.4.1-1to Table 6.6.3.3.4.1-22 depending on network signal value.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.3.4.3.

6.6.3.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.3.4.1-1 to 6.6.3.3.4.1-22. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Tables 6.2.4.5-1 to 6.2.4.5-27 for Power Class 3 UEs or 6.2.4_1.5-2 for Power Class 2 UEs as appropriate. The period of the measurement shall be at least one sub-frame (1ms).
4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.3.3.5.1-1 to 6.6.3.3.5.21-1 as appropriate. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. For NS_07 measurements made in a bandwidth of 6.25kHz, measurement parameter settings defined in table 6.6.3.3.4.2-1 shall be used. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

Table 6.6.3.3.4.2-1: Measurement setup for NS_07

	Option 1: Measurement with No RMS VBW available	Option2 Measurement with VBW Filtering on Power scale
VBW	>=62.5 kHz (10 times or more the RBW)	<=43Hz
RBW	<=6.25kHz	<=6.25kHz
Detector type	Averages signal envelope during each measurement point, such as "RMS detector"	Peak
Averaging mode (Trace averaging)	Power (RMS voltage)	Power (RMS voltage), as controlled by "Average Type"
Average Type (applies to detector)	Power (RMS voltage) (automatically occurs with "RMS detector")	Not applicable
Average Type (applies to VBW filter)	Not applicable	Power (RMS voltage)
Number of averages	30, to reduce variance as required, or use an even longer sweep time	1 or use an even narrower VBW filter, thus a longer sweep time
Sweep time	[Don't specify]	Sweep rate (span divided by sweep time) <= 0.8 * RBW*VBW

6.6.3.3.4.3 Message contents

6.6.3.3.4.3.1 Message contents exceptions (network signalled value "NS_04")

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.1-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_04" for Power Class 2

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	4 (NS_04)		

6.6.3.3.4.3.2 Message contents (network signalled value "NS_05")

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions:

1. Information element additionalSpectrumEmission is set to NS_05. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.2-1: *SystemInformationBlockType2: A*dditional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	5 (NS_05)		

6.6.3.3.4.3.3 Message contents (network signalled value "NS_07")

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions:

1. Information element additionalSpectrumEmission is set to NS_07. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.3-1: *SystemInformationBlockType2: A*dditional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	7 (NS_07)		

6.6.3.3.4.3.4 Message contents (network signalled value "NS_08")

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions:

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.4-1: *SystemInformationBlockType2: A*dditional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	8 (NS_08)		

6.6.3.3.4.3.5 Message contents (network signalled value "NS_09")

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions:

1. Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.5-1: *SystemInformationBlockType2: A*dditional spurious emissions requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	9 (NS_09)		

6.6.3.3.4.3.6 Message contents exceptions (network signalled value "NS_11")

1. Information element additionalSpectrumEmission is set to NS_11. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.6-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_11"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	11 (NS_11)		

6.6.3.3.4.3.7 Message contents exceptions (network signalled value "NS_12")

1. Information element additionalSpectrumEmission is set to NS_12. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.7-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_12"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	12 (NS_12)		

6.6.3.3.4.3.8 Message contents exceptions (network signalled value "NS_13")

1. Information element additionalSpectrumEmission is set to NS_13. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.8-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_13"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	13 (NS_13)		

6.6.3.3.4.3.9 Message contents exceptions (network signalled value "NS_14")

1. Information element additionalSpectrumEmission is set to NS_14. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.9-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_14"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	14 (NS_14)		

6.6.3.3.4.3.10 Message contents exceptions (network signalled value "NS_15")

1. Information element additionalSpectrumEmission is set to NS_15. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.10-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_15"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	15 (NS_15)		

6.6.3.3.4.3.11 Message contents exceptions (network signalled value "NS_16")

1. Information element additionalSpectrumEmission is set to NS_16. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.11-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_16"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	16 (NS_16)		

6.6.3.3.4.3.12 Message contents exceptions (network signalled value "NS_17")

1. Information element additionalSpectrumEmission is set to NS_17. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.12-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_17"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	17 (NS_17)		

6.6.3.3.4.3.13 Message contents exceptions (network signalled value "NS_18")

1. Information element additionalSpectrumEmission is set to NS_18. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.13-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_18"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	18 (NS_18)		

6.6.3.3.4.3.14 Message contents exceptions (network signalled value "NS_19")

1. Information element additionalSpectrumEmission is set to NS_19. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.14-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_19"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	19 (NS_19)		

6.6.3.3.4.3.15 Message contents exceptions (network signalled value "NS_20")

1. Information element additionalSpectrumEmission is set to NS_20. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.15-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_20"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	20 (NS_20)		

6.6.3.3.4.3.16 Message contents exceptions (network signalled value "NS_21")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.16-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_21"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	21 (NS_21)		

6.6.3.3.4.3.17 Message contents exceptions (network signalled value "NS_22")

1. Information element additionalSpectrumEmission is set to NS_22. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.17-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_22"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	22(NS_23)		

6.6.3.3.4.3.18 Message contents exceptions (network signalled value "NS_23")

1. Information element additionalSpectrumEmission is set to NS_23. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.18-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_23"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	23(NS_23)		

6.6.3.3.4.3.19 Message contents exceptions (network signalled value "NS_24")

1. Information element additionalSpectrumEmission is set to NS_24. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.19-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_24"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	24 (NS_24)		

6.6.3.3.4.3.20 Message contents exceptions (network signalled value "NS_25")

1. Information element additionalSpectrumEmission is set to NS_25. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.20-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_25"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	25 (NS_25)		

6.6.3.3.4.3.21 Message contents exceptions (network signalled value "NS_27")

1. Information element additionalSpectrumEmission is set to NS_27. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3.4.3.21-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_27"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	27(NS_27)		

6.6.3.3.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for an additional spectrum emission requirement with protected bands as indicated from table 6.6.3.3.5.1-1 to table 6.6.3.3.5.21-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

6.6.3.3.5.1 Test requirement (network signalled value “NS_04”)

When "NS 04" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-3 or 6.2.4_1.5-2 as appropriate, and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.1-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.1-1: Additional requirements

Frequency band (MHz)	**Channel bandwidth / Spectrum emission limit (dBm)**	**Measurement bandwidth**
	5, 10, 15, 20 MHz	
2490.5 ≤ f < 2496	-13	1 MHz
0 < f < 2490.5	-25	1 MHz

6.6.3.3.5.2 Test requirement (network signalled value "NS_05")

When "NS_05" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-4 as appropriate,

and

the measured average power of spurious emission, derived in step 2, shall not exceed the described value in Table 6.6.3.3.5.2-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.2-1: Additional requirements (PHS) test requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)				Measurement bandwidth
	5 MHz	10 MHz	15 MHz	20 MHz	
1884.5 ≤ f ≤1915.7*1	-41	-41	-41	-41	300 KHz
Note 1: Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the Channel BW assigned, where Channel BW is as defined in sub-clause 5.4.2. Additional restrictions apply for operations below this point.					

The requirements in Table 6.6.3.3.5.2-1 apply with the additional restrictions specified in Table 6.6.3.3.5.2-2 when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is less than the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned.

Table 6.6.3.3.5.2-2: RB restrictions for additional requirement (PHS) (Rel-11 and earlier and bit number 1 in modifiedMPRbehavior = 0)

15 MHz channel bandwidth with f_c = 1932.5 MHz			
RB_{start}	0-7	8-66	67-74
L_{CRB}	N/A	≤ MIN(30, 67 – RB_{start})	N/A
20 MHz channel bandwidth with f_c = 1930 MHz			
RB_{start}	0-23	24-75	76-99
L_{CRB}	N/A	≤ MIN(24, 76 – RB_{start})	N/A

6.6.3.3.5.3 Test requirement (network signalled value "NS_07")

When "NS_07" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-7 as appropriate,

and

- the measured average power of spurious emission, derived in step 4, shall not exceed the described value in Table 6.6.3.3.5.3-1. These requirements also apply for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.3-1: Additional requirements (network signalled value "NS_07")

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz	
769 ≤ f ≤ 775	-55.5	6.25 kHz
Note: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB		

6.6.3.3.5.4 Test requirement (network signalled value "NS_08")

When "NS_08" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-8 as appropriate,

and

the measured average power of spurious emission, derived in step 4, shall not exceed the described value in Table 6.6.3.3.5.4-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.4-1: Additional requirements (network signalled value "NS_08")

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)			Measurement bandwidth
	5MHz	10MHz	15MHz	
860 ≤ f ≤ 895	-40	-40	-40	1 MHz

6.6.3.3.5.5 Test requirement (network signalled value "NS_09")

When "NS_09" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-9 as appropriate,

and

- the measured average power of spurious emission, derived in step 4, shall not exceed the described value in table 6.6.3.3.5.5-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.5-1: Additional requirements (network signalled value "NS_09")

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)			Measurement bandwidth
	5MHz	10MHz	15MHz	
1475.9 ≤ f ≤ 1510.9	-35	-35	-35	1 MHz

NOTE 1: To improve measurement accuracy, A-MPR values for NS_09 specified in Table 6.2.4.3-1 in sub-clause 6.2.4 are derived based on 100 kHz RBW.

6.6.3.3.5.6 Test requirement (network signalled value "NS_11")

When "NS 11" is indicated in the cell:

the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-11 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.6-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.6-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	1.4, 3, 5, 10, 15, 20 MHz		
E-UTRA Band 2	-50	1 MHz	
1998 ≤ f ≤ 1999	-21	1 MHz	
1997 ≤ f < 1998	-27	1 MHz	
1996 ≤ f < 1997	-32	1 MHz	
1995 ≤ f < 1996	-37	1 MHz	
1990 ≤ f < 1995	-40	1 MHz	

6.6.3.3.5.7 Test requirement (network signalled value "NS_12")

When "NS 12" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-12 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.7-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.7-1: Additional requirements

Frequency band (MHz)	Channel bandwidth/ Spectrum emission limit (dBm)	Measurement bandwidth
	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz	
806 ≤ f ≤ 813.5	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 814.2 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3.3.5.8 Test requirement (network signalled value "NS_13")

When "NS 13" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-13 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.8-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.8-1: Additional requirements

Frequency band (MHz)	Channel bandwidth/ Spectrum emission limit (dBm)	Measurement bandwidth
	1.4, 3, 5 MHz	
806 ≤ f ≤ 816	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 819 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3.3.5.9 Test requirement (network signalled value "NS_14")

When "NS 14" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-14 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.9-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.9-1: Additional requirements

Frequency band (MHz)	Channel bandwidth/ Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz, 15 MHz	
806 ≤ f ≤ 816	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 824 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3.3.5.10 Test requirement (network signalled value "NS_15")

When "NS 15" is indicated in the cell:

the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-15 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.10-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.10-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	1.4, 3, 5, 10, 15 MHz		
851 ≤ f ≤ 859	-53	6.25 kHz	

6.6.3.3.5.11 Test requirement (network signalled value "NS_16")

When "NS 16" is indicated in the cell:

the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-16 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.11-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.11-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	1.4, 3, 5, 10 MHz		
790 ≤ f ≤ 803	-32	1 MHz	

6.6.3.3.5.12 Test requirement (network signalled value "NS_17")

When "NS 17" is indicated in the cell:

the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-17 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.12-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.12-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	5, 10 MHz		
470 ≤ f ≤ 710	-26.2	6 MHz	1
Note 1: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.			

6.6.3.3.5.13 Test requirement (network signalled value "NS_18")

When "NS 18" is indicated in the cell:

the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-18 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.13-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.13-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	5, 10, 15, 20 MHz		
692 ≤ f ≤ 698	-26.2	6 MHz	

6.6.3.3.5.14 Test requirement (network signalled value "NS_19")

When "NS 19" is indicated in the cell:

the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-19 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.14-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.14-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	3, 5, 10, 15, 20 MHz		
662 ≤ f ≤ 694	-25	8 MHz	

6.6.3.3.5.15 Test requirement (network signalled value "NS_20")

When "NS 20" is indicated in the cell:

the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-20 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.15-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.15-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	Note
	5, 10, 15, 20 MHz		
1990 ≤ f < 1999	-40	1 MHz	
1999 ≤ f ≤ 2000	-40	Note 1	
Note 1: The measurement bandwidth is 1% of the applicable E-UTRA channel bandwidth (5.4.2.1-1).			

6.6.3.3.5.16 Test requirement (network signalled value “NS_21”)

When “NS_21” is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-21 as appropriate, and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.16-1. These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.16-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5, 10 MHz	
2200 ≤ f < 2288	-40	1 MHz
2288 ≤ f < 2292	-37	1 MHz
2292 ≤ f < 2296	-31	1 MHz
2296 ≤ f < 2300	-25	1 MHz
2320 ≤ f < 2324	-25	1 MHz
2324 ≤ f < 2328	-31	1 MHz
2328 ≤ f < 2332	-37	1 MHz
2332 ≤ f ≤ 2395	-40	1 MHz

6.6.3.3.5.17 Minimum requirement (network signalled value “NS_22”)

When "NS 22" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-22 as appropriate, and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.17-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.17-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	MBW
	5, 10, 15, 20 MHz	
3400 ≤ f ≤ 3800	-23 (NOTE 1, NOTE 3)	5 MHz
	-40 (NOTE 2)	1 MHz
NOTE 1: This requirement applies within an offset between 5 MHz and 25 MHz		

	from the lower and from the upper edge of the channel bandwidth, whenever these frequencies overlap with the specified frequency band.
NOTE 2:	This requirement applies from 3400 MHz to 25 MHz below the lower E-UTRA channel edge and from 25 MHz above the upper E-UTRA channel edge to 3800 MHz.
NOTE 3:	This emission limit might imply risk of harmful interference to UE(s) operating in the protected operating band

6.6.3.3.5.18 Minimum requirement (network signalled value “NS_23”)

When "NS 23" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-23 as appropriate, and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.18-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.18-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	MBW
	5, 10, 15, 20 MHz	
3400 ≤ f ≤ 3800	-23 (NOTE 1, NOTE 4)	5 MHz
	-40 (NOTE 2)	1 MHz
NOTE 1:	This requirement applies within an offset between 5 MHz + $F_{offset_NS_23}$ and 25 MHz + $F_{offset_NS_23}$ from the lower and from the upper edges of the channel bandwidth, whenever these frequencies overlap with the specified frequency band.	
NOTE 2:	This requirement applies from 3400 MHz to 25 MHz + $F_{offset_NS_23}$ below the lower E-UTRA channel edge and from 25 MHz + Foffset$_{NS_23}$ above the upper E-UTRA channel edge to 3800 MHz.	
NOTE 3:	$F_{offset_NS_23}$ is: 0 MHz for 5 MHz channel BW, 5 MHz for 10 MHz channel BW, 9 MHz for 15 MHz channel BW and 12 MHz for 20 MHz channel BW.	
NOTE 4:	This emission limit might imply risk of harmful interference to UE(s) operating in the protected operating band.	

6.6.3.3.5.19 Test requirement (network signalled value “NS_24”)

When "NS 24" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-24 as appropriate, and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.19-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.19-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5 MHz, 10 MHz, 15 MHz, 20 MHz	
Band 34	-50	MHz
Note 1:	This requirement applies at a frequency offset equal or larger than 5 MHz from the upper edge of the channel bandwidth, whenever these frequencies overlap with the specified frequency band.	

6.6.3.3.5.20 Test requirement (network signalled value “NS_25”)

When "NS 25" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-25 as appropriate, and

  - the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.20-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.20-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5 MHz, 10 MHz, 15 MHz, 20 MHz	
Band 34	-40	MHz
Note 1: This requirement applies at a frequency offset equal or larger than 5 MHz from the upper edge of the channel bandwidth, whenever these frequencies overlap with the specified frequency band.		

6.6.3.3.5.21 Minimum requirement (network signalled value “NS_27”)

When "NS 27" is indicated in the cell:

the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-27 as appropriate,

and

- the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5.21-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3.5.21-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	5, 10, 15, 20 MHz	
$0 \le f \le 3530$	-40	1 MHz

6.6.3.3_1 Additional spurious emissions for UL 64QAM

6.6.3.3_1.1 Test purpose

Same test purpose as in clause 6.6.3.3.1.

6.6.3.3_1.2 Test applicability

This test case applies to all types of E-UTRA UE from release 13 and forward that support UL 64QAM.

6.6.3.3_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.3.3.3.

6.6.3.3_1.4 Test description

6.6.3.3_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3.3_1.4.1-1 through Table 6.6.3.3_1.4.1-21. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.3_1.4.1-1: Test Configuration Table (network signalled value "NS_04")

<table>
<tr><th colspan="7">Initial Conditions</th></tr>
<tr><td colspan="4">Test Environment
(as specified in TS 36.508 [7] subclause 4.1)</td><td colspan="3">Normal</td></tr>
<tr><td colspan="4">Test Frequencies
(as specified in TS 36.508 [7] subclause 4.3.1)</td><td colspan="3">Low Range, Mid Range, High Range
Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0:

For 5 MHz bandwidth:
2499.6 MHz, N_{UL}= 39696

For 10 MHz bandwidth:
2504.1 MHz, N_{UL}= 39731

For 15 MHz bandwidth:
2510.9 MHz, N_{UL}= 39799

For 20 MHz bandwidth:
2517.6 MHz, N_{UL}= 39866

Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1:

For 5 MHz bandwidth:
2500.6 MHz, N_{UL}= 39686

For 10 MHz bandwidth:
2504.1 MHz, N_{UL}= 39731

For 15 MHz bandwidth:
2510.9 MHz, N_{UL}= 39799

For 20 MHz bandwidth:
2517.6 MHz, N_{UL}= 39866</td></tr>
<tr><td colspan="4">Test Channel Bandwidths
(as specified in TS 36.508 [7] subclause 4.3.1)</td><td colspan="3">5MHz, 10MHz, 15MHz, 20MHz</td></tr>
<tr><th colspan="7">Test Parameters for NS_04 A-MPR</th></tr>
<tr><th></th><th></th><th colspan="2">Downlink Configuration</th><th colspan="3">Uplink Configuration</th></tr>
<tr><th>Configuration ID</th><th>Ch BW</th><th>Mod'n</th><th>RB allocation FDD</th><th>Mod'n</th><th>RB allocation FDD</th><th>RB_{start} FDD</th></tr>
<tr><td>1 (Note 1)</td><td>5MHz</td><td colspan="2" rowspan="5">N/A for A-MPR testing</td><td>64QAM</td><td>16</td><td>9</td></tr>
<tr><td>2 (Note 2)</td><td>5MHz</td><td>64QAM</td><td>25</td><td>0</td></tr>
<tr><td>3</td><td>10MHz</td><td>64QAM</td><td>50</td><td>0</td></tr>
<tr><td>4</td><td>15MHz</td><td>64QAM</td><td>75</td><td>0</td></tr>
<tr><td>5</td><td>20MHz</td><td>64QAM</td><td>100</td><td>0</td></tr>
<tr><td colspan="7">Note 1: Only applicable for Low Range.
Note 2: Only applicable for Mid, High Range and additional test frequencies.</td></tr>
</table>

Table 6.6.3.3_1.4.1-2: Test Configuration Table (network signalled value "NS_05")

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range In case of Low range: - For 5MHz Channel Bandwidth: 1927.2MHz (N_{UL} = 18072) - For 10MHz Channel Bandwidth: 1934.7MHz (N_{UL} = 18147) - For 15MHz Channel Bandwidth: 1932.5MHz (N_{UL} = 18125) - For 20MHz Channel Bandwidth: 1930MHz (N_{UL} = 18100)					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, 10MHz, 15MHz, 20MHz					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
5MHz	N/A for Additional Spurious Emissions testing			64QAM	25	NA
10MHz				64QAM	50 (Note 1)	
15MHz				64QAM	75 (Note 1)	
20MHz				64QAM	100 (Note 1)	
10MHz				64QAM	50 (Note 2)	
15MHz				64QAM	75 (Note 2)	
20MHz				64QAM	100 (Note 2)	
Note 1: Applies only for Low Range. Note 2: Applies only for Mid Range.						

Table 6.6.3.3_1.4.1-3: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	10MHz					
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	RB_{start}
1	10MHz	N/A for Additional Spurious Emissions testing.		64QAM	36	13
2	10MHz			64QAM	16	19
3	10MHz			64QAM	30	19
4	10MHz			64QAM	50	0

Table 6.6.3.3_1.4.1-4: Test Configuration Table (network signalled value "NS_08")

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, 10MHz, 15MHz					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
5MHz	N/A for Additional Spurious Emissions testing			64QAM	25	N/A
10MHz				64QAM	50	
15MHz				64QAM	75	

Table 6.6.3.3_1.4.1-5: Test Configuration Table (network signalled value "NS_09")

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, 10MHz, 15MHz					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
5MHz	N/A for Additional Spurious Emissions testing			64QAM	25	N/A
10MHz				64QAM	50	
15MHz				64QAM	75	

Table 6.6.3.3_1.4.1-6: Test Configuration Table (network signalled value "NS_11")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 3 MHz Channel Bandwidth: a. 2001.5 MHz (N_{UL} = 25515) b. 2004.5 MHz (N_{UL} = 25545) For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2004.5 MHz (N_{UL} = 25545) c. 2007.5 MHz (N_{UL} = 25575) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2005.5 MHz (N_{UL} = 25555) c. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2007.5 MHz (N_{UL} = 25575) b. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				3MHz, 5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_11 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	3MHz	N/A for Additional Spurious Emissions testing.		64QAM	6
2	3MHz			64QAM	15
3	5MHz			64QAM	8
4	5MHz			64QAM	25
5	10MHz			64QAM	12
6	10MHz			64QAM	50
7	15MHz			64QAM	8
8	15MHz			64QAM	25
9	15MHz			64QAM	30
10	15MHz			64QAM	75
11	20MHz			64QAM	10
12	20MHz			64QAM	25
13	20MHz			64QAM	100
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

Table 6.6.3.3_1.4.1-7: Test Configuration Table (network signalled value "NS_12")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: UL 814.9 MHz (NUL = 26699) For 5 MHz Channel Bandwidth: UL 816.7 MHz (NUL = 26717) For 10 MHz Channel Bandwidth: UL 819.2 MHz (NUL = 26742) For 15 MHz Channel Bandwidth: UL 821.7 MHz (NUL = 26767)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 5 MHz, 10 MHz and 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1	1.4 MHz	N/A for Additional Spurious Emissions testing		64QAM	6	0
2	5 MHz			64QAM	25	0
3	10 MHz			64QAM	50	0
4	15 MHz			64QAM	75	0

Table6.6.3.3_1.4.1-8: Test Configuration Table (network signalled value "NS_13")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 5 MHz Channel Bandwidth: UL 821.5 MHz (NUL = 26765)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1	5 MHz	N/A for Additional Spurious Emissions testing		64QAM	25	0

Table 6.6.3.3_1.4.1-9: Test Configuration Table (network signalled value "NS_14")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 10 MHz Channel Bandwidth: UL 829 MHz (N_{UL} = 26840) For 15 MHz Channel Bandwidth: Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10 MHz, 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RBstart FDD
1	10 MHz	N/A for Additional Spurious Emissions testing		64QAM	50	0
2	15 MHz			64QAM	75	0

Table 6.6.3.3_1.4.1-10: Test Configuration Table (network signalled value "NS_15")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for Additional Spurious Emissions testing		64QAM	6	0
2	3 MHz			64QAM	15	0
3	5 MHz			64QAM	25	0
4	10 MHz			64QAM	50	0
5	15 MHz			64QAM	75	0

Table 6.6.3.3_1.4.1-11: Test Configuration Table (network signalled value "NS_16")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: Low range For 3 MHz Channel Bandwidth: Low range, 810 MHz (N_{UL}= 27070) For 5 MHz Channel Bandwidth: Low range, 811 MHz (N_{UL}= 27080) , 814.5 MHz (N_{UL}= 27115) For 10 MHz Channel Bandwidth: Low range, 813.5 MHz (N_{UL}= 27105), 817 MHz (N_{UL}= 27140)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for Additional Spurious Emissions testing.		64QAM	6	0
2	3 MHz			64QAM	15	0
3	5 MHz			64QAM	25	0
4	10 MHz			64QAM	50	0

Table 6.6.3.3_1.4.1-12: Test Configuration Table (network signalled value "NS_17")

Initial Conditions					
Test Environment (as specified in TS 36.508[7] subclause 4.1)				Normal	
Test Frequencies (as specified inTS36.508 [7] subclause 4.3.1)				Mid range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for Additional Spurious Emissions testing.		64QAM	25
2	10MHz			64QAM	50

Table 6.6.3.3_1.4.1-13: Test Configuration Table (network signalled value "NS_18")

Initial Conditions					
Test Environment (as specified in TS 36.508[7] subclause 4.1)				Normal	
Test Frequencies (as specified inTS36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for Additional Spurious Emissions testing.		64QAM	25
2	10MHz			64QAM	50
3	15MHz			64QAM	75
4	20MHz			64QAM	100

Table 6.6.3.3_1.4.1-14: Test Configuration Table (network signalled value "NS_19")

Initial Conditions					
Test Environment (as specified in TS 36.508[7] subclause 4.1)				Normal	
Test Frequencies (as specified inTS36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				3MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**
1	3MHz	N/A for Additional Spurious Emissions testing.		64QAM	15
2	10MHz			64QAM	40
3	15MHz			64QAM	45
4	20MHz			64QAM	50
Note 1: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

Table 6.6.3.3_1.4.1-15: Test Configuration Table (network signalled value "NS_20")

Initial Conditions					
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal	
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 5 MHz Channel Bandwidth a. 2002.5 MHz (N_{UL} = 25525) b. 2007.5 MHz (N_{UL} = 25575) c. 2012.5 MHz (N_{UL} = 25625) d. 2017.5 MHz (N_{UL} = 25675) For 10 MHz Channel Bandwidth a. 2005 MHz (N_{UL} = 25550) b. 2015 MHz (N_{UL} = 25650) For 15 MHz Channel Bandwidth a. 2012.5 MHz (N_{UL} = 25625) For 20 MHz Channel Bandwidth a. 2010 MHz (N_{UL} = 25600)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for NS_20 A-MPR					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for Additional Spurious Emissions testing.		64QAM	15
2	5MHz			64QAM	25
3	10MHz			64QAM	12
4	10MHz			64QAM	50
5	15MHz			64QAM	25
6	15MHz			64QAM	36
7	15MHz			64QAM	75
8	20MHz			64QAM	18
9	20MHz			64QAM	25
10	20MHz			64QAM	75
11	20MHz			64QAM	100
Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE. Note 2: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.					

Table 6.6.3.3_1.4.1-16: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 1)	10 MHz	N/A for Additional Spurious Emissions testing.		64QAM	50	0
Note 1: Applicable only to high range frequency testing.						

Table 6.6.3.3_1.4.1-17: Test Configuration Table (network signalled value "NS_22")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_22 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		64QAM	1	0
2	5MHz			64QAM	1	24
3	10MHz			64QAM	1	0
4	10MHz			64QAM	1	49
5	15MHz			64QAM	1	0
6	15MHz			64QAM	1	74
7	20MHz			64QAM	1	0
8	20MHz			64QAM	1	99

Table 6.6.3.3_1.4.1-18: Test Configuration Table (network signalled value "NS_23")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz		
Test Parameters for NS_23 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		64QAM	1	0
2	5MHz			64QAM	1	24

Table 6.6.3.3_1.4.1-19: Test Configuration Table (network signalled value "NS_24")

	Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to F_{UL} in test parameters with following: 5 MHz CH BW: 2007.5 MHz (N_{UL} = high range) 10 and 15 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) 20 MHz CH BW: - 2000 MHz (N_{UL} = high range)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_24 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	2007.5	5MHz	N/A for A-MPR testing		64QAM	25	0
2	1980	10MHz			64QAM	50	0
3	1990	10MHz			64QAM	50	0
4	1980	15MHz			64QAM	75	0
5	2000	20MHz			64QAM	100	0

Table 6.6.3.3_1.4.1-20: Test Configuration Table (network signalled value "NS_25")

	Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to F_{UL} in test parameters with following: 5 MHz CH BW: 2007.5 MHz (N_{UL} = high range)10 and 15 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772) 20 MHz CH BW: - 2000 MHz (N_{UL} = high range)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_25 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	2007.5	5MHz	N/A for A-MPR testing		64QAM	25	0
2	1980	10MHz			64QAM	50	0
3	1990	10MHz			64QAM	50	0
4	1980	15MHz			64QAM	75	0
5	1980	20MHz			64QAM	100	0
6	2000	20MHz			64QAM	100	0

Table 6.6.3.3_1.4.1-21: Test Configuration Table (network signalled value "NS_27")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to Frequency column in test parameters		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid/High	5MHz			64QAM	25	0
2	Low/Mid/High	10MHz			64QAM	50	0
3	Low/Mid/High	15MHz			64QAM	75	0
4	Low/Mid/High	20MHz			64QAM	100	0

Editor's note: The following lines belong at the end of section 6.6.3.3_1.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.7.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3.3_1.4.1-1 to Table 6.6.3.3_1.4.1-21 depending on network signal value.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.3_1.4.3.

6.6.3.3_1.4.2 Test procedure

Same test procedure as in clause 6.6.3.3.4.2.

6.6.3.3_1.4.3 Message contents

Same message contents as in clause 6.6.3.3.4.3.

6.6.3.3_1.5 Test requirement

Same test requirement as in clause 6.6.3.3.5.

6.6.3.3A Additional spurious emissions for CA

6.6.3.3A.1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA)

6.6.3.3A.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions in intra-band contiguous carrier aggregation under the deployment scenarios where additional requirements are specified.

6.6.3.3A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA but do not support UL 64QAM.

6.6.3.3A.1.3 Minimum conformance requirements

This clause specifies the requirements for the specified E-UTRA band for an additional spectrum emission for CA requirement with protected bands as indicated from Table 6.6.3.3A.1.3.1-1 to Table 6.6.3.3A.1.3.6-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

6.6.3.3A.1.3.1 Minimum conformance requirements for CA_1C (network signalled value "CA_NS_01")

When "CA_NS_01" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.1.3.1-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.3.1-1: Additional requirements (PHS) for CA

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
E-UTRA band 34	F_{DL_low}	-	F_{DL_high}	-50	1	
Frequency range	1884.5	-	1915.7	-41	0.3	1
Note 1: Applicable when the aggregated channel bandwidth is confined within frequency range 1940 – 1980 MHz						

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3A.1.

6.6.3.3A.1.3.2 Minimum conformance requirements for CA_1C (network signalled value "CA_NS_02")

When "CA_NS_02" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.1.3.2-1. These requirements also apply for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.3.2-1: Additional requirements for CA

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
E-UTRA band 34	F_{DL_low}	-	F_{DL_high}	-50	1
Frequency range	1900	-	1915	-15.5	5
Frequency range	1915	-	1920	+1.6	5

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3A.2.

6.6.3.3A.1.3.3 Minimum requirement for CA_1C (network signalled value "CA_NS_03")

When "CA_NS_03" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.1.3.3-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.3.3-1: Additional requirement for CA

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
E-UTRA band 34	F_{DL_low}	-	F_{DL_high}	-50	1
Frequency range	1880	-	1895	-40	1
Frequency range	1895	-	1915	-15.5	5
Frequency range	1915	-	1920	+1.6	5

6.6.3.3A.1.3.4 Minimum requirement for CA_38C (network signalled value "CA_NS_05")

When "CA_NS_05" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.1.3.4-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1A.1.3-1 from the edge of the aggregated channel bandwidth.

Table 6.6.3.3A.1.3.4-1: Additional requirements

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
Frequency range	2620	-	2645	-15.5	5
Frequency range	2645	-	2690	-40	1

6.6.3.3A.1.3.5 Minimum requirement for CA_7C (network signalled value "CA_NS_06")

When "CA_NS_06" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.1.3.5-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1A.3-1 from the edge of the aggregated channel bandwidth.

Table 6.6.3.3A.1.3.5-1: Additional requirements

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
Frequency range	2570	-	2575	+1.6	5
Frequency range	2575	-	2595	-15.5	5
Frequency range	2595	-	2620	-40	1

6.6.3.3A.1.3.6 Minimum requirement for CA_39C (network signalled value "CA_NS_07")

When "CA_NS_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.1.3.6-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1A.1.3-1 from the edge of the aggregated channel bandwidth.

Table 6.6.3.3A.1.3.6-1: Additional requirements

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
Frequency range	1805	-	1855	-40	1	1
Frequency range	1855	-	1880	-15.5	5	1, 2, 3
NOTE 1: This requirement is applicable for carriers with aggregated channel bandwidths confined in 1885-1920 MHz. NOTE 2: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.0-1 from the edge of the aggregated channel bandwidth. NOTE 3: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.						

The normative reference for this requirement is TS 36.101[2] subclause 6.6.3.3A.3.

6.6.3.3A.1.4 Test description

6.6.3.3A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in tables' 6.6.3.3A.1.4.1-1 to 6.6.3.3A.1.4.1-3. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.3A.1.4.1-1: Test Configuration Table for CA (network signalled value "CA_NS_01")

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			C: Low and High range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			Lowest N_{RB_agg} Highest N_{RB_agg}						
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	QPSK	1	P_1@0	S_0@0		
2	75	75		QPSK	150	P_75@0	S_75@0		
3	75	75		QPSK	45	P_45@7	S_0@0		
4	75	75		QPSK	8	P_0@0	S_8@67		
5	75	75		QPSK	129	P_75@0	S_54@0		
6	75	75		QPSK	2	P_1@0	S_1@74		
7	100	100		QPSK	200	P_100@0	S_100@0		
8	100	100		QPSK	1	P_1@0	S_0@0		
9	100	100		QPSK	175	P_75@25	S_100@0		
10	100	100		QPSK	25	P_0@0	S_25@75		
11	100	100		QPSK	64	P_64@24	S_0@0		
12	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

Table 6.6.3.3A.1.4.1-2: Test Configuration Table for CA (network signalled value "CA_NS_02")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	Lowest N_{RB_agg} Highest N_{RB_agg}

Test Parameters for CA Configurations									
ID	**CA Configuration / NR_{B_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	QPSK	1	P_1@0	S_0@0		
2	75	75		QPSK	75	P_75@0	S_0@0		
3	75	75		QPSK	129	P_75@0	S_54@0		
4	75	75		QPSK	129	P_54@21	S_75@0		
5	75	75		QPSK	1	P_0@0	S_1@74		
6	75	75		QPSK	1	P_0@0	S_1@54		
7	75	75		QPSK	2	P_1@0	S_1@74		
8	100	100		QPSK	1	P_1@0	S_0@0		
9	100	100		QPSK	1	P_1@21	S_0@0		
10	100	100		QPSK	90	P_90@0	S_0@0		
11	100	100		QPSK	180	P_100@0	S_80@0		
12	100	100		QPSK	1	P_0@0	S_1@99		
13	100	100		QPSK	1	P_0@0	S_1@83		
14	100	100		QPSK	2	P_1@0	S_1@99		

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1

Table 6.6.3.3A.1.4.1-3: Test Configuration Table for CA (network signalled value "CA_NS_03")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	Lowest N_{RB_agg} Highest N_{RB_agg}

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	QPSK	1	P_1@0	S_0@0		
2	75	75		QPSK	1	P_1@21	S_0@0		
3	75	75		QPSK	75	P_75@0	S_0@0		
4	75	75		QPSK	90	P_75@0	S_15@0		
5	75	75		QPSK	150	P_75@0	S_75@0		
6	75	75		QPSK	1	P_0@0	S_1@74		
7	75	75		QPSK	1	P_0@0	S_1@44		
8	75	75		QPSK	2	P_1@0	S_1@74		
9	100	100		QPSK	1	P_1@0	S_0@0		
10	100	100		QPSK	60	P_60@0	S_0@0		
11	100	100		QPSK	1	P_1@63	S_0@0		
12	100	100		QPSK	90	P_90@0	S_0@0		
13	100	100		QPSK	164	P_100@0	S_64@0		
14	100	100		QPSK	1	P_0@0	S_1@99		

15	100	100		QPSK	1	P_0@0	S_1@70		
16	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

Table 6.6.3.3A.1.4.1-4: Test Configuration Table for CA (network signalled value "CA_NS_05")

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1				NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.				C: High range					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration				Lowest N_{RB_agg} Highest N_{RB_agg}					
Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	QPSK	40	P_40@0	S_0@0		
2	75	75		QPSK	80	P_50@25	S_30@0		
3	75	75		QPSK	60	P_10@65	S_50@0		
4	75	75		QPSK	65	P_1@74	S_64@0		
5	75	75		QPSK	92	P_20@55	S_72@0		
6	75	75		QPSK	2	P_1@0	S_1@74		
7	100	100		QPSK	8	P_8@0	S_0@0		
8	100	100		QPSK	40	P_40@0	S_0@0		
9	100	100		QPSK	80	P_50@50	S_30@0		
10	100	100		QPSK	150	P_60@40	S_90@0		
11	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

Table 6.6.3.3A.1.4.1-5: Test Configuration Table (network signalled value "CA_NS_06")

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1				NC		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.				C: Low and High range		
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration				As in Table 6.2.4A.1.3.6-1		
Test Parameters for CA Configurations						
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**

1	75	75	N/A	QPSK	5	P_5@0	S_0@0		
2	75	75		QPSK	45	P_45@0	S_0@0		
3	75	75		QPSK	75	P_60@15	S_15@0		
4	75	75		QPSK	60	P_10@65	S_50@0		
5	75	75		QPSK	90	P_18@57	S_72@0		
6	75	75		QPSK	2	P_1@0	S_1@74		
7	100	100		QPSK	10	P_10@0	S_0@0		
8	100	100		QPSK	30	P_30@0	S_0@0		
9	100	100		QPSK	100	P_75@25	S_25@0		
10	100	100		QPSK	90	P_40@60	S_50@0		
11	100	100		QPSK	96	P_15@85	S_81@0		
12	100	100		QPSK	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.6.3.3A.1.4.1-6: Test Configuration Table for CA (network signalled value "CA_NS_07")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	As in Table 6.2.4A.1.3.7-1

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	100	25	N/A	QPSK	1	P_1@0	S_0@0		
2	100	25		QPSK	85	P_80@20	S_5@0		
3	100	25		QPSK	65	P_60@40	S_5@0		
4	100	25		QPSK	35	P_30@70	S_5@0		
5	100	25		QPSK	2	P_1@0	S_1@24		
6	100	50		QPSK	1	P_1@1	S_0@0		
7	100	50		QPSK	10	P_10@30	S_0@0		
8	100	50		QPSK	30	P_30@30	S_0@0		
9	100	50		QPSK	60	P_40@60	S_20@0		
10	100	50		QPSK	30	P_10@90	S_20@0		
11	100	50		QPSK	5	P_0@0	S_5@45		
12	100	50		QPSK	2	P_1@0	S_1@49		
13	100	75		QPSK	1	P_1@1	S_0@0		
14	100	75		QPSK	40	P_40@20	S_0@0		
15	100	75		QPSK	85	P_80@20	S_5@0		
16	100	75		QPSK	40	P_0@0	S_40@20		
17	100	75		QPSK	15	P_0@0	S_15@60		
18	100	75		QPSK	2	P_1@0	S_1@74		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

1. Connect the SS to the UE to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.33 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.6.3.3A.1.4.1-1, Table 6.6.3.3A.1.4.1-2, Table 6.6.3.3A.1.4.1-3, Table 6.6.3.3A.1.4.1-4, Table 6.6.3.3A.1.4.1-5 or Table 6.6.3.3A.1.4.1-6 depending on network signal value.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.3A.1.4.3.

6.6.3.3A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.3.3A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.3A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control “up” commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

6. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Tables 6.2.4A.1.5-1 to 6.2.4A.1.5-7 as appropriate. The period of the measurement shall be at least one sub-frame (1ms).

7. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.3.3A.1.5.1-1, 6.6.3.3A.1.5.2-1, 6.6.3.3A.1.5.3-1, 6.6.3.3A.1.5.4-1, 6.6.3.3A.1.5.5-1 and 6.6.3.3A.1.5.6-1 as appropriate. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3.3A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exceptions for each network signalled value.

6.6.3.3A.1.4.3.1 Message contents (network signalled value "CA_NS_01")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_01. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3A.1.4.3.1-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for “CA_NS_01”

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	1 (CA_NS_01)		

6.6.3.3A.1.4.3.2 Message contents exceptions (network signalled value "CA_NS_02")

1. Information element additionalSpectrumEmissionSCell-r10 is set to CA_NS_02. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3A.1.4.3.2-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for “CA_NS_02”

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	2 (CA_NS_02)		

6.6.3.3A.1.4.3.3 Message contents exceptions (network signalled value “CA_NS_03")

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3A.1.4.3.3-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for “CA_NS_03”

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	3 (CA_NS_03)		

6.6.3.3A.1.4.3.4 Message contents exceptions (network signalled value “CA_NS_05")

1. Information element additionalSpectrumEmission is set to CA_NS_05. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3A.1.4.3.4-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for “CA_NS_05”

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	5 (CA_NS_05)		

6.6.3.3A.1.4.3.5 Message contents exceptions (network signalled value “CA_NS_06")

1. Information element additionalSpectrumEmission is set to CA_NS_06. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3A.1.4.3.5-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for “CA_NS_06”

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	6 (CA_NS_06)		

6.6.3.3A.1.4.3.6 Message contents exceptions (network signalled value “CA_NS_07")

1. Information element additionalSpectrumEmission is set to CA_NS_07. This can be set in the *RadioResourceConfigCommonSCell-r10-DEFAULT* as part of the common RRC messages. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.6.3.3A.1.4.3.6-1: *RadioResourceConfigCommonSCell-r10-DEFAULT*: Additional spectrum emission test requirement for “CA_NS_07”

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-13A			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmissionSCell-r10	7 (CA_NS_07)		

6.6.3.3A.1.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for an additional spectrum emission for CA requirement with protected bands as indicated from table 6.6.3.3A.1.5.1-1 to table 6.6.3.3A.1.5.6-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

6.6.3.3A.1.5.1 Test requirement for CA (network signalled value "CA_NS_01")

When "CA_NS_01" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4A.1.5-1 as appropriate,

and

the measured average power of spurious emission, derived in step 2, shall not exceed the described value in Table 6.6.3.3A.1.5.1-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.5.1-1: Additional requirements (PHS) for CA

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note
E-UTRA band 34	F_{DL_low}	-	F_{DL_high}	-50	1	
Frequency range	1884.5	-	1915.7	-41	0.3	1
Note 1: Applicable when the aggregated channel bandwidth is confined within frequency range 1940 – 1980 MHz.						

6.6.3.3A.1.5.2 Test requirement for CA (network signalled value “CA_NS_02")

When “CA_NS_02” is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4A.1.5-2 as appropriate,

and

the measured average power of spurious emission, derived in step 2, shall not exceed the described value in Table 6.6.3.3A.1.5.2-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.5.2-1: Additional requirements for CA

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
E-UTRA band 34	F_{DL_low}	-	F_{DL_high}	-50	1
Frequency range	1900	-	1915	-15.5	5
Frequency range	1915	-	1920	+1.6	5

6.6.3.3A.1.5.3 Test requirement for CA (network signalled value “CA_NS_03")

When “CA_NS_03” is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4A.1.5-3 as appropriate,

and

the measured average power of spurious emission, derived in step 2, shall not exceed the described value in Table 6.6.3.3A.1.5.3-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.5.3-1: Additional requirement for CA

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
E-UTRA band 34	F_{DL_low}	-	F_{DL_high}	-50	1
Frequency range	1880	-	1895	-40	1
Frequency range	1895	-	1915	-15.5	5
Frequency range	1915	-	1920	+1.6	5

6.6.3.3A.1.5.4 Test requirement for CA (network signalled value “CA_NS_05")

When “CA_NS_05” is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4A.1.5-5 as appropriate,

and

the measured average power of spurious emission, derived in step 2, shall not exceed the described value in Table 6.6.3.3A.1.5.4-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.5.4-1: Additional requirement for CA

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
Frequency range	2620	-	2645	-15.5	5
Frequency range	2645	-	2690	-40	1

6.6.3.3A.1.5.5 Test requirement for CA (network signalled value “CA_NS_06")

When “CA_NS_06” is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4A.1.5-6 as appropriate,

and

the measured average power of spurious emission, derived in step 2, shall not exceed the described value in Table 6.6.3.3A.1.5.5-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.5.5-1: Additional requirements

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
Frequency range	2570	-	2575	+1.6	5
Frequency range	2575	-	2595	-15.5	5
Frequency range	2595	-	2620	-40	1

6.6.3.3A.1.5.6 Test requirement for CA (network signalled value “CA_NS_07")

When “CA_NS_07” is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4A.1.5-7 as appropriate,

and

the measured average power of spurious emission, derived in step 2, shall not exceed the described value in Table 6.6.3.3A.1.5.6-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1A.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3.3A.1.5.6-1: Additional requirement for CA

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
Frequency range	1805	-	1855	-40	1	1
Frequency range	1855	-	1880	-15.5	5	1, 2, 3
NOTE 1: This requirement is applicable for carriers with aggregated channel bandwidths confined in 1885-1920 MHz NOTE 2: The requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1.3-1 and Table 6.6.3.1A.0-1 from the edge of the channel bandwidth. NOTE 3: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.						

6.6.3.3A.1_1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM

6.6.3.3A.1_1.1 Test purpose

Same test purpose as in clause 6.6.3.3A.1.1

6.6.3.3A.1_1.2 Test applicability

This test case applies to all types of E-UTRA UE from release 13 and forward that support intra-band contiguous DL CA, UL CA and UL 64QAM.

6.6.3.3A.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.3.3.3A.1.3

6.6.3.3A.1_1.4 Test description

6.6.3.3A.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in tables' 6.6.3.3A.1_1.4.1-1 to 6.6.3.3A.1_1.4.1-3. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.3A.1_1.4.1-1: Test Configuration Table for CA (network signalled value "CA_NS_01")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	Lowest N_{RB_agg} Highest N_{RB_agg}

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	64QAM	1	P_1@0	S_0@0		
2	75	75		64QAM	150	P_75@0	S_75@0		
3	75	75		64QAM	45	P_45@7	S_0@0		
4	75	75		64QAM	8	P_0@0	S_8@67		
5	75	75		64QAM	129	P_75@0	S_54@0		
6	75	75		64QAM	2	P_1@0	S_1@74		
7	100	100		64QAM	200	P_100@0	S_100@0		
8	100	100		64QAM	1	P_1@0	S_0@0		
9	100	100		64QAM	175	P_75@25	S_100@0		
10	100	100		64QAM	25	P_0@0	S_25@75		
11	100	100		64QAM	64	P_64@24	S_0@0		
12	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

Table 6.6.3.3A.1_1.4.1-2: Test Configuration Table for CA (network signalled value "CA_NS_02")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	Lowest N_{RB_agg} Highest N_{RB_agg}

Test Parameters for CA Configurations									
ID	**CA Configuration / NR_{B_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	64QAM	1	P_1@0	S_0@0		
2	75	75		64QAM	75	P_75@0	S_0@0		
3	75	75		64QAM	129	P_75@0	S_54@0		
4	75	75		64QAM	129	P_54@21	S_75@0		
5	75	75		64QAM	1	P_0@0	S_1@74		
6	75	75		64QAM	1	P_0@0	S_1@54		
7	75	75		64QAM	2	P_1@0	S_1@74		
8	100	100		64QAM	1	P_1@0	S_0@0		
9	100	100		64QAM	1	P_1@21	S_0@0		
10	100	100		64QAM	90	P_90@0	S_0@0		
11	100	100		64QAM	180	P_100@0	S_80@0		
12	100	100		64QAM	1	P_0@0	S_1@99		
13	100	100		64QAM	1	P_0@0	S_1@83		
14	100	100		64QAM	2	P_1@0	S_1@99		

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1

Table 6.6.3.3A.1_1.4.1-3: Test Configuration Table for CA (network signalled value "CA_NS_03")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	Lowest N_{RB_agg} Highest N_{RB_agg}

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	75	75	N/A	64QAM	1	P_1@0	S_0@0		
2	75	75		64QAM	1	P_1@21	S_0@0		
3	75	75		64QAM	75	P_75@0	S_0@0		
4	75	75		64QAM	90	P_75@0	S_15@0		
5	75	75		64QAM	150	P_75@0	S_75@0		
6	75	75		64QAM	1	P_0@0	S_1@74		
7	75	75		64QAM	1	P_0@0	S_1@44		
8	75	75		64QAM	2	P_1@0	S_1@74		
9	100	100		64QAM	1	P_1@0	S_0@0		
10	100	100		64QAM	60	P_60@0	S_0@0		
11	100	100		64QAM	1	P_1@63	S_0@0		
12	100	100		64QAM	90	P_90@0	S_0@0		
13	100	100		64QAM	164	P_100@0	S_64@0		
14	100	100		64QAM	1	P_0@0	S_1@99		

15	100	100		64QAM	1	P_0@0	S_1@70		
16	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

Table 6.6.3.3A.1_1.4.1-4: Test Configuration Table for CA (network signalled value "CA_NS_05")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	Lowest N_{RB_agg} Highest N_{RB_agg}

Test Parameters for CA Configurations

ID	CA Configuration / N_{RB_agg}		DL Allocation (PDCCH on PCC)	CC MOD	UL Allocation				
	PCC N_{RB}	SCCs N_{RB}	PCC & SCC RB allocation		N_{RB_alloc}	PCC & SCC RB allocations (L_{CRB} @ RB_{start})			
1	75	75	N/A	64QAM	40	P_40@0	S_0@0		
2	75	75		64QAM	80	P_50@25	S_30@0		
3	75	75		64QAM	60	P_10@65	S_50@0		
4	75	75		64QAM	65	P_1@74	S_64@0		
5	75	75		64QAM	92	P_20@55	S_72@0		
6	75	75		64QAM	2	P_1@0	S_1@74		
7	100	100		64QAM	8	P_8@0	S_0@0		
8	100	100		64QAM	40	P_40@0	S_0@0		
9	100	100		64QAM	80	P_50@50	S_30@0		
10	100	100		64QAM	150	P_60@40	S_90@0		
11	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

Table 6.6.3.3A.1_1.4.1-5: Test Configuration Table (network signalled value "CA_NS_06")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	As in Table 6.2.4A.1_1.3.6-1

Test Parameters for CA Configurations

ID	CA Configuration / N_{RB_agg}		DL Allocation (PDCCH on PCC)	CC MOD	UL Allocation	
	PCC N_{RB}	SCCs N_{RB}	PCC & SCC RB allocation		N_{RB_alloc}	PCC & SCC RB allocations (L_{CRB} @ RB_{start})

1	75	75	N/A	64QAM	5	P_5@0	S_0@0		
2	75	75		64QAM	45	P_45@0	S_0@0		
3	75	75		64QAM	75	P_60@15	S_15@0		
4	75	75		64QAM	60	P_10@65	S_50@0		
5	75	75		64QAM	90	P_18@57	S_72@0		
6	75	75		64QAM	2	P_1@0	S_1@74		
7	100	100		64QAM	10	P_10@0	S_0@0		
8	100	100		64QAM	30	P_30@0	S_0@0		
9	100	100		64QAM	100	P_75@25	S_25@0		
10	100	100		64QAM	90	P_40@60	S_50@0		
11	100	100		64QAM	96	P_15@85	S_81@0		
12	100	100		64QAM	2	P_1@0	S_1@99		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									

Table 6.6.3.3A.1_1.4.1-6: Test Configuration Table for CA (network signalled value "CA_NS_07")

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.	C: Low and High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration	As in Table 6.2.4A.1_1.3.7-1

Test Parameters for CA Configurations									
ID	**CA Configuration / N_{RB_agg}**		**DL Allocation (PDCCH on PCC)**	**CC MOD**	**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
1	100	25	N/A	64QAM	1	P_1@0	S_0@0		
2	100	25		64QAM	85	P_80@20	S_5@0		
3	100	25		64QAM	65	P_60@40	S_5@0		
4	100	25		64QAM	35	P_30@70	S_5@0		
5	100	25		64QAM	2	P_1@0	S_1@24		
6	100	50		64QAM	1	P_1@1	S_0@0		
7	100	50		64QAM	10	P_10@30	S_0@0		
8	100	50		64QAM	30	P_30@30	S_0@0		
9	100	50		64QAM	60	P_40@60	S_20@0		
10	100	50		64QAM	30	P_10@90	S_20@0		
11	100	50		64QAM	5	P_0@0	S_5@45		
12	100	50		64QAM	2	P_1@0	S_1@49		
13	100	75		64QAM	1	P_1@1	S_0@0		
14	100	75		64QAM	40	P_40@20	S_0@0		
15	100	75		64QAM	85	P_80@20	S_5@0		
16	100	75		64QAM	40	P_0@0	S_40@20		
17	100	75		64QAM	15	P_0@0	S_15@60		
18	100	75		64QAM	2	P_1@0	S_1@74		
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1									

1. Connect the SS to the UE to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.33 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.6.3.3A.1_1.4.1-1, Table 6.6.3.3A.1_1.4.1-2, Table 6.6.3.3A.1_1.4.1-3, Table 6.6.3.3A.1_1.4.1-4, Table 6.6.3.3A.1_1.4.1-5 or Table 6.6.3.3A.1_1.4.1-6 depending on network signal value.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.3A.1_1.4.3.

6.6.3.3A.1_1.4.2 Test procedure

Same test procedure as in clause 6.6.3.3A.1.4.2 with following exceptions:

- Instead of Tables 6.2.4A.1.5-1 to 6.2.4A.1.5-7 → use Tables 6.2.4A.1_1.5-1 to 6.2.4A.1_1.5-7.

6.6.3.3A.1_1.4.3 Message contents

Same message contents as in clause 6.6.3.3A.1.4.3.

6.6.3.3A.1_1.5 Test requirement

Same test requirements as in clause 6.6.3.3A.1.5.1 with following exceptions:

- Instead of Tables 6.2.4A.1.5-1 to 6.2.4A.1.5-7 → use Tables 6.2.4A.1_1.5-1 to 6.2.4A.1_1.5-7.

6.6.3.3A.2 Additional spurious emissions for CA (inter-band DL CA and UL CA)

6.6.3.3A.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions in inter-band carrier aggregation under the deployment scenarios where additional requirements are specified.

6.6.3.3A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

6.6.3.3A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.3.3.3.

6.6.3.3A.2.4 Test description

6.6.3.3A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. For the UE maximum output power modified by A-MPR specified in table 6.6.3.3A.2.4.1-1, the power limits specified in subclause 6.2.5A.2.3 apply

Table 6.6.3.3A.2.4.1-1: Additional spurious emissions for inter-band CA

Uplink CA Configuration	NS-value per CC (in same order as UL CA Configuration column)		Applicable emissions requirements (in same order as UL CA Configuration column)	
CA_1A-3A Note 3 CA_1A-5A Note 3 CA_1A-7A Note 3 CA_1A-8A Note 3 CA_1A-18A Note 3 CA_1A-26A Note 3 CA_1A-42A Note 3	NS_05	NS_01	Table 6.6.3.3.5.2-1	N/A
CA_1A-19A Note 3	NS_05	NS_08	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.4-1
CA_1A-21A Note 3	NS_05	NS_09	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.5-1
CA_2A-4A CA_2A-66A	NS_03	NS_03	N/A	N/A
CA_2A-12A CA_2A-13A CA_4A-12A CA_4A-13A CA_4A-17A	NS_03	NS_06	N/A	N/A
CA_2A-13A Note 3, CA_4A-13A Note 3	NS_03	NS_07	N/A	Table 6.6.3.3.5.3-1
CA_2A-30A Note 3	NS_03	NS_21	N/A	Table 6.6.3.3.5.16-1
CA_3A-5A CA_3A-7A CA_3A-8A CA_5A-7A	NS_01	NS_01	N/A	N/A
CA_3A-19A Note 3	NS_01	NS_08	N/A	Table 6.6.3.3.5.4-1
CA_3A-20A CA_7A-20A	NS_01	NS_10	N/A	N/A
CA_3A-26A	NS_01	NS_12	N/A	Table 6.6.3.3.5.7-1
CA_3A-26A	NS_01	NS_13	N/A	Table 6.6.3.3.3.8-1
CA_3A-26A	NS_01	NS_14	N/A	Table 6.6.3.3.3.9-1
CA_3A-26A	NS_01	NS_15	N/A	Table 6.6.3.3.5.10-1
CA_2A-5A CA_2A-7ACA_4A-5A CA_4A-7A	NS_03	NS_01	N/A	N/A
CA_5A-12A CA_5A-17A	NS_01	NS_06	N/A	N/A
CA_5A-30A Note 3	NS_01	NS_21	N/A	Table 6.6.3.3.5.16-1
CA_5A-66A	NS_01	NS_03	N/A	N/A
CA_7A-28A Note 3	NS_01	NS_17	N/A	Table 6.6.3.3.5.12-1
	NS_01	NS_18	N/A	Table 6.6.3.3.5.13-1
CA_19A-21A Note 3	NS_08	NS_09	Table 6.6.3.3.5.4-1	Table 6.6.3.3.5.5-1
CA_1A-28A Note 3	NS_05	NS_17	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.12-1
CA_12A-30A Note 3	NS_06	NS_21	N/A	Table 6.6.3.3.5.16-1
CA_18A-28A	NS_01	NS_17	N/A	Table 6.6.3.3.5.12-1

Note 1: For CCs with NS_01, there are no additional requirements defined in 36.101. Only CCs with NS-value different than NS_01 and present in 6.6.3.3.3 needs to be tested.
Note 2: A-MPR values for NS-values in this table are the same as in section 6.2.4.3.
Note 3: No test required since only A-Spur requirements apply, and the frequency range to test is unaffected by intermodulation products as described in section 4.3 in TR 36.905.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in tables 6.6.3.3A.2.4.1-2 to 6.6.3.3A.2.4.1-5. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.3A.2.4.1-2: Test Configuration Table (network signalled value NS_01/NS_12)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_12)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	8	8@7
2	25	25		16QAM	16QAM	10	8
3	25	25		QPSK	16QAM	8	8
4	50	50		QPSK	QPSK	12	12@16
5	50	50		16QAM	16QAM	15	18
6	50	50		QPSK	16QAM	12	18
7	100	75		QPSK	QPSK	15	16@31
8	100	75		16QAM	16QAM	20	30
9	100	75		QPSK	16QAM	15	30
Note 1: *CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.*							
Note 2: *If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.*							
Note 3: *For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.*							

Table 6.6.3.3A.2.4.1-3: Test Configuration Table (network signalled value NS_01/NS_15)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01) NRB	**SCC (NS_15) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
1	25	25	N/A for this test	QPSK	QPSK	8	6@14
2	25	25		16QAM	16QAM	10	10@15
3	25	25		QPSK	16QAM	8	10@15
4	50	50		QPSK	QPSK	12	12@25
5	50	50		16QAM	16QAM	15	15@35
6	50	50		QPSK	16QAM	12	15@35
7	100	75		QPSK	QPSK	18	18@19
8	100	75		16QAM	16QAM	20	20@55
9	100	75		QPSK	16QAM	18	20@55
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.							
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.3.3A.2.4.1-4: Test Configuration Table (network signalled value NS_01/NS_17)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01)	**SCC (NS_17)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	25	N/A for this test	QPSK	QPSK	6	6
2	25	25		16QAM	16QAM	25	25
3	25	25		16QAM	QPSK	25	6
4	25	50		QPSK	QPSK	6	15
5	25	50		16QAM	16QAM	25	25
6	25	50		16QAM	QPSK	25	15
7	50	50		QPSK	QPSK	15	15
8	50	50		16QAM	16QAM	50	25
9	50	50		16QAM	QPSK	50	15
10	100	50		QPSK	QPSK	16	15
11	100	50		16QAM	16QAM	50	25
12	100	50		16QAM	QPSK	50	15

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.6.3.3A.2.4.1-5: Test Configuration Table (network signalled value NS_05/NS_01)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_05)	**SCC (NS_01)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	15	N/A for this test	QPSK	QPSK	6	4
2	25	15		16QAM	16QAM	25	6
3	25	15		16QAM	QPSK	25	4
4	25	25		QPSK	QPSK	6	6
5	25	25		16QAM	16QAM	25	25
6	25	25		16QAM	QPSK	25	6
7	25	50		QPSK	QPSK	6	15
8	25	50		16QAM	16QAM	25	25
9	25	50		16QAM	QPSK	25	15
10	50	50		QPSK	QPSK	15	15
11	50	50		16QAM	16QAM	50	25
12	50	50		16QAM	QPSK	50	15
13	100	50		QPSK	QPSK	18	15
14	100	50		16QAM	16QAM	50	25
15	100	50		16QAM	QPSK	50	15
16	100	100		QPSK	QPSK	18	18
17	100	100		16QAM	16QAM	50	25
18	100	100		16QAM	QPSK	50	18
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list. Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

1. Connect the SS to the UE to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.33 as appropriate.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Tables 6.6.3.3A.2.4.1-2 to 6.6.3.3A.2.4.1-5 depending on network signal value.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.3A.2.4.3.

6.6.3.3A.2.4.2 Test procedures

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.6.3.3A.2.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 6.6.3.3A.2.4.1-2 to 6.6.3.3A.2.4.1-5 as appropriate on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control “up” commands in every uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
6. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Tables 6.6.3.3A.2.4.1-2 to 6.6.3.3A.2.4.1-5 as appropriate. The period of the measurement shall be at least one sub-frame (1ms).
7. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Tables 6.6.3.3A.2.4.1-2 to 6.6.3.3A.2.4.1-5 as appropriate. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3.3A.2.4.3 Message contents

Same message contents as in clause 6.6.3.3.4.3.

6.6.3.3A.2.5 Test requirement

Same test requirements as in clause 6.6.3.3.5 depending on network signal value.

6.6.3.3A.2_1 Additional spurious emissions for CA (inter-band DL CA and UL CA) for UL 64QAM

6.6.3.3A.2_1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions in inter-band carrier aggregation under the deployment scenarios where additional requirements are specified.

6.6.3.3A.2_1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward that support inter-band DL CA and UL CA and UL 64QAM.

6.6.3.3A.2_1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.6.3.3.3.

6.6.3.3A.2_1.4 Test description

6.6.3.3A.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state. For the UE maximum output power modified by A-MPR specified in table 6.6.3.3A.2_1.4.1-1, the power limits specified in subclause 6.2.5A.2.3 apply

6.6.3.3A.2_1.4.1-1 Additional spurious emissions for inter-band CA

Uplink CA Configuration	NS-value per CC (in same order as UL CA Configuration column)		Applicable emissions requirements (in same order as UL CA Configuration column)	
CA_1A-3A Note 3 CA_1A-5A CA_1A-7A CA_1A-8A CA_1A-18A Note 3 CA_1A-26A Note 3 CA_1A-42A Note 3	NS_05	NS_01	Table 6.6.3.3.5.2-1	N/A
CA_2A-13A, CA_4A-13A	NS_03	NS_07	Table 6.6.2.2.3.1-1	Table 6.6.2.2.3.3-1 Table 6.6.3.3.3.3-1
CA_3A-26A	NS_01	NS_12	N/A	Table 6.6.3.3.3.7-1
CA_3A-26A	NS_01	NS_15	N/A	Table 6.6.3.3.3.10-1
CA_1A-19A Note 3	NS_05	NS_08	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.4-1
CA_1A-21A Note 3	NS_05	NS_09	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.5-1
CA_1A-28A Note 3	NS_05	NS_17	Table 6.6.3.3.5.2-1	Table 6.6.3.3.5.12-1
CA_3A-19A Note 3	NS_01	NS_08	N/A	Table 6.6.3.3.5.4-1
CA_19A-21A Note 3	NS_08	NS_09	Table 6.6.3.3.5.4-1	Table 6.6.3.3.5.5-1
CA_18A-28A	NS_01	NS_17	N/A	Table 6.6.3.3.5.12-1

Note 1: For CCs with NS_01, there are no additional requirements defined in 36.101. Only CCs with NS-value different than NS_01 needs to be tested.
Note 2: A-MPR values for NS-values in this table are the same as in section 6.2.4.3.
Note 3: No test required since only A-Spur requirements apply, and the frequency range to test is unaffected by intermodulation products as described in section 4.3 in TR 36.905.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in tables 6.6.3.3A.2_1.4.1-2 to 6.6.3.3A.2_1.4.1-5. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3.3A.2_1.4.1-2: Test Configuration Table (network signalled value NS_01/NS_12)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01) NRB	**SCC (NS_12) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
1	25	25	N/A for this test	QPSK	QPSK	8	8@7
2	25	25		64QAM	64QAM	10	8
3	25	25		QPSK	64QAM	8	8
4	50	50		QPSK	QPSK	12	12@16
5	50	50		64QAM	64QAM	15	18
6	50	50		QPSK	64QAM	12	18
7	100	75		QPSK	QPSK	15	16@31
8	100	75		64QAM	64QAM	20	30
9	100	75		QPSK	64QAM	15	30
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.							
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.3.3A.2_1.4.1-3: Test Configuration Table (network signalled value NS_01/NS_15)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01) NRB	**SCC (NS_15) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
1	25	25	N/A for this test	QPSK	QPSK	8	6@14
2	25	25		64QAM	64QAM	10	10@15
3	25	25		QPSK	64QAM	8	10@15
4	50	50		QPSK	QPSK	12	12@25
5	50	50		64QAM	64QAM	15	15@35
6	50	50		QPSK	64QAM	12	15@35
7	100	75		QPSK	QPSK	18	18@19
8	100	75		64QAM	64QAM	20	20@55
9	100	75		QPSK	64QAM	18	20@55
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.							
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.3.3A.2_1.4.1-4: Test Configuration Table (network signalled value NS_03/NS_07)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1					NC		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes					Low and High range for both PCC and SCC (Note 3)		
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Lowest and Highest N_{RBagg}(Note 2)		
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_03)	**SCC (NS_07)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	50	N/A for this test	QPSK	QPSK	6	4
2	25	50		64QAM	64QAM	25	50
3	25	50		QPSK	64QAM	6	50
4	50	50		QPSK	QPSK	6	4
5	50	50		64QAM	64QAM	50	50
6	50	50		QPSK	64QAM	6	50
7	100	50		QPSK	QPSK	10	4
8	100	50		64QAM	64QAM	100	50
9	100	50		QPSK	64QAM	10	50
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: f in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.							
Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.							

Table 6.6.3.3A.2_1.4.1-5: Test Configuration Table (network signalled value NS_05/NS_01)

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1				NC			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes				Low and High range for both PCC and SCC (Note 3)			
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Lowest and Highest N_{RBagg}(Note 2)			
Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_05)	**SCC (NS_01)**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
	NRB	**NRB**					
1	25	15	N/A for this test	QPSK	QPSK	6	4
2	25	15		64QAM	64QAM	25	6
3	25	15		64QAM	QPSK	25	4
4	25	25		QPSK	QPSK	6	6
5	25	25		64QAM	64QAM	25	25
6	25	25		64QAM	QPSK	25	6
7	25	50		QPSK	QPSK	6	15
8	25	50		64QAM	64QAM	25	25
9	25	50		64QAM	QPSK	25	15
10	50	50		QPSK	QPSK	15	15
11	50	50		64QAM	64QAM	50	25
12	50	50		64QAM	QPSK	50	15
13	100	50		QPSK	QPSK	18	15
14	100	50		64QAM	64QAM	50	25
15	100	50		64QAM	QPSK	50	15
16	100	100		QPSK	QPSK	18	18
17	100	100		64QAM	64QAM	50	25
18	100	100		64QAM	QPSK	50	18

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

Table 6.6.3.3A.2_1.4.1-6: Test Configuration Table (network signalled value NS_01/NS_17)

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes	Low and High range for both PCC and SCC (Note 3)
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest and Highest N_{RBagg}(Note 2)

Test Parameters for CA Configurations							
Config ID	**CA Configuration / NRB_agg**		**DL Allocation**	**CC MOD**		**UL Allocation**	
	PCC (NS_01) NRB	**SCC (NS_17) NRB**	**PCC & SCC RB allocation**	**PCC**	**SCC**	**PCC & SCC RB allocations**	
1	25	25	N/A for this test	QPSK	QPSK	6	6
2	25	25		64QAM	64QAM	25	25
3	25	25		64QAM	QPSK	25	6
4	25	50		QPSK	QPSK	6	15
5	25	50		64QAM	64QAM	25	25
6	25	50		64QAM	QPSK	25	15
7	50	50		QPSK	QPSK	15	15
8	50	50		64QAM	64QAM	50	25
9	50	50		64QAM	QPSK	50	15
10	100	50		QPSK	QPSK	16	15
11	100	50		64QAM	64QAM	50	25
12	100	50		64QAM	QPSK	50	15

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration. which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1

Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same NRB_agg. Only the first of those is tested. according to the order on the Test Configuration Table list.

Note 3: For Low range place test point with RBstart=0. For High range place test point with $RB_{start}=RB_{max}-L_{CRB}+1$.

1. Connect the SS to the UE to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure group A.33 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Tables 6.6.3.3A.2_1.4.1-2 to 6.6.3.3A.2_1.4.1-5 depending on network signal value.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3.3A.2_1.4.3.

6.6.3.3A.2_1.4.2 Test procedures

Same test procedure as in clause 6.6.3.3A.2.4.2.

6.6.3.3A.2_1.4.3 Message contents

Same message content as in clause 6.6.3.3A.2.4.3.

6.6.3.3A.2_1.5 Test requirement

Same test requirements as in clause 6.6.3.3A.2.5.

6.6.3.3A.3 Additional spurious emissions for CA (intra-band non-contiguous DL CA and UL CA)

Editor's note: No test case details specified because the additional maximum power reduction and the additional spurious emissions cannot be verified for the intra-band non-contiguous UL CA case due to A-MPR is N/A and no additional requirement is needed in current non-contiguous Uplink CA configuration CA_4A-4A according to Table 6.2.4A-2 in TS 36.101.

6.6.3B Spurious emission for UL-MIMO

For UE supporting UL-MIMO, the requirements for Spurious emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products are specified at each transmit antenna connector.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements in subclause 6.6.3 apply to each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-1.

For single-antenna port scheme, the general requirements in subclause 6.6.2 apply.

6.6.3B.1 Transmitter Spurious emissions for UL-MIMO

6.6.3B.1.1 Test purpose

To verify that UE transmitter with a UL-MIMO does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.6.3B.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.6.3B.1.3 Minimum conformance requirements

For UE with multiple transmit antenna connectors, the requirements for Spurious emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products are specified at each transmit antenna connector.

For UEs with two transmit antenna connectors, the requirements in clause 6.6.3 apply to each transmit antenna with the UL-MIMO configurations specified in Table 6.2.2B-1 for closed-loop spatial multiplexing scheme.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.3B.

6.6.3B.1.4 Test description

6.6.3B.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3B.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3B.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)	NC					
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)	Low range, Mid range, High range					
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Spurious Emissions testing			QPSK	6	6
1.4MHz				QPSK	1	1
3MHz				QPSK	15	15
3MHz				QPSK	1	1
5MHz				QPSK	25	25
5MHz				QPSK	1	1
10MHz				QPSK	50	50
10MHz				QPSK	1	1
15MHz				QPSK	75	75
15MHz				QPSK	1	1
20MHz				QPSK	100	100
20MHz				QPSK	1	1
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.						

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.38.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3B.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3B.1.4.3.

6.6.3B.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.6.3B.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at PUMAX level.
3. Measure the power of the transmitted signal at each UE antenna connector with a measurement filter of bandwidths according to table 6.6.3B.1.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3B.1.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3B.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.3B.1.5 Test requirement

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in table 6.6.3B.1.5-1.

The spurious emission limits apply for the frequency ranges that are more than ΔfOOB (MHz) from the edge of the channel bandwidth shown in Table 6.6.3.1.3-1.

Table 6.6.3B.1.5-1: General spurious emissions test requirements

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	Note 1
Note 1: Applies for Band 22, Band 42 and Band 43.			

NOTE: In order that the measurement of spurious emissions falls within the frequency ranges that are more than ΔfOOB (MHz) from the edge of the channel bandwidth, the minimum offset of the measurement frequency from each edge of the channel should be ΔfOOB + MBW/2. MBW denotes the measurement bandwidth defined in Table 6.6.3B.1.5-1.

6.6.3B.2 Spurious emission band UE co-existence for UL-MIMO

Editor's note: This test case contains different requirements for different UE releases

6.6.3B.2.1 Test purpose

To verify that UE transmitter with a UL-MIMO does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions.

6.6.3B.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.6.3B.2.3 Minimum conformance requirements

For UE with multiple transmit antenna connectors, the requirements for Spurious emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products are specified at each transmit antenna connector.

For UEs with two transmit antenna connectors, the requirements in clause 6.6.3 apply to each transmit antenna with the UL-MIMO configurations specified in Table 6.2.2B-1 for closed-loop spatial multiplexing scheme.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.3B.

This test use minimum requirements from many releases of TS 36.101 [2] due to release independence defined in TS 36.307 [16].

6.6.3B.2.4 Test description

6.6.3B.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3B.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3B.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1) (Note 3)				Low range, Mid range, High range (Note 3)		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				Lowest, 5MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Spurious Emissions testing			QPSK	6	6
1.4MHz				QPSK	1	1
3MHz				QPSK	15	15
3MHz				QPSK	1	1
5MHz				QPSK	25	25[5]
5MHz				QPSK	1	1[5]
10MHz				QPSK	50	50
10MHz				QPSK	1	1
15MHz				QPSK	75	75
15MHz				QPSK	1	1
20MHz				QPSK	100	100
20MHz				QPSK	1	1
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.						
Note 3: Do not apply for requirements under Note 13 in Tables 6.6.3.2.3-1B to 6.6.3.2.3-1E. Test frequencies for these requirements are defined in Table 6.6.3B.2.4.1-2.						
Note 4: Void						
Note 5: For requirements under note 22 in Table 6.6.3B.2.5-1, the message exception in Table 6.6.3B.2.4.3-1 is used to test with the high channel.						

Table 6.6.3B.2.4.1-2: Test frequencies for E-UTRA channel bandwidth for operating band 3 with Note 13 (in Tables 6.6.3.2.3-1B to 6.6.3.2.3-1E)

Bandwidth [MHz]	**N_{UL}**	**Frequency of Uplink [MHz]**	**N_{DL}**	**Frequency of Downlink [MHz]**
5	19924	1782.4	1924	1877.4
10	19899	1779.9	1899	1874.9
15	19874	1777.4	1874	1872.4
20	19849	1774.9	1849	1869.9

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.38.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.6.3B.2.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3B.2.4.3.

6.6.3B.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.6.3B.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the power of the transmitted signal at each UE antenna connector with a measurement filter of bandwidths according to table 6.6.3B.2.5-1. For band 14 measurements made in a bandwidth of 6.25kHz, measurement parameter settings defined in table 6.6.3B.2.4.2-1 shall be used. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3B.2.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

Table 6.6.3B.2.4.2-1: Measurement setup for band 14

	Option 1: Measurement with No RMS VBW available	**Option2 Measurement with VBW Filtering on Power scale**
VBW	>=62.5 kHz (10 times or more the RBW)	<=43Hz
RBW	<=6.25kHz	<=6.25kHz
Detector type	Averages signal envelope during each measurement point, such as "RMS detector"	Peak
Averaging mode (Trace averaging)	Power (RMS voltage)	Power (RMS voltage), as controlled by "Average Type"
Average Type (applies to detector)	Power (RMS voltage) (automatically occurs with "RMS detector")	Not applicable
Average Type (applies to VBW filter)	Not applicable	Power (RMS voltage)
Number of averages	30, to reduce variance as required, or use an even longer sweep time	1 or use an even narrower VBW filter, thus a longer sweep time
Sweep time	[Don't specify]	Sweep rate (span divided by sweep time) <= 0.8 * RBW*VBW

6.6.3B.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 6.6.3B.2.4.3-1: SystemInformationBlockType1 with Note 22 in table 6.6.3B.2.5-1

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	20		

6.6.3B.2.5 Test requirement

Test requirements for Spurious Emissions UE Co-existence for UL-MIMO are the same as the minimum requirements and are not repeated in this section.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in tables 6.6.3.2.3-1B to 6.6.3.2.3-1E according to the following rule:

The requirements for the UE are release specific and can be found in Tables 6.6.3.2.3-1B to 6.6.3.2.3-1E. If the UE support a band, which is not defined in the table corresponding UE's release, the requirements for this band are taken from the table of earliest release where requirements for this band are defined. This has been described in following Table 6.6.3B.2.5-1.

The spurious emission limits apply for the frequency ranges that are more than ΔfOOB (MHz) from the edge of the channel bandwidth shown in Table 6.6.3.1.3-1.

Table 6.6.3B.2.5-1: UE Requirements according to UE E-UTRA release and supported E-UTRA band

Band	UE Requirements per release				
	Rel-10	Rel-11	Rel-12	Rel-13	Rel-14
1	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
2	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
3	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
4	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
5	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
6	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
7	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
8	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
9	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
10	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
11	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
12	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
13	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
14	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
...					
17	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
18	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
19	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
20	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
21	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
22	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F

23	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
24	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
25	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
26	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
27	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
28	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
30	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
31	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
...					
33	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
34	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
35					
36					
37					
38	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
39	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
40	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
41	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
42	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
43	Table 6.6.3.2.3-1B	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
44	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1C	Table 6.6.3.2.3-1D	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
45	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F
…					
48	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F	Table 6.6.3.2.3-1F
65	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1E	Table 6.6.3.2.3-1F

NOTE: The frequency range applicable with network signalled values of NS_05, NS_08, and NS_09 are covered in 6.6.3B.3 Additional Spurious Emissions for UL-MIMO.

6.6.3B.3 Additional spurious emissions for UL-MIMO

Editor's note: This clause is incomplete. for Rel-10 as it is also testing Rel-11 minimum requirements.

6.6.3B.3.1 Test purpose

To verify that UE transmitter with a UL-MIMO does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions under the deployment scenarios where additional requirements are specified.

6.6.3B.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.6.3B.3.3 Minimum conformance requirements

For UE with multiple transmit antenna connectors, the requirements for Spurious emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products are specified at each transmit antenna connector.

For UEs with two transmit antenna connectors, the requirements in clause 6.6.3 apply to each transmit antenna with the UL-MIMO configurations specified in Table 6.2.2B-1 for closed-loop spatial multiplexing scheme.

The normative reference for this requirement is TS 36.101 [2] clause 6.6.3B.

6.6.3B.3.4 Test description

6.6.3B.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Tables 6.6.3B.3.4.1-1 to 6.6.3B.3.4.1-19. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.6.3B.3.4.1-1: Test Configuration Table (network signalled value "NS_04") (Power Class 3)

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low range, Mid range, High range Additional test frequencies for Rel-12 to Rel-13 and bit 2 of modifiedMPRbehavior = 0: For 5 MHz bandwidth: 2499.6 MHz, N_{UL}= 39696 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866 Additional test frequencies for Rel-12 and later and bit 2 of modifiedMPRbehavior = 1: For 5 MHz bandwidth: 2500.6 MHz, N_{UL}= 39686 For 10 MHz bandwidth: 2504.1 MHz, N_{UL}= 39731 For 15 MHz bandwidth: 2510.9 MHz, N_{UL}= 39799 For 20 MHz bandwidth: 2517.6 MHz, N_{UL}= 39866			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10 MHz, 15 MHz, 20MHz		
Test Parameters for NS_04 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configura-tion ID	**Ch BW**	**Mod'n**	**RB allocation TDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1 (Note 6)	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Note 6)	5MHz			QPSK	8	Note 3
3(Note 6)	5MHz			QPSK	6	Note 3
4 (Note 6)	5MHz			16QAM (Note 5)	25	0
5 (Note 6)	5MHz			16QAM (Note 5)	8	Note 3
6 (Note 6)	10MHz			QPSK	1	0
7 (Note 6)	10MHz			QPSK	12	0
8 (Note 6)	10MHz			QPSK	50	0
9 Note 6)	10MHz			16QAM (Note 5)	50 (Note 4)	0
10 (Note 6)	10MHz			QPSK	24	13
11 (Note 6)	10MHz			16QAM (Note 5)	24	13
12 (Note 6)	10MHz			QPSK	36	13
13 (Note 6)	10MHz			QPSK	12	37
14 (Note 6)	10MHz			QPSK	1	49
15 (Note 6)	15MHz			QPSK	1	0
16 (Note 6)	15MHz			QPSK	16	0
17 (Note 6)	15MHz			QPSK	75	0

18 (Note 6)	15MHz		16QAM (Note 5)	75 (Note 4)	0
19 (Note 6)	15MHz		QPSK	36	19
20 (Note 6)	15MHz		16QAM (Note 5)	36 (Note 4)	19
21 (Note 6)	15MHz		QPSK	50	19
22 (Note 6)	15MHz		QPSK	18	56
23 (Note 6)	15MHz		QPSK	1	74
24 (Note 6)	20MHz		QPSK	1	0
25 (Note 6)	20MHz		QPSK	18	0
26 (Note 6)	20MHz		QPSK	100	0
27 (Note 6)	20MHz		16QAM (Note 5)	100 (Note 4)	0
28 (Note 6)	20MHz		QPSK	50	25
29 (Note 6)	20MHz		16QAM (Note 5)	50 (Note 4)	25
30 (Note 6)	20MHz		QPSK	75	25
31 (Note 6)	20MHz		QPSK	25	75
32 (Note 6)	20MHz		QPSK	1	99
33 (Note 8)	5MHz		QPSK	1	0
34 (Note 8)	5MHz		QPSK	16	9
35 (Note 9)	5MHz		QPSK	25	0
36 (Note 8)	5MHz		16QAM (Note 5)	16	9
37 (Note 9)	5MHz		16QAM (Note 5)	25	0
38 (Note 8)	10MHz		QPSK	1	0
39 (Note 8)	10MHz		QPSK	1	49
40 (Note 8)	10MHz		QPSK	24	0
41 (Note 8)	10MHz		QPSK	40	10
42 (Note 7)	10MHz		QPSK	50	0
43 (Note 7)	10MHz		16QAM (Note 5)	50	0
44 (Note 8)	15MHz		QPSK	1	0
45 (Note 8)	15MHz		QPSK	1	74
46 (Note 8)	15MHz		QPSK	32	0
47 (Note 8)	15MHz		QPSK	60	15
48 (Note 7)	15MHz		QPSK	75	0
49 (Note 7)	15MHz		16QAM (Note 5)	75	0
50 (Note 8)	20MHz		QPSK	1	0
51 (Note 8)	20MHz		QPSK	1	99
52 (Note 8)	20MHz		QPSK	36	0
53 (Note 8)	20MHz		QPSK	75	25
54 (Note 7)	20MHz		QPSK	100	0
55 (Note 7)	20MHz		16QAM (Note 5)	100	0

Note 1: Test Channel Bandwidths are checked separately for E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The configuration ID will be used to map the applicable Test Configuration to be corresponding Test Requirement in subclause 6.2.4 as not all combinations are necessarily required based on the applicability of the UE.
Note 3: The RB_{start} of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth.
Note 4: Applies only for UE-Categories ≥2.
Note 5: Void.
Note 6: Applies only for Rel-11 and earlier.
Note 7: Applies only for Rel-12 and later.
Note 8: Applies only for Rel-12 and later and Low Range.
Note 9: Applies only for Rel-12 and later and Mid, High Range and additional test frequencies.

Table 6.6.3B.3.4.1-2: Test Configuration Table (network signalled value "NS_05")

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range In case of Low range: - For 5MHz Channel Bandwidth: 1927.2MHz (N_{UL} = 18072) - For 10MHz Channel Bandwidth: 1934.7MHz (N_{UL} = 18147) - For 15MHz Channel Bandwidth: 1932.5MHz (N_{UL} = 18125) - For 20MHz Channel Bandwidth: 1930MHz (N_{UL} = 18100)						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, 10MHz, 15MHz, 20MHz						
Test Parameters for Channel Bandwidths							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**		**RB_{start}**
		FDD	**TDD**		**FDD**	**TDD**	**FDD**
5MHz	N/A for Additional Spurious Emissions testing			QPSK	1	N/A	0
5MHz				QPSK	1		24
5MHz				QPSK	25		0
10MHz				QPSK	1		0
10MHz				QPSK	1		49
10MHz				QPSK	12		0
10MHz				QPSK	12		38
10MHz				QPSK	48		0
10MHz				QPSK	48		2
10MHz (Note 6)				QPSK	50		0
10MHz (Note 6)				16QAM	50 (Note 3)		0
15MHz (Note 7)				QPSK	1		8
15MHz (Note 7)				QPSK	1		66
15MHz (Note 7)				QPSK	16		8
15MHz (Note 7)				QPSK	16		51
15MHz (Note 7)				QPSK	30		8
15MHz (Note 7)				QPSK	30		37
20MHz (Note 7)				QPSK	1		24
20MHz (Note 7)				QPSK	1		75
20MHz (Note 7)				QPSK	18		24
20MHz (Note 7)				QPSK	18		58
20MHz (Note 7)				QPSK	24		24
20MHz (Note 7)				QPSK	24		52
15MHz (Note 8)				QPSK	1		0
15MHz (Note 8)				QPSK	1		74
15MHz (Note 8)				QPSK	16		0
15MHz (Note 8)				QPSK	16		59
15MHz (Note 8)				QPSK	48		0
15MHz (Note 8)				QPSK	48		27

15MHz (Note 8)		QPSK	75		0
15MHz (Note 8)		16QAM	75 (Note 3)		0
20MHz (Note 8)		QPSK	1		0
20MHz (Note 8)		QPSK	1		99
20MHz (Note 8)		QPSK	18		0
20MHz (Note 8)		QPSK	18		82
20MHz (Note 8)		QPSK	48		0
20MHz (Note 8)		QPSK	48		52
20MHz (Note 8)		QPSK	100		0
20MHz (Note 8)		16QAM	100 (Note 3)		0
10MHz (Note 9)		QPSK	50		0
10MHz (Note 9)		16QAM	50 (Note 3)		0
15MHz (Note 9)		QPSK	1		0
15MHz (Note 9)		QPSK	75		0
15MHz (Note 9)		QPSK	16		8
15MHz (Note 9)		QPSK	30		8
15MHz (Note 9)		QPSK	54		8
15MHz (Note 9)		QPSK	64		8
15MHz (Note 9)		QPSK	1		74
15MHz (Note 9)		QPSK	6		69
15MHz (Note 9)		QPSK	8		67
20MHz (Note 9)		QPSK	1		0
20MHz (Note 9)		QPSK	100		0
20MHz (Note 9)		QPSK	18		24
20MHz (Note 9)		QPSK	24		24
20MHz (Note 9)		QPSK	40		24
20MHz (Note 9)		QPSK	50		24
20MHz (Note 9)		QPSK	72		24
20MHz (Note 9)		QPSK	1		99
20MHz (Note 9)		QPSK	6		94
20MHz (Note 9)		QPSK	24		76
10MHz (Note 10)		QPSK	50		0
10MHz (Note 10)		16QAM	50 (Note 3)		0

15MHz (Note 10)		QPSK	1		0
15MHz (Note 10)		QPSK	1		74
15MHz (Note 10)		QPSK	16		0
15MHz (Note 10)		QPSK	16		59
15MHz (Note 10)		QPSK	48		0
15MHz (Note 10)		QPSK	48		27
15MHz (Note 10)		QPSK	75		0
15MHz (Note 10)		16QAM	75 (Note 3)		0
20MHz (Note 10)		QPSK	1		0
20MHz (Note 10)		QPSK	1		99
20MHz (Note 10)		QPSK	18		0
20MHz (Note 10)		QPSK	18		82
20MHz (Note 10)		QPSK	48		0
20MHz (Note 10)		QPSK	48		52
20MHz (Note 10)		QPSK	100		0
20MHz (Note 10)		16QAM	100 (Note 3)		0

Note 1: Void
Note 2: Void
Note 3: Applies only for UE-Categories ≥2.
Note 4: Void
Note 5: Void
Note 6: Applies when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 7: Applies for low range and when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 8: Applies for mid range and when bit number 1 in modifiedMPRbehavior = 0 (Rel-11 minimum requirements apply) for Band1 and not available for Band65.
Note 9: Applies only for low range and when bit number 1 in modifiedMPRbehavior = 1 (Rel-12 minimum requirements apply) for Band1 and low range for Band65.
Note 10: Applies only for mid range and when bit number 1 in modifiedMPRbehavior = 1 (Rel-12 minimum requirements apply) for Band1 and mid range for Band65.
Note 11: ModifiedMPRbehavior is defined in annex J.1

Table 6.6.3B.3.4.1-3: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment as specified in TS 36.508 [7] clause 4.1				NC		
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1				Mid range		
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1				10MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	TDD
1	10MHz	N/A for Additional Spurious Emissions testing.		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			16QAM	36 (Note 1)	13
7	10MHz			QPSK	16	19
8	10MHz			QPSK	12	19
9	10MHz			16QAM	16	19
10	10MHz			QPSK	30	19
11	10MHz			16QAM	30 (Note 1)	19
12	10MHz			QPSK	6	43
13	10MHz			QPSK	2	48
14	10MHz			QPSK	50	0
15	10MHz			QPSK	12	0
16	10MHz			16QAM	50 (Note 1)	0
Note 1: Applies only for UE-Categories ≥2.						

Table 6.6.3B.3.4.1-4: Test Configuration Table (network signalled value "NS_08")

Initial Conditions						
Test Environment as specified in TS 36.508 [7] clause 4.1				Normal		
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1				High range		
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1				5MHz, 10MHz, 15MHz		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
5MHz	N/A for Additional Spurious Emissions testing			QPSK	1	N/A
5MHz				QPSK	8	
5MHz				QPSK	25	
10MHz				QPSK	1	
10MHz				QPSK	12	
10MHz				QPSK	40	
10MHz				QPSK	50	
10MHz				16QAM	50 (Note 3)	
15MHz				QPSK	1	
15MHz				QPSK	16	
15MHz				QPSK	40	
15MHz				QPSK	75	
15MHz				16QAM	75 (Note 3)	
Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max.						
Note 2: The RBstart of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth.						
Note 3: Applies only for UE-Categories ≥2.						

Table 6.6.3B.3.4.1-5: Test Configuration Table (network signalled value "NS_09")

Initial Conditions						
Test Environment as specified in TS 36.508 [7] clause 4.1				Normal		
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1				High range		
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1				5MHz, 10MHz, 15MHz		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
5MHz	N/A for Additional Spurious Emissions testing			QPSK	1	N/A
5MHz				QPSK	8	
5MHz				QPSK	25	
10MHz				QPSK	1	
10MHz				QPSK	12	
10MHz				QPSK	40	
10MHz				QPSK	50	
10MHz				16QAM	50 (Note 3)	
15MHz				QPSK	1	
15MHz				QPSK	16	
15MHz				QPSK	40	
15MHz				QPSK	54	
15MHz				QPSK	75	
15MHz				16QAM	75 (Note 3)	
Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max. Note 2: The RBstart of partial RB allocation shall be RB#0 and RB# (max + 1 - RB allocation) of the channel bandwidth. Note 3: Applies only for UE-Categories ≥2.						

Table 6.6.3B.3.4.1-6: Test Configuration Table (network signalled value "NS_12")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				For 1.4 MHz Channel Bandwidth: UL 814.9 MHz (NUL = 26699) For 3 MHz Channel Bandwidth: UL 815.7 MHz (NUL = 26707) For 5 MHz Channel Bandwidth: UL 816.7 MHz (NUL = 26717) For 10 MHz Channel Bandwidth: UL 819.2 MHz (NUL = 26742) For 15 MHz Channel Bandwidth: UL 821.7 MHz (NUL = 26767)		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz and 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RB_{start} FDD
1	1.4 MHz	N/A for Additional Spurious Emissions testing		QPSK	1	0
2	1.4 MHz			QPSK	6	0
3	1.4 MHz			QPSK	1	1
4	1.4 MHz			QPSK	5	1
5	1.4 MHz			16QAM	6	0
6 (Note 1)	3 MHz			QPSK	4	0
7 (Note 1)	3 MHz			QPSK	10	0
8	3 MHz			QPSK	4	4
9	3 MHz			QPSK	10	4
10 (Note 1)	3 MHz			16QAM	15	0
11	5 MHz			QPSK	8	0
12	5 MHz			QPSK	15	0
13	5 MHz			QPSK	8	7
14 (Note 1)	5 MHz			QPSK	15	7
15	5 MHz			16QAM	25	0
16 (Note 2)	10 MHz			QPSK	18	0
17 (Note 2)	10 MHz			QPSK	18	16
18 (Note 2)	10 MHz			16QAM	50	0
19 (Note 2)	15 MHz			QPSK	30	0
20 (Note 2)	15 MHz			QPSK	30	31
21 (Note 2)	15 MHz			16QAM	75	0
Note 1: Only for UEs of Rel-11 and earlier Note 2: Only for UEs of Rel-12 and later						

Table6.6.3B.3.4.1-7: Test Configuration Table (network signalled value "NS_13")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				For 1.4 MHz Channel Bandwidth: UL 819.7 MHz (NUL = 26747) For 3 MHz Channel Bandwidth: UL 820.5 MHz (NUL = 26755) For 5 MHz Channel Bandwidth: UL 821.5 MHz (NUL = 26765)		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				1.4 MHz, 3MHz and 5 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RB_{start} FDD
1 (Note 1)	1.4 MHz	N/A for Additional Spurious Emissions testing		QPSK	6	0
2 (Note 1)	3 MHz			QPSK	15	0
1	5 MHz			QPSK	1	0
2	5 MHz			QPSK	25	0
3	5 MHz			QPSK	15	0
4	5 MHz			QPSK	15	7
5	5 MHz			16QAM	25	0
Note 1: Only for UEs of Rel-12 and later						

Table 6.6.3B.3.4.1-8: Test Configuration Table (network signalled value "NS_14")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] clause 4.1)				NC		
Test Frequencies (as specified in TS 36.508 [7] clause 4.3.1)				For 10 MHz Channel Bandwidth: UL 829 MHz (NUL = 26840) For 15 MHz Channel Bandwidth: Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] clause 4.3.1)				10 MHz, 15 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation FDD	RB_{start} FDD
1	10 MHz	N/A for Additional Spurious Emissions testing		QPSK	1	0
2	10 MHz			QPSK	25	0
3	10 MHz			QPSK	50	0
4	10 MHz			QPSK	25	1
5 (Note 1)	10 MHz			16QAM	50	0
6	15 MHz			QPSK	8	0
7	15 MHz			QPSK	25	0
8	15 MHz			QPSK	75	0
9	15 MHz			QPSK	50	15
10 (Note 1)	15 MHz			16QAM	75	0
Note 1: Applies only for UE-Categories ≥2.						

Table 6.6.3B.3.4.1-9: Test Configuration Table (network signalled value "NS_15")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	NC
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)	For 1.4 MHz Channel Bandwidth: High range For 3 MHz Channel Bandwidth: 843.5 MHz (N_{UL} = 26985) or High range For 5 MHz Channel Bandwidth: 842.5 MHz (N_{UL} = 26975) or High range For 10 MHz Channel Bandwidth: 840 MHz (NUL = 26950) or High range For 15 MHz Channel Bandwidth: 837.5 MHz (NUL = 26925) or High range
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz

Test Parameters for Channel Bandwidths

		Downlink Configuration		Uplink Configuration		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 3)	1.4 MHz	N/A for A-MPR testing.		QPSK	4	0
2 (note 3)	1.4 MHz			16QAM	6	0
3 (note 3)	3 MHz			QPSK	6	7
4 (note 3)	3 MHz			QPSK	12	1
5 (note 3)	3 MHz			16QAM	15	0
6 (note 2)	3 MHz			QPSK	15	0
7 (note 3)	5 MHz			QPSK	6	14
8 (note 3)	5 MHz			QPSK	20	0
9 (note 3)	5 MHz			16QAM	25	0
10 (note 2)	5 MHz			QPSK	16	9
11 (note 2)	5 MHz			QPSK	25	0
12 (note 3)	10 MHz			QPSK	1	49
13 (note 3)	10 MHz			QPSK	1	0
14 (note 3)	10 MHz			QPSK	3	0
15 (note 3)	10 MHz			QPSK	20	3
16 (note 3)	10 MHz			QPSK	36	1
17 (note 3)	10 MHz			QPSK	50	0
18 (note 3)	10 MHz			16QAM	50	0
19 (note 2)	10 MHz			QPSK	20	25
20 (note 2)	10 MHz			QPSK	45	0
21 (note 3)	15 MHz			QPSK	18	36
22 (note 3)	15 MHz			QPSK	25	1
23 (note 3)	15 MHz			QPSK	54	0
24 (note 3)	15 MHz			16QAM	75	0
25 (note 2)	15 MHz			QPSK	18	44

26 (note 2)	15 MHz		QPSK	60	2

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only test frequency < high range
Note 3: Applicable only to high range frequency testing

Table 6.6.3B.3.4.1-10: Test Configuration Table (network signalled value "NS_16")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				For 1.4 MHz Channel Bandwidth: Low range For 3 MHz Channel Bandwidth: Low range, 810 MHz (N_{UL}= 27070) For 5 MHz Channel Bandwidth: Low range, 811 MHz (N_{UL}= 27080) , 814.5 MHz (N_{UL}= 27115) For 10 MHz Channel Bandwidth: Low range, 813.5 MHz (N_{UL}= 27105), 817 MHz (N_{UL}= 27140)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1	1.4 MHz	N/A for Additional Spurious Emissions A-MPR testing.		QPSK	1	0
2	1.4 MHz			QPSK	6	0
3 (Note 1)	1.4 MHz			16QAM	6	0
4	3 MHz			QPSK	1	0
5	3 MHz			QPSK	12	1
6	3 MHz			QPSK	15	0
7 (Note 1)	3 MHz			16QAM	15	0
8	5 MHz			QPSK	1	0
9	5 MHz			QPSK	12	2
10	5 MHz			QPSK	18	2
11	5 MHz			QPSK	20	0
12	5 MHz			QPSK	20	2
13	5 MHz			QPSK	25	0
14 (Note 1)	5 MHz			16QAM	25	0
15	10 MHz			QPSK	1	0
16 (Note 2)	10 MHz			QPSK	1	10

17 (Note 2)	10 MHz		QPSK	20	0
18 (Note 2)	10 MHz		QPSK	27	15
19 (Note 2)	10 MHz		QPSK	32	15
20	10 MHz		QPSK	32	0
21	10 MHz		QPSK	50	0
22 (Note 1)	10 MHz		16QAM	50	0
23 (Note 3)	10 MHz		QPSK	40	0
24 Note 3)	10 MHz		QPSK	40	1
Note 1: Applies only for UE-Categories ≥2. Note 2: Applies only for 10 MHz channel for Low Range, and 813.5 MHz Note 3: Applies only for 10 MHz channel for 817 MHz range					

Table 6.6.3B.3.4.1-11: Test Configuration Table (network signalled value "NS_17")

Initial Conditions					
Test Environment (as specified in TS 36.508[7] subclause 4.1)				Normal	
Test Frequencies (as specified inTS36.508 [7] subclause 4.3.1)				For 5 MHz Channel Bandwidth: 720.5 MHz (N_{UL}= 27385) For 10 MHz Channel Bandwidth: 723 MHz (N_{UL}= 27410)	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for Additional Spurious Emissions testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	5MHz			16QAM	25 (Note 3)
5	10MHz			QPSK	1
6	10MHz			QPSK	12
7	10MHz			QPSK	50
8	10MHz			16QAM	50 (Note 3)
Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max. Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. Note 3: Applies only for UE-Categories ≥2.					

Table 6.6.3B.3.4.1-12: Test Configuration Table (network signalled value "NS_18")

Initial Conditions					
Test Environment (as specified in TS 36.508[7] subclause 4.1)				Normal	
Test Frequencies (as specified inTS36.508 [7] subclause 4.3.1)				Low range	
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz	
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**
1	5MHz	N/A for Additional Spurious Emissions testing		QPSK	1
2	5MHz			QPSK	8
3	5MHz			QPSK	25
4	5MHz			16QAM	25 (Note 3)
5	10MHz			QPSK	1
6	10MHz			QPSK	12
7	10MHz			QPSK	50
8	10MHz			16QAM	50 (Note 3)
9	15MHz			QPSK	1
10	15MHz			QPSK	16
11	15MHz			QPSK	75
12	15MHz			16QAM	75 (Note 3)
13	20MHz			QPSK	1
14	20MHz			QPSK	18
15	20MHz			QPSK	100
16	20MHz			16QAM	100 (Note 3)
Note 1: The 1 RB allocation shall be tested at both RB #0 and RB #max. Note 2: The RBstart of partial RB allocation shall be RB# 0 and RB# (max +1 - RB allocation) of the channel bandwidth. Note 3: Applies only for UE-Categories ≥2.					

Table 6.6.3B.3.4.1-13: Test Configuration Table (network signalled value "NS_19")

FFS

Table 6.6.3B.3.4.1-14: Test Configuration Table (network signalled value "NS_21")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range or High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5 MHz, 10 MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation**	**Mod'n**	**RB allocation FDD**	**RBstart FDD**
1 (note 2)	5 MHz			QPSK	1	0
2 (note 2)	5 MHz			QPSK	25	0
3 (note 2)	10 MHz			QPSK	1	0
4 (note 3)	10 MHz			QPSK	1	49
5 (note 2)	10 MHz			QPSK	15	0
6 (note 3)	10 MHz			QPSK	3	47
7 (note 3)	10 MHz			QPSK	50	0
8 (note 1, 3)	10 MHz			16QAM	50	0

Note 1: Applies only for UE-Categories ≥2.
Note 2: Applicable only to low range frequency testing.
Note 3: Applicable only to high range frequency testing.

Table 6.6.3B.3.4.1-15: Test Configuration Table (network signalled value "NS_22")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_22 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	25	0
3	5MHz			QPSK	1	24
4	5MHz			16QAM	1	0
5	5MHz			16QAM	1	24
6	10MHz			QPSK	50	0
7	10MHz			QPSK	36	0
8	10MHz			QPSK	1	0
9	10MHz			QPSK	1	49
10	10MHz			16QAM	1	0
11	10MHz			16QAM	1	49
12	15MHz			QPSK	75	0
13	15MHz			QPSK	50	0
14	15MHz			QPSK	1	0
15	15MHz			QPSK	1	74
16	15MHz			16QAM	1	0
17	15MHz			16QAM	1	74
18	20MHz			QPSK	100	0
19	20MHz			QPSK	64	0
20	20MHz			QPSK	1	0
21	20MHz			QPSK	1	99
22	20MHz			16QAM	1	0
23	20MHz			16QAM	1	99

Table 6.6.3B.3.4.1-16: Test Configuration Table (network signalled value "NS_23")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)				Low Range, Mid Range, High Range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_23 A-MPR						
		Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation TDD**	**RB_{start} TDD**
1	5MHz	N/A for A-MPR testing		QPSK	1	0
2	5MHz			QPSK	1	24
3	5MHz			QPSK	25	0
4	5MHz			16QAM	1	0
5	5MHz			16QAM	1	24
6	10MHz			QPSK	50	0
7	15MHz			QPSK	75	0
8	20MHz			QPSK	100	0

Table 6.6.3B.3.4.1-17: Test Configuration Table (network signalled value "NS_24")

Initial Conditions	
Test Environment (as specified in TS 36.508 [7] subclause 4.1)	Normal
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)	Refer to F_{UL} in test parameters with following: 5 MHz CH BW: - 1985 MHz (N_{UL} = 132722) - 2007.5 MHz (N_{UL} = high range) 10 MHz CH BW: - 1980 MHz (N_{UL} = 132672) - 1990 MHz (N_{UL} = 132772) - 2005 MHz (N_{UL} = high range) 15 MHZ CH BW: - 1980 MHz (N_{UL} = 132672) - 1990 MHz (N_{UL} = 132772) - 2002.5 MHz (N_{UL} = high range) 20 MHz CH BW: 2000 MHz (N_{UL} = high range) -
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)	5MHz, 10MHz, 15MHz, 20MHz

Test Parameters for NS_24 A-MPR

			Downlink Configuration		Uplink Configuration		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	2007.5	5MHz	N/A for A-MPR testing		QPSK	1	0
2	2007.5	5MHz			QPSK	8	17
3	2007.5	5MHz			QPSK	25	0
4 (Notes 2,3)	2007.5	5MHz			16QAM	25	0
5	1985	5MHz			QPSK	8	17
6	1980	10MHz			QPSK	12	1
7 (Notes 2,3)	1980	10MHz			16QAM	50	0
8	1980	10MHz			QPSK	48	2
9	1980	10MHz			QPSK	25	25
10	1980	10MHz			QPSK	1	49
11	1980	10MHz			QPSK	12	38
12 (Notes 2,3)	1980	10MHz			16QAM	12	38
13	1980	10MHz			QPSK	3	47
14	1980	10MHz			QPSK	8	1
15	1990	10MHz			QPSK	1	0
16	1990	10MHz			QPSK	12	38
17 (Notes 2,3)	1990	10MHz			16QAM	50	0
18	2005	10MHz			QPSK	12	38
19	2005	10MHz			QPSK	50	0
20 (Notes 2,3)	2005	10MHz			16QAM	50	0
21	1980	15MHz			QPSK	1	11
22	1980	15MHz			QPSK	16	11
23	1980	15MHz			QPSK	45	11
24 (Notes 2,3)	1980	15MHz			16QAM	50	0
25	1980	15MHz			QPSK	16	28
26	1980	15MHz			QPSK	16	59
27	1980	15MHz			QPSK	60	15
28	1980	15MHz			QPSK	30	12
29	2002.5	15MHz			QPSK	1	0
30	2002.5	15MHz			QPSK	16	59
31 (Notes 2,3)	2002.5	15MHz			16QAM	16	59
32 (Notes 2,3)	2002.5	15MHz			16QAM	75	0
33	2000	20MHz			QPSK	1	0
34	2000	20MHz			QPSK	18	82
35 (Notes 2,3)	2000	20MHz			16QAM	18	82
36 (Notes 2,3)	2000	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.

Note 2:	Applies only for UE-Categories ≥2.
Note 3:	The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3B.3.4.1-18: Test Configuration Table (network signalled value "NS_25")

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to F_{UL} in test parameters with following: 10 and 15 MHz CH BW: - 1980 MHz (N_{UL} = 131672) - 1990 MHz (N_{UL} = 131772)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_25 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**F_{UL}**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	2007.5	5MHz	N/A for A-MPR testing		QPSK	25	0
2 (Notes 2,3)	2007.5	5MHz			16QAM	25	0
3	2007.5	5MHz			QPSK	8	9
4	2007.5	5MHz			QPSK	1	24
5	2007.5	5MHz			QPSK	8	17
6 (Notes 2,3)	2007.5	5MHz			16QAM	8	17
7	1980	10MHz			QPSK	12	1
8 (Notes 2,3)	1980	10MHz			16QAM	50	0
9 (Notes 2,3)	1980	10MHz			16QAM	48	2
10	1980	10MHz			QPSK	25	25
11	1980	10MHz			QPSK	1	49
12	1980	10MHz			QPSK	12	38
13	1990	10MHz			QPSK	12	0
14	1990	10MHz			QPSK	25	0
15	1990	10MHz			QPSK	50	0
16 (Notes 2,3)	1990	10MHz			16QAM	25	0
17	1990	10MHz			QPSK	48	2
18	1990	10MHz			QPSK	30	19
19 (Notes 2,3)	1990	10MHz			16QAM	30	19
20	1990	10MHz			QPSK	12	31
21	2005	10MHz			QPSK	1	0
22	2005	10MHz			QPSK	12	6
23	2005	10MHz			QPSK	50	0
24 (Notes 2,3)	2005	10MHz			16QAM	50	0
25	2005	10MHz			QPSK	40	10
26 (Notes 2,3)	2005	10MHz			16QAM	40	10
27	2005	10MHz			QPSK	32	18
28 (Notes 2,3)	2005	10MHz			16QAM	32	18
29	2005	10MHz			QPSK	12	23
30	1980	15MHz			QPSK	16	4
31	1980	15MHz			QPSK	75	0
32	1980	15MHz			QPSK	60	15
33 (Notes 2,3)	1980	15MHz			16QAM	40	35
34	1980	15MHz			QPSK	1	74
35	1980	15MHz			QPSK	12	63
36	1980	15MHz			QPSK	16	55
37	2002.5	15MHz			QPSK	1	0
38	2002.5	15MHz			QPSK	16	0
39 (Notes 2,3)	2002.5	15MHz			16QAM	16	0
40 (Notes 2,3)	2002.5	15MHz			16QAM	1	0
41	1980	20MHz			QPSK	1	0
42	1980	20MHz			QPSK	18	0
43 (Notes 2,3)	1980	20MHz			16QAM	100	0
44	1980	20MHz			QPSK	64	36
45	1980	20MHz			QPSK	18	72
46 (Notes 2,3)	1980	20MHz			16QAM	54	46
47	1980	20MHz			QPSK	18	55
48	2000	20MHz			QPSK	1	0
49	2000	20MHz			QPSK	18	72

50 (Notes 2,3)	2000	20MHz		16QAM	18	72
51 (Notes 2,3)	2000	20MHz		16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Table 6.6.3B.3.4.1-19: Test Configuration Table (network signalled value "NS_27")Initial Conditions

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)					Normal		
Test Frequencies (as specified in TS 36.508 [7] subclause 4.3.1)					Refer to Frequency column in test parameters		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)					5MHz, 10MHz, 15MHz, 20MHz		
Test Parameters for NS_27 A-MPR							
			Downlink Configuration		**Uplink Configuration**		
Configuration ID	**Frequency**	**Ch BW**	**Mod'n**	**RB allocation FDD**	**Mod'n**	**RB allocation FDD**	**RB_{start} FDD**
1	Low/Mid	5MHz	N/A for A-MPR testing		QPSK	1	0
2	High	5MHz			QPSK	1	24
3	Low/Mid/High	5MHz			QPSK	25	0
4	Low/Mid/High	5MHz			16QAM	25	0
5	Low/Mid	10MHz			QPSK	1	0
6	High	10MHz			QPSK	1	49
7	Low/Mid/High	10MHz			QPSK	50	0
8 (Note 2)	Low/Mid/High	10MHz			16QAM	50	0
9	Low/Mid	15MHz			QPSK	1	0
10	Low	15MHz			QPSK	1	7
11	Low/Mid	15MHz			QPSK	16	0
12	High	15MHz			QPSK	1	74
13	High	15MHz			QPSK	1	67
14	High	15MHz			QPSK	16	74
15	Low/Mid/High	15MHz			QPSK	75	0
16 (Note 2)	Low/Mid/High	15MHz			16QAM	75	0
17	Low/Mid	20MHz			QPSK	1	0
18	Low	20MHz			QPSK	1	13
19	Low	20MHz			QPSK	1	16
20	Low/Mid	20MHz			QPSK	21	0
21	High	20MHz			QPSK	1	99
22	High	20MHz			QPSK	1	86
23	High	20MHz			QPSK	1	83
24	High	20MHz			QPSK	21	0
25	Low/Mid/High	20MHz			QPSK	100	0
26 (Note 2)	Low/Mid/High	20MHz			16QAM	100	0

Note 1: The Configuration ID will be used to map the applicable Test Configuration to the corresponding Test Requirement in subclause 6.2.4B.5 as not all combinations are necessarily required based on the applicability of the UE.
Note 2: Applies only for UE-Categories ≥2.
Note 3: The 16QAM configurations shall not apply to UEs which support UL 64QAM.

Editor's note: The following lines belong at the end of section 6.2.4.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.38.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Tables 6.6.3B.3.4.1-1 to 6.6.3B.3.4.1-19 depending on network signal value.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.6.3B.3.4.3.

6.6.3B.3.4.2 Test procedure

Same test procedure as defined in clause 6.6.2.2.4.2.

6.6.3B.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6, with the same exceptions as in clause 6.6.3.3.4.3.

6.6.3B.3.5 Test requirement

Same test requirements as defined in clause 6.6.3.3.5.

6.6.3E Spurious emission for UE category 0

6.6.3E.1 Transmitter Spurious emissions for UE category 0

6.6.3E.1.1 Test purpose

Same test purpose as in clause 6.6.3.1.1.

6.6.3E.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.6.3E.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.3.1.3.

6.6.3E.1.4 Test description

6.6.3E.1.4.1 Initial conditions

Same initial conditions as in clause 6.6.3.1.4.1 with following exceptions for HD-FDD:

- Instead of Table 6.6.3.1.4.1-1 → use Table 6.6.3E.1.4.1-1.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.6.3E.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Low range, Mid range, High range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, Highest		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD and HD-FDD**	**TDD**
1.4MHz	N/A for Spurious Emissions testing			QPSK	6	6
1.4MHz				QPSK	1	1
3MHz				QPSK	15	15
3MHz				QPSK	1	1
5MHz				QPSK	25	25
5MHz				QPSK	1	1
10MHz				QPSK	36	36
10MHz				QPSK	1	1
15MHz				QPSK	36	36
15MHz				QPSK	1	1
20MHz				QPSK	36	36
20MHz				QPSK	1	1
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.						

6.6.3E.1.4.2 Test procedure

Same test procedure as in clause 6.6.3E.1.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframe are not under test.

6.6.3E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.6.3E.1.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table. 6.6.3E.1.5-1.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in Table 6.6.3E.1.5-1.

The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth shown in Table 6.6.3.1.3-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3E.1.5-1: General spurious emissions test requirements

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	

6.6.3E.2 Spurious emission band UE co-existence for UE category 0

6.6.3E.2.1 Test purpose

Same test purpose as in clause 6.6.3.2.1.

6.6.3E.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.6.3E.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.3.2.3 with the following exceptions:

- Instead of Tables 6.6.3.2.3-1 through 6.6.3.2.3-1D → use Table 6.6.3E.2.3-1.

Table 6.6.3E.2.3-1: Spurious emission band limits Rel-12

E-UTRA Band	Spurious emission						
	Protected band	**Frequency range (MHz)**			**Maximum Level (dBm)**	**MBW (MHz)**	**Note**
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 26, 27, 28, 29, 30, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 41, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 26, 27, 28, 29, 30, 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
5	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 23, 24, 25, 28, 29, 30, 31, 38, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 26	859	-	869	-27	1	
8	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA band 7	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23, 25, 26, 27, 29, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	2
20	E-UTRA Band 1, 3, 7, 8, 20, 22, 31, 32, 33, 34, 40, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
39	E-UTRA Band 22, 34, 40, 41, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805		1855	-40	1	32
	Frequency range	1855		1875	-15.5	5	15,26,32
	Frequency range	1875		1880	-15.5	5	15,26,33
41	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	30
	Frequency range	1839.9		1879.9	-50	1	30
	Frequency range	1884.5		1915.7	-41	0.3	8, 30

Note 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1.
Note 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1.3-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.
Note 3: To meet these requirements some restriction will be needed for either the operating band or protected band.
Note 4: N/A
Note 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band.
Note 6: N/A
Note 7: Applicable when co-existence with PHS system operating in 1884.5 -1919.6MHz.
Note 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.
Note 9: N/A
Note 10: N/A
Note 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD.
Note 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.
Note 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.
Note 14: N/A
Note 15: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.
Note 16: N/A
Note 17: N/A
Note 18: N/A
Note 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.
Note 20: N/A
Note 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
Note 22: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.
Note 23: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.
Note 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
Note 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).
Note 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
Note 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink

	transmission bandwidth less than or equal to 54 RB.
Note 28:	N/A
Note 29:	N/A
Note 30:	This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz.
Note 31:	N/A
Note 32:	This requirement is applicable for an uplink transmission bandwidth less than or equal to [54 RB] for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1887.5 - 1889.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1890 - 1898 MHz.
Note 33:	This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to [54 RB] for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.
Note 34:	This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.
Note 35:	This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3E.2.

This test use minimum requirements from many releases of TS 36.101 [2] due to release independence defined in TS 36.307 [16]

6.6.3E.2.4 Test description

6.6.3E.2.4.1 Initial conditions

Same initial conditions as in clause 6.6.3.2.4.1 with the following exceptions:

- Instead of Table 6.6.3.2.4.1-1 and Table 6.6.3.2.4.1-2 → use Table 6.6.3E.2.4.1-1 and Table 6.6.3E.2.4.1-2.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.6.3E.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) (Note 6, Note 7)				Low range, Mid range, High range (Note 6, 13, 16)		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, Highest (Note 13, 16)		
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	N/A for Spurious Emissions testing			QPSK	6	6
1.4MHz				QPSK	1	1
3MHz				QPSK	15	15
3MHz				QPSK	1	1
5MHz				QPSK	25	25[12]
5MHz				QPSK	1	1[12]
5MHz				QPSK	20[8]	-
10MHz				QPSK	36	36
10MHz				QPSK	1	1
10MHz				QPSK	30[15]	
10MHz				QPSK	32[9]	-
10MHz				QPSK	1[10, 14]	-
15MHz				QPSK	36	36
15MHz				QPSK	36[3, 11]	36[4, 17, 18]
15MHz				QPSK	1	1[5]
20MHz				QPSK	36	36
20MHz				QPSK	36[3, 11]	36[4, 17, 18]
20MHz				QPSK	1	1[5]

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.
Note 3: To be used for requirements under note 15 in table 6.6.3.2.3-1 in high range at RB#, instead of full allocation.
Note 4: To be used for requirements under note 16 in table 6.6.3.2.3-1 and table 6.6.3.2.3-1A, note 17 in table 6.6.3.2.3-1B, note 22 in table 6.6.3.2.3-1C in high range - 5MHz at RB#(full allocation – 54), instead of full allocation.
Note 5: For requirements under note 16 in table 6.6.3.2.-1 and table 6.6.3.2.3-1A, note 17 in table 6.6.3.2.3-1B, note 22 in table 6.6.3.2.3-1C (high range – 5MHz) is tested instead of high channel.
Note 6: Do not apply for requirements under Note 13 in Tables 6.6.3.2.3-1 to 6.6.3.2.3-1C. Test frequencies for these requirements are defined in Table 6.6.3.2.4.1-2.
Note 7: Void
Note 8: For requirements under note 17 in table 6.6.3.2.3-1A, note 18 in table 6.6.3.2.3-1, note 23 in table 6.6.3.2.3-1C (high range – 10MHz) is tested with RB #0 to RB #19 used.
Note 9: For requirements under note 17 in table 6.6.3.2.3-1A, note 18 in table 6.6.3.2.3-1B, note 23 in table 6.6.3.2.3-1C high range is tested with RB #4 to RB #35 used.
Note 10: For requirements under note 17 in table 6.6.3.2.3-1A, note 18 in table 6.6.3.2.3-1B, note 23 in table 6.6.3E.2.3-1C high range is tested with RB #4 and (RB#max -4) used.
Note 11: To be used for requirements under note 17 in table 6.6.3.2.3-1, note 18 in table 6.6.3.2.3-1A, note 19 in table 6.6.3.2.3-1B and note 27 in table 6.6.3.2.3-1C in low range at RB#0, instead of full allocation.
Note 12: For requirements under note 16 in table 6.6.3E.2.3-1 and table 6.6.3.2.3-1A, note 17 in table 6.6.3.2.3-1B, note 22 in table 6.6.3.2.3-1C, the message exception in Table 6.6.3.2.4.3-1 is used to test with the high range.
Note 13: For requirements under note 31 in table 6.6.3.2.3-1C and note 34 in table 6.6.3E.2.3-1 only 720.5 MHz is tested with 5 MHz and only 723 MHz is tested with 10 MHz.
Note 14: For requirements under note 31 in table 6.6.3.2.3-1C and note 34 in table 6.6.3E.2.3-1 RB #2 and RB #47 used.
Note 15: To be used for requirements under note 31 in table 6.6.3.2.3-1C and note 34 in table 6.6.3E.2.3-1 at RB#2, instead of full allocation.
Note 16: For requirements under note 32 in table 6.6.3.2.3-1C and note 35 in table 6.6.3E.2.3-1 only low range and 728 MHz with 10 MHz is tested.
Note 17: To be used for requirements under note 32 in table 6.6.3E.2.3-1 in low range, instead of full allocation.
Note 18: To be used for requirements under note 33 in table 6.6.3E.2.3-1 (high range-7 MHz), instead of full allocation and high range.

Table 6.6.3E.2.4.1-2: Test frequencies for E-UTRA channel bandwidth for operating band 3 with Note 13 (in Tables 6.6.3E.2.3-1)

Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
5	19924	1782.4	1924	1877.4
10	19899	1779.9	1899	1874.9
15	19874	1777.4	1874	1872.4
20	19849	1774.9	1849	1869.9

6.6.3E.2.4.2 Test procedure

Same test procedure as in clause 6.6.3.2.4.2 with the following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframes are not under test.

6.6.3E.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

6.6.3E.2.5 Test requirement

Test requirements for Spurious Emissions UE Co-existence are the same as the minimum requirements and are not repeated in this section.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in table 6.6.3E.2.3-1 according to the following rule:

The requirements for the UE are release specific and can be found in Tables 6.6.3E.2.3-1. If the UE support a band, which is not defined in the table corresponding UE's release, the requirements for this band are taken from the table of earliest release where requirements for this band are defined. This has been described in following Table 6.6.3E.2.5-1.

Table 6.6.3E.2.5-1: UE Requirements according to UE E-UTRA release and supported E-UTRA band

Band	UE Requirements per release
	Rel-12
2	Table 6.6.3E.2.3-1
3	Table 6.6.3E.2.3-1
4	Table 6.6.3E.2.3-1
5	Table 6.6.3E.2.3-1
8	Table 6.6.3E.2.3-1
13	Table 6.6.3E.2.3-1
20	Table 6.6.3E.2.3-1
39	Table 6.6.3E.2.3-1
41	Table 6.6.3E.2.3-1

NOTE 1: The following is applied to Note2 in Table 6.6.3E.2.3-1. For frequency with 2nd, 3rd or 4th harmonic spurious emissions, the measurements are covered in 6.6.3.1.

NOTE 2: The restriction on the maximum uplink transmission to 36 RB in Notes 14 and 15 of Table 6.6.3E.2.5-1 is intended for conformance testing and may be applied to network operation to facilitate coexistence when the aggressor and victim bands are deployed in the same geographical area. The applicable spurious emission requirement of -15.5 dBm/5MHz is a least restrictive technical condition for FDD/TDD coexistence and may have to be revised in the future.

6.6.3E.3 Additional spurious emissions for UE category 0

6.6.3E.3.1 Test purpose

Same test purpose as in clause 6.6.3.3.1.

6.6.3E.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.6.3E.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.3.3.3.

6.6.3E.3.4 Test description

6.6.3E.3.4.1 Initial conditions

Same initial conditions as in clause 6.2.3.4.1 with following exceptions for HD-FDD:

- Instead of Table 6.6.3.3.4.1-1 through 6.6.3.3.4.1-15 → use Table 6.6.3E.3.4.1-1 1.
- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 6.6.3E.3.4.1-1: Test Configuration Table (network signalled value "NS_07")

Initial Conditions						
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC		
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)				Mid range		
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				10MHz		
Test Parameters for Channel Bandwidths						
		Downlink Configuration		**Uplink Configuration**		
Test Number	Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	RB_{start}
1	10MHz	N/A for Additional Spurious Emissions testing.		QPSK	1	0
2	10MHz			QPSK	8	0
3	10MHz			QPSK	6	13
4	10MHz			QPSK	20	13
5	10MHz			QPSK	12	13
6	10MHz			16QAM	5	13
7	10MHz			QPSK	16	19
8	10MHz			QPSK	12	19
9	10MHz			16QAM	5	19
10	10MHz			QPSK	30	19
11	10MHz			QPSK	6	43
12	10MHz			QPSK	2	48
13	10MHz			QPSK	36	0
14	10MHz			QPSK	12	0

Editor's note: The following lines belong at the end of section 6.2.4.4.1. As new tables are added to this section, these lines should always follow the tables.

6.6.3E.3.4.2 Test procedure

Same test procedure as in clause 6.2.3.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframe are not under test.

Table 6.6.3E.3.4.2-1: Measurement setup for NS_07

	Option 1: Measurement with No RMS VBW available	Option2 Measurement with VBW Filtering on Power scale
VBW	>=62.5 kHz (10 times or more the RBW)	<=43Hz
RBW	<=6.25kHz	<=6.25kHz
Detector type	Averages signal envelope during each measurement point, such as "RMS detector"	Peak
Averaging mode (Trace averaging)	Power (RMS voltage)	Power (RMS voltage), as controlled by "Average Type"
Average Type (applies to detector)	Power (RMS voltage) (automatically occurs with "RMS detector")	Not applicable
Average Type (applies to VBW filter)	Not applicable	Power (RMS voltage)
Number of averages	30, to reduce variance as required, or use an even longer sweep time	1 or use an even narrower VBW filter, thus a longer sweep time
Sweep time	[Don't specify]	Sweep rate (span divided by sweep time) <= 0.8 * RBW*VBW

6.6.3E.3.4.3 Message contents

Same message contents as in clause 6.6.3.3.4.3.

6.6.3E.3.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for an additional spectrum emission requirement with protected bands as indicated from table 6.6.3E.3.5.1-1 to table 6.6.3E.3.5.2-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

6.6.3E.3.5.1 Test requirement (network signalled value "NS_07")

When "NS_07" is indicated in the cell:

- the measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Table 6.2.4.5-7 as appropriate,

and

- the measured average power of spurious emission, derived in step 4, shall not exceed the described value in Table 6.6.3E.3.5.1-1. These requirements also apply for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3E.3.5.1-1: Additional requirements (network signalled value "NS_07")

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz	

769 ≤ f ≤ 775	-55.5	6.25 kHz
Note: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3EA Spurious emission for UE category M1

6.6.3EA.1 Transmitter Spurious emissions for UE category M1

6.6.3EA.1.1 Test purpose

Same test purpose as in clause 6.6.3.1.1.

6.6.3EA.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.6.3EA.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.6.3.1.3.

6.6.3EA.1.4 Test description

6.6.3EA.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3EA.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.6.3EA.1.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1	NC				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range, High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index (Note 1)
Low range, Mid range					
1.4MHz	N/A	QPSK	1	1	0
1.4MHz		QPSK	6	6	0
3.0MHz		QPSK	1	1	0
3.0MHz		QPSK	6	6	0
5MHz		QPSK	1	1	0
5MHz		QPSK	6	6	0
High range					
1.4MHz	N/A	QPSK	1	1	0
1.4MHz		QPSK	6	6	0
3.0MHz		QPSK	1	1	1
3.0MHz		QPSK	6	6	1
5MHz		QPSK	1	1	3
5MHz		QPSK	6	6	3
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

1. Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.7 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.6.3EA.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.6.3EA.1.4.3.

6.6.3EA.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.6.3EA.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

3. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3EA.1.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3.EA 1.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3EA.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEmodeA.

6.6.3EA.1.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table. 6.6.3EA.1.5-1.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in Table 6.6.3EA.1.5-1.

The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth shown in Table 6.6.3.1.3-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3EA.1.5-1: General spurious emissions test requirements

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	

6.6.3EA.2 Spurious emission band UE co-existence for UE category M1

6.6.3EA.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions.

6.6.3EA.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.6.3EA.2.3 Minimum conformance requirements

This clause specifies the requirements for the specified E-UTRA band for coexistence with protected bands as indicated in Table 6.6.3EA.2.3-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3EA.2.3-1: Spurious emission band limits Rel-13

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
1	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 65, 67, 68	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	15
	Frequency range	1839.9	-	1879.9	-50	1	15
	Frequency range	1880		1895	-40	1	15, 27
	Frequency range	1895		1915	-15.5	5	15, 26, 27
	Frequency range	1915		1920	+1.6	5	15, 26, 27
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 30, 41, 42, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 65, 67, 68	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 41, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
5	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 23, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 18, 19	F_{DL_low}	-	F_{DL_high}	-40	1	38
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	38
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 38
7	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 20, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 66, 67, 68	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	15, 21, 26
	Frequency range	2575	-	2595	-15.5	5	15, 21, 26
	Frequency range	2595	-	2620	-40	1	15, 21
8	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 65, 67, 68	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
11	E-UTRA Band 1, 11, 18, 19, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

12	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23, 25, 26, 27, 29, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
18	E-UTRA Band 1, 11, 21, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
19	E-UTRA Band 1, 11, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

20	E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
21	E-UTRA Band 1, 18, 19, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18,19, 21, 23, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	703	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
27	E-UTRA Band 1, 2, 3, 4, 5, 7, 10, 12, 13, 14, 17, 23, 25, 26, 27, 29, 30, 31, 38, 40, 41, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 28	F_{DL_low}	-	790	-50	1	
	Frequency range	799	-	805	-35	0.00625	
28	E-UTRA Band 1, 4, 10, 22, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	19, 25
	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24
	Frequency range	470	-	694	-42	8	15, 35
	Frequency range	470	-	710	-26.2	6	34
	Frequency range	662	-	694	-26.2	6	15
	Frequency range	758	-	773	-32	1	15
	Frequency range	773	-	803	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
31	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 40, 42, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
…							
39	E-UTRA Band 1, 8, 22, 26, 34, 40, 41, 42, 44, 45	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805		1855	-40	1	33
	Frequency range	1855		1880	-15.5	5	15,26,33
41	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 45, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	30
	Frequency range	1839.9		1879.9	-50	1	30
	Frequency range	1884.5		1915.7	-41	0.3	8, 30

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band

NOTE 4: N/A

NOTE 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band

NOTE 6: N/A
NOTE 7: Applicable when co-existence with PHS system operating in 1884.5 -1919.6MHz.
NOTE 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.
NOTE 9: N/A
NOTE 10: N/A
NOTE 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD
NOTE 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB
NOTE 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.
NOTE 14: N/A
NOTE 15: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth.
NOTE 16: N/A
NOTE 17: N/A
NOTE 18: N/A
NOTE 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.
NOTE 20: N/A
NOTE 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
NOTE 22: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.
NOTE 23: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.
NOTE 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
NOTE 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
NOTE 28: N/A
NOTE 29: N/A
NOTE 30: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz
NOTE 31: N/A
NOTE 33: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.
NOTE 34: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.

NOTE 35: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.
NOTE 36: This requirement is applicable for E-UTRA channel bandwidth allocated within 1920-1980 MHz.
NOTE 37: Applicable when the upper edge of the channel bandwidth frequency is greater than 1980MHz.
NOTE 38: Applicable only for UE category M1 and NB1.

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3.2.

This test use minimum requirements from many releases of TS 36.101 [2] due to release independence defined in TS 36.307 [16]

6.6.3EA.2.4 Test description

6.6.3EA.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3EA.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.6.3EA.2.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment (as specified in TS 36.508 [7] subclause 4.1)				NC			
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1) (Note 6, Note 7)				Low range, Mid range, High range (Note 6, 13, 16)			
Test Channel Bandwidths (as specified in TS 36.508 [7] subclause 4.3.1)				Lowest, 5MHz, Highest (Note 13, 16)			
Test Parameters for Channel Bandwidths							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation		
		FDD	TDD		FDD	TDD	Narrowband index[1]
1.4MHz	N/A for Spurious Emissions testing			QPSK	6@0	6@0	0
1.4MHz				QPSK	1@0	1@0	0
1.4MHz				QPSK	1@5	1@5	0
3MHz				QPSK	6@0	6@0	0
3MHz				QPSK	6@0	6@0	1
3MHz				QPSK	1@0	1@0	0
3MHz				QPSK	1@5	1@5	1
5MHz				QPSK	6@0[8]	6@0	0
5MHz				QPSK	6@0[8]	6@0	3
5MHz				QPSK	1@0	1@0	0
5MHz				QPSK	1@5	1@5	3
10MHz				QPSK	6@0[9, 15]	6@0	0
10MHz				QPSK	6@0[9, 15]	6@0	7
10MHz				QPSK	1@0[10, 14]	1@0	0
10MHz				QPSK	1@5[10, 14]	1@5	7
15MHz				QPSK	6@0[3, 11]	6@0[4, 18]	0
15MHz				QPSK	6@0[3, 11]	6@0[4, 18]	11
15MHz				QPSK	1@0	1@0[5]	0
15MHz				QPSK	1@5	1@5[5]	11
20MHz				QPSK	6@0[3, 11]	6@0[4, 18]	0
20MHz				QPSK	6@0[3, 11]	6@0[4, 18]	15
20MHz				QPSK	1@0	1@0[5]	0
20MHz				QPSK	1@5	1@5[5]	15

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4
Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 3: For requirements under note 21 in table 6.6.3EA.2.3-1 in high range with max narrowband index.
Note 4: Void
Note 5: Void
Note 6: Do not apply for requirements under Note 13 in Table 6.6.3EA.2.3-1. Test frequencies for these requirements are defined in Table 6.6.3EA.2.4.1-2.
Note 7: Void
Note 8: For requirements under note 23 in table 6.6.3EA.2.3-1 (high range – 10MHz) is tested at RB #0 with narrowband index 0.
Note 9: For requirements under note 23 in table 6.6.3EA.2.3-1 high range is tested at RB #0 with narrowband index 1.
Note 10: For requirements under note 23 in table 6.6.3EA.2.3-1 high range is tested at RB #3 with narrowband index 0 and at RB#2 with narrowband index 7.
Note 11: For requirements under note 27 in table 6.6.3EA.2.3-1 in low range with narrowband index 0.
Note 12: Void
Note 13: For requirements under note 31 in table 6.6.3.2.3-1C and note 34 in table 6.6.3.2.3-1D only 720.5 MHz is tested with 5 MHz and only 723 MHz is tested with 10 MHz.
Note 14: For requirements under note 34 in table 6.6.3EA.2.3-1 RB#1 with narrowband index 0 and RB#4 with narrowband index 7 are used.
Note 15: For requirements under note 34 in table 6.6.3EA.2.3-1 RB#0 with narrowband index 1 is used
Note 16: For requirements under note 35 in table 6.6.3EA.2.3-1 only low range and 728 MHz with 10 MHz is tested.
Note 17: Void
Note 18: For requirements under note 33 in table 6.6.3EA.2.3-1 (high range-7 MHz) is tested.

Table 6.6.3EA.2.4.1-2: Test frequencies for E-UTRA channel bandwidth for operating band 3 with Note 13 (in Tables 6.6.3EA.2.3-1)

Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
5	19924	1782.4	1924	1877.4
10	19899	1779.9	1899	1874.9
15	19874	1777.4	1874	1872.4
20	19849	1774.9	1849	1869.9

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.7 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3EA.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.6.3EA.2.4.3.

6.6.3EA.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.6.3EA.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.
3. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3EA.2.3-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3EA.2.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3EA.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA.

6.6.3EA.2.5 Test requirement

Test requirements for Spurious Emissions UE Co-existence are the same as the minimum requirements and are not repeated in this section.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in table 6.6.3EA.2.3-1 according to the following rule:

The requirements for the UE are release specific and can be found in Tables 6.6.3EA.2.3-1. If the UE support a band, which is not defined in the table corresponding UE's release, the requirements for this band are taken from the table of earliest release where requirements for this band are defined. This has been described in following Table 6.6.3EA.2.5-1.

Table 6.6.3EA.2.5-1: UE Requirements according to UE E-UTRA release and supported E-UTRA band

Band	UE Requirements per release
	Rel-13
1	Table 6.6.3EA.2.3-1
2	Table 6.6.3EA.2.3-1
3	Table 6.6.3EA.2.3-1
4	Table 6.6.3EA.2.3-1
5	Table 6.6.3EA.2.3-1
7	Table 6.6.3EA.2.3-1
8	Table 6.6.3EA.2.3-1
11	Table 6.6.3EA.2.3-1
12	Table 6.6.3EA.2.3-1
13	Table 6.6.3EA.2.3-1
18	Table 6.6.3EA.2.3-1
19	Table 6.6.3EA.2.3-1
20	Table 6.6.3EA.2.3-1
21	Table 6.6.3EA.2.3-1
26	Table 6.6.3EA.2.3-1
27	Table 6.6.3EA.2.3-1
28	Table 6.6.3EA.2.3-1
31	Table 6.6.3EA.2.3-1
39	Table 6.6.3EA.2.3-1
41	Table 6.6.3EA.2.3-1

NOTE 1: The following is applied to Note2 in Table 6.6.3EA.2.3-1. For frequency with 2nd, 3rd or 4th harmonic spurious emissions, the measurements are covered in 6.6.3.1.

NOTE 2: The restriction on the maximum uplink transmission to 36 RB in Notes 14 and 15 of Table 6.6.3EA.2.5-1 is intended for conformance testing and may be applied to network operation to facilitate coexistence when the aggressor and victim bands are deployed in the same geographical area. The applicable spurious emission requirement of -15.5 dBm/5MHz is a least restrictive technical condition for FDD/TDD coexistence and may have to be revised in the future.6.6.3EA.3 Additional spurious emissions for UE category M1

6.6.3EA.3 Additional spurious emissions for UE category M1

Editor's note: Following aspects missing or not yet determined:

- Test configuration tables and test requirement tables FFS for NS_12

6.6.3EA.3.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions under the deployment scenarios where additional requirements are specified.

6.6.3EA.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.6.3EA.3.3 Minimum conformance requirements

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

6.6.3EA.3.3.1 Minimum requirement (network signalled value "NS_05")

When "NS_05" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.1-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.1-1: Additional requirements (PHS)

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)				Measurement bandwidth	NOTE
	5 MHz	10 MHz	15 MHz	20 MHz		
1884.5 ≤ f ≤1915.7	-41	-41	-41	-41	300 KHz	1

6.6.3EA.3.3.2 Minimum requirement (network signalled value "NS_07")

When "NS_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.2-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.2-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz	
769 ≤ f ≤ 775	-57	6.25 kHz
NOTE: The emissions measurement shall be sufficiently power averaged to ensure standard deviation < 0.5 dB.		

6.6.3EA.3.3.3 Minimum requirement (network signalled value "NS_08")

When "NS_08" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.3-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.3-1: Additional requirement

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)			Measurement bandwidth
	5MHz	10MHz	15MHz	
860 ≤ f ≤ 895	-40	-40	-40	1 MHz

6.6.3EA.3.3.4 Minimum requirement (network signalled value "NS_09")

When "NS 09" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.4-1. This requirement also applies for the frequency ranges that are less than Δf_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.4-1: Additional requirement

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)			Measurement bandwidth
	5MHz	10MHz	15MHz	
1475.9 ≤ f ≤ 1510.9	-35	-35	-35	1 MHz

NOTE 1: To improve measurement accuracy, A-MPR values for NS_09 specified Table 6.2.4EA -1 in sub-clause 6.2.4EA are derived based on 100 kHz RBW.

6.6.3EA.3.3.5 Minimum requirement (network signalled value "NS_12")

When "NS 12" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.5-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.5-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz	
806 ≤ f ≤ 813.5	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 814.2 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3EA.3.3.6 Minimum requirement (network signalled value "NS_13")

When "NS 13" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.6-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.6-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	1.4, 3, 5 MHz	
806 ≤ f ≤ 816	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 819 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3EA.3.3.7 Minimum requirement (network signalled value "NS_14")

When "NS 14" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.7-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.7-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz, 15 MHz	
806 ≤ f ≤ 816	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 824 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3EA.3.3.8 Minimum requirement (network signalled value "NS_15")

When "NS 15" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.8-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.8-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz	
851 ≤ f ≤ 859	-53	6.25 kHz
NOTE 1: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3EA.3.3.9 Minimum requirement (network signalled value "NS_16")

When "NS_16" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.9-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.9-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	NOTE
	1.4, 3, 5, 10 MHz		
790 ≤ f ≤ 803	-32	1 MHz	

6.6.3EA.3.3.10 Minimum requirement (network signalled value "NS_17")

When "NS_17" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.10-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.10-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	NOTE
	5, 10 MHz		
470 ≤ f ≤ 710	-26.2	6 MHz	1
NOTE 1: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.			

6.6.3EA.3.3.11 Minimum requirement (network signalled value "NS_18")

When "NS_18" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.3.11-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.3.11-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth	NOTE
	5, 10, 15, 20 MHz		
692-698	-26.2	6 MHz	

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3.3.

6.6.3EA.3.4 Test description

6.6.3EA.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 6.6.3EA.3.4.1-1 to Table 6.6.3EA.3.4.1-11. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.6.3EA.3.4.1-1: Test Configuration Table (network signalled value "NS_05")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low Range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.6.3EA.3.4.1-2: Test Configuration Table (network signalled value "NS_07")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		10MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A for Maximum Power Reduction (MPR) test case	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	10MHz		QPSK	1	0
2	10MHz		QPSK	4	0
3	10MHz		QPSK	6	0
4	10MHz		16QAM	5	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.6.3EA.3.4.1-3: Test Configuration Table (network signalled value "NS_08")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		High Range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		5MHz			
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.6.3EA.3.4.1-4: Test Configuration Table (network signalled value "NS_09")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			High Range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.6.3EA.3.4.1-5: Test Configuration Table (network signalled value "NS_12")

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Table 6.6.3EA.3.4.1-6: Test Configuration Table (network signalled value "NS_13")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			UL 819.7 MHz (N_{UL} = 26747)		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			1.4MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	1.4MHz		QPSK	1	0
2	1.4MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.6.3EA.3.4.1-7: Test Configuration Table (network signalled value "NS_14")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			UL 829 MHz (N_{UL} = 26840)		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			10MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	10MHz		QPSK	1	0
2	10MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.6.3EA.3.4.1-8: Test Configuration Table (network signalled value "NS_15")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Configuration ID 1-2: UL 844.3 MHz Configuration ID 3-8: High range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			1.4MHz, 3MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	1.4MHz		QPSK	1@0, 1@5	0
2	1.4MHz		QPSK	6	0
3	1.4MHz		QPSK	1@5	0
4	1.4MHz		QPSK	6	0
5	3MHz		QPSK	1@1	1
6	3MHz		QPSK	1@5	1
7	3MHz		QPSK	6	1
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4					

Table 6.6.3EA.3.4.1-9: Test Configuration Table (network signalled value "NS_16")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			1.4MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	1.4MHz		QPSK	1	0
2	1.4MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4. Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.6.3EA.3.4.1-10: Test Configuration Table (network signalled value "NS_17")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			720.5 MHz		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

Table 6.6.3EA.3.4.1-11: Test Configuration Table (network signalled value "NS_18")

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low Range		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz		
Test Parameters for Channel Bandwidths and Narrowband positions					
		Downlink Configuration	**Uplink Configuration**		
Configuration ID	Ch BW	N/A	Mod'n	RB allocation	
				FDD and HD-FDD	Narrowband index (Note 1)
1	5MHz		QPSK	1	0
2	5MHz		QPSK	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 3: The RB_{start} of partial RB allocation shall be RB#0 and RB# (6 - RB allocation) of the narrowband.					

1. Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.7 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL Reference Measurement channels are set according to Table 6.6.3EA.3.4.1-1 to Table 6.6.3EA.3.4.1-11.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.6.3EA.3.4.3.

6.6.3EA.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.6.3EA.3.4.1-1 to Table 6.6.3EA.3.4.1-11 depending on NS-value. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC

2. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure that the UE transmits at $P_{UMAX\ level}$.

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Tables 6.2.4EA.5-1 to 6.2.4EA.5-17 as appropriate. The period of measurement shall be at least the continuous duration one sub-frame (1ms). For TDD slots with transient periods are not under test. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.

4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to Table 6.6.3EA.3.1-1, 6.6.3EA.3.3.3-1 to 6.6.3EA.3.3.11-1, and 6.6.3EA.3.5.1-1 as appropriate. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. For NS_07 measurements made in a bandwidth of 6.25kHz, measurement parameter settings defined in table 6.6.3EA.3.4.2-1 shall be used. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

Table 6.6.3EA.3.4.2-1: Measurement setup for NS_07

	Option 1: Measurement with No RMS VBW available	Option2 Measurement with VBW Filtering on Power scale
VBW	>=62.5 kHz (10 times or more the RBW)	<=43Hz
RBW	<=6.25kHz	<=6.25kHz
Detector type	Averages signal envelope during each measurement point, such as "RMS detector"	Peak
Averaging mode (Trace averaging)	Power (RMS voltage)	Power (RMS voltage), as controlled by "Average Type"
Average Type (applies to detector)	Power (RMS voltage) (automatically occurs with "RMS detector")	Not applicable
Average Type (applies to VBW filter)	Not applicable	Power (RMS voltage)
Number of averages	30, to reduce variance as required, or use an even longer sweep time	1 or use an even narrower VBW filter, thus a longer sweep time
Sweep time	[Don't specify]	Sweep rate (span divided by sweep time) <= 0.8 * RBW*VBW

6.6.3EA.3.4.3 Message contents

Message contents are same as in clause 6.2.4EA.4.3.

6.6.3EA.3.5 Test requirement

The measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in Tables 6.2.4EA.5-1 to 6.2.4EA.5-17 as appropriate,

and

With the exception of NS_07, test requirements for Additional Spurious Emissions are the same as the minimum requirements and are not repeated in this section.

6.6.3EA.3.5.1 Test requirement (network signalled value "NS_07")

When "NS_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3EA.3.5.1-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1.3-1 from the edge of the channel bandwidth.

Table 6.6.3EA.3.5.1-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz	
769 ≤ f ≤ 775	-55.5	6.25 kHz
NOTE: The emissions measurement shall be sufficiently power averaged to ensure standard deviation < 0.5 dB.		

6.6.3F Spurious emission for category NB1

6.6.3F.1 Transmitter Spurious emissions for category NB1

6.6.3F.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.6.3F.1.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.6.3F.1.3 Minimum conformance requirements

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) from the edge of the channel bandwidth. The spurious emission limits in Table 6.6.3F.1.3-1 apply for all transmitter band configurations (NRB) and channel bandwidths.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3F.1.3-1: Spurious emissions limits

Frequency Range	Maximum Level	Measurement bandwidth	NOTE
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	

…

When UE is configured for category NB1 uplink transmissions the boundary between category NB1 out of band and spurious emission domain shall be F_{OOB} = 1.7 MHz.

The normative reference for this requirement is TS 36.101 [2] subclauses 6.6.3.1 and 6.6.3F.

6.6.3F.1.4 Test description

6.6.3F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 6.6.3F.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.6.3F.1.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1	NC			
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1	Frequency ranges defined in Annex K.1.2			
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A for Maximum Power Reduction (MPR) test case	**Modulation**	**N_{tones}**	**Subcarrier spacing (kHz)**
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		BPSK	1@0	15
4		BPSK	1@11	15
5 (Note 1)		QPSK	12@0	15
Note 1: Applicable to UE supporting UL multi-tone transmissions				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1.1 and H.4.0.

4. The UL Reference Measurement channels are set according to Table 6.6.3F.1.4.1-1.

5. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.6.3F.1.4.3.

6.6.3E.1.4.2 Test procedure

1. SS sends uplink scheduling information via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.6.3F.1.4.1-1 and with the scheduling pattern according to Annex A.2. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC

2. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3F.1.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3F.1.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.6.3F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.6.3F.1.5 Test requirement

This clause specifies the requirements for the specified E-UTRA band for Transmitter Spurious emissions requirement with frequency range as indicated in table. 6.6.3F.1.5-1.

The measured average power of spurious emission, derived in step 3, shall not exceed the described value in Table 6.6.3F.1.5-1.

The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3F.1.5-1: General spurious emissions test requirements

Frequency Range	Maximum Level	Measurement Bandwidth	Notes
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	

6.6.3F.2 Spurious emission band UE co-existence for category NB1

Editor's note: This test case contains different requirements for different UE releases

6.6.3F.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions.

6.6.3F.2.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

6.6.3F.2.3 Minimum conformance requirements

This clause specifies the requirements for the specified E-UTRA band for coexistence with protected bands as indicated in Tables 6.6.3F.2.3-1 and 6.6.3F.2.3-1A.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3F.2.3-1: Spurious emission band UE co-existence limits Rel-13

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
1	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1880		1895	-40	1	
	Frequency range	1895		1915	-15.5	5	26
	Frequency range	1915		1920	+1.6	5	15, 26
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 30, 41, 42, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	

	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
5	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 23, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
8	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
12	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23, 25, 26, 27, 29, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	
	Frequency range	799	-	805	-35	0.00625	11
17	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 30, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	
18	E-UTRA Band 1, 11, 21, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
19	E-UTRA Band 1, 11, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
20	E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 38, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18,19, 21, 23, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	703	-	799	-50	1	
	Frequency range	799	-	803	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
28	E-UTRA Band 1, 4, 10, 22, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	19, 25
	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24

	Frequency range	470	-	694	-42	8	35
	Frequency range	470	-	710	-26.2	6	34
	Frequency range	662	-	694	-26.2	6	
	Frequency range	758	-	773	-32	1	
	Frequency range	773	-	803	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
66	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2

Note 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1.
Note 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3F.1.3-1 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.
Note 3: N/A
Note 4: N/A
Note 5: N/A
Note 6: N/A
Note 7: N/A
Note 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.
Note 9: N/A
Note 10: N/A
Note 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD
Note 12: N/A
Note 13: This requirement applies for 200 kHz channel bandwidth allocated within 1744.9MHz and 1784.9MHz.
Note 14: N/A
Note 15: These requirements also apply for the frequency ranges that are less than F_{OOB} = 1.7 (MHz) from the edge of the channel bandwidth.
Note 16: N/A
Note 17: N/A
Note 18: N/A
Note 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 200 kHz.
Note 20: N/A
Note 21: N/A
Note 22: N/A
Note 23: This requirement is applicable only for the following cases:
- for carriers of 200 kHz channel bandwidth when carrier centre frequency (F_c) is within the range 900.1 MHz ≤ F_c ≤ 914.9 MHz.
Note 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
Note 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).
Note 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
Note 27: N/A
Note 28: N/A
Note 29: N/A
Note 30: N/A
Note 31: N/A
Note 32: N/A
Note 33: N/A
Note 34: This requirement is applicable for channel bandwidth allocated within 718-728MHz.
Note 35: This requirement is applicable for carriers with bandwidth within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.
Note 36: N/A
Note 37: N/A

Table 6.6.3F.2.3-1A: Spurious emission band UE co-existence limits Rel-14

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
1	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	15
	Frequency range	1880		1895	-40	1	15
	Frequency range	1895		1915	-15.5	5	15, 26
	Frequency range	1915		1920	+1.6	5	15, 26
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
5	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 18, 19	F_{DL_low}	-	F_{DL_high}	-40	1	39
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	39
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 39
8	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
11	E-UTRA Band 1, 11, 18, 19, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

12	E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 48,	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 25, 26, 27, 29, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
17	E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 48	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
18	E-UTRA Band 1, 11, 21, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
19	E-UTRA Band 1, 11, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

20	E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42, 69	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
25	E-UTRA Band 4, 5, 10,12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18,19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	703	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
28	E-UTRA Band 1, 4, 10, 22, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	19, 25
	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24
	Frequency range	470	-	694	-42	8	15, 35
	Frequency range	470	-	710	-26.2	6	34
	Frequency range	662	-	694	-26.2	6	15
	Frequency range	758	-	773	-32	1	15
	Frequency range	773	-	803	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
31	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 40, 42, 43, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
66	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42, 48	F_{DL_low}	-	F_{DL_high}	-50	1	2
70	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1
NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3F.1.3-1 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.
NOTE 3: N/A
NOTE 4: N/A
NOTE 5: N/A
NOTE 6: N/A
NOTE 7: N/A
NOTE 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.
NOTE 9: N/A
NOTE 10: N/A
NOTE 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD
NOTE 12: N/A
NOTE 13: This requirement applies for 200 kHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.
NOTE 14: N/A
NOTE 15: These requirements also apply for the frequency ranges that are less than F_{OOB} = 1.7 (MHz) from the edge of the channel bandwidth.
NOTE 16: N/A
NOTE 17: N/A
NOTE 18: N/A

NOTE 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 200 kHz.
NOTE 20: N/A
NOTE 21: N/A
NOTE 22: N/A
NOTE 23: This requirement is applicable only for the following cases:
- for carriers of 200 kHz channel bandwidth when carrier centre frequency (Fc) is within the range 900.1 MHz ≤ Fc ≤ 914.9 MHz.
NOTE 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
NOTE 27: N/A
NOTE 28: N/A
NOTE 29: N/A
NOTE 30: N/A
NOTE 31: N/A
NOTE 32: Void
NOTE 33: N/A
NOTE 34: This requirement is applicable for channel bandwidth allocated within 718-728MHz.
NOTE 35: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.
NOTE 36: N/A
NOTE 37: N/A
NOTE 38: N/A
NOTE 39: Applicable only for UE category M1 and UE category NB1 and NB2.
NOTE 40: N/A

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3.2.

This test use minimum requirements from many releases of TS 36.101 [2] due to release independence defined in TS 36.307 [16]

6.6.3F.2.4 Test description

6.6.3F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in Table 6.6.3F.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 6.6.3F.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		NC		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.3 (Note 2)		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A for Spurious Emissions testing	**Modulation**	**N_{tones}**	**Subcarrier spacing (kHz)**
1		QPSK	1@0	3.75
2		QPSK	1@47	3.75
3		BPSK	1@0	15
4		BPSK	1@11	15
5 (Note 1)		QPSK	12@0	15
Note 1: Applicable to UE supporting UL multi-tone transmissions Note 2: Do not apply for requirements under Note 13 and Note 34 in Tables 6.6.3F.2.3-1 to 6.6.3F.2.3-1A. Test frequencies for these requirements are defined in Table 6.6.3F.2.4.1-2 and 6.6.3F.2.4.1-3.				

Table 6.6.3F.2.4.1-2: Test frequencies for E-UTRA channel bandwidth for operating band 3 with Note 13 (in Tables 6.6.3F.2.3-1 to 6.6.3F.2.3-1A)

Bandwidth [kHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
200	19948	1784.8	1948	1879.8

Table 6.6.3F.2.4.1-3: Test frequencies for E-UTRA channel bandwidth for operating band 28 with Note 34 (in Tables 6.6.3F.2.3-1 to 6.6.3F.2.3-1A)

Bandwidth [kHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
200	27361	718.1	9361	773.1

1. Connect the SS to the UE to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.7 using only main Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1.1 and H.4.0.
4. The UL Reference Measurement channels are set according to Table 6.6.3F.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.6.3F.2.4.3.

6.6.3F.2.4.2 Test procedure

1. SS sends uplink scheduling information via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.6.3F.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC (UE should be already transmitting P_{UMAX} after Initial Conditions setting).
2. Measure the power of the transmitted signal with a measurement filter of bandwidths according to tables 6.6.3F.2.3-1 to 6.6.3F.2.3-1A. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3F.2.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

NOTE 1: For configuration IDs applicable to UE depending on UE capability in Test Configuration Table with different UL sub-carrier spacing, the SS shall release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the appropriate UL subcarrier spacing in Random Access Response message.

6.6.3F.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.6.3F.2.5 Test requirement

Test requirements for Spurious Emissions UE Co-existence are the same as the minimum requirements and are not repeated in this section.

The measured average power of spurious emission, derived in step 2, shall not exceed the described value in tables 6.6.3F.2.3-1 to 6.6.3F.2.3-1A according to the following rule:

The requirements for the UE are release specific and can be found in Tables 6.6.3F.2.3-1 to 6.6.3F.2.3-1A. If the UE support a band, which is not defined in the table corresponding UE's release, the requirements for this band are taken from the table of earliest release where requirements for this band are defined. This has been described in following Table 6.6.3F.2.5-1.

Table 6.6.3F.2.5-1: UE Requirements according to UE NB-IoT release and supported NB-IoT band

Band	UE Requirements per release	
	Rel-13	Rel-14
1	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
2	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
3	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
5	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
8	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
11	Table 6.6.3F.2.3-1A	Table 6.6.3F.2.3-1A
12	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
13	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
17	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
18	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
19	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
20	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
25	Table 6.6.3F.2.3-1A	Table 6.6.3F.2.3-1A
26	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
28	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
31	Table 6.6.3F.2.3-1A	Table 6.6.3F.2.3-1A
66	Table 6.6.3F.2.3-1	Table 6.6.3F.2.3-1A
70	Table 6.6.3F.2.3-1A	Table 6.6.3F.2.3-1A

6.6.3G.1 Transmitter Spurious emissions for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test mode of side link State [5A-V2X] in 36.508 is FFS.
- The test tolerance is left FFS for carrier frequency operating on band 47 f > 5GHz

6.6.3G.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

6.6.3G.1.2 Test applicability

This test case applies to E-UTRA UE release 14 and forward which support V2X communication.

6.6.3G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in subclause 5.2G, the transmitter spurious emissions limit in table 6.6.3G.1.3-2 apply for the frequency ranges more than F_{OOB} listed in table 6.6.3G.1.3-1 from the edge of the transmission bandwidth.

Table 6.6.3G.1.3-1: Boundary between E-UTRA out of band and spurious emission domain

Channel bandwidth	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
OOB boundary F_{OOB} (MHz)	2.8	6	10	15	20	25

Table 6.6.3G.1.3-2: Spurious emissions limits

Frequency Range	Maximum Level	Measurement bandwidth	NOTE
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	1
12.75 GHz < f < 26GHz	-30dBm	1MHz	2
NOTE 1: Applies for Band 22, Band 42, Band 43 and Band 48. NOTE 2: Applies for Band 46 and Band 47.			

6.6.3G.1.4 Test description

6.6.3G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.3G.1.4.1-1 the details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3 and refer GNSS system simulator configuration to Annex C Table C.2-8.

Table 6.6.3G.1.4.1-1: Test Configuration for V2X sidelink transmission

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		Low range, Mid range, High range
Test Channel Bandwidths (as specified in subclause 5.4.2G)		Lowest, Mid, Highest
Test Parameters for Channel Bandwidths		
	V2X sidelink transmission	
Ch BW	Mod'n	RB Allocation
10MHz	QPSK	1
10MHz	QPSK	48
20MHz	QPSK	1
20MHz	QPSK	96
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max of the channel bandwidth.		

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.67.

2. Propagation conditions are set according to Annex B.0

3. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to SL-V2X-Preconfiguration in TS36.508 [7] subclause Table 6.8.2.1-1 with the exception specified in table 6.6.2G.1.4.3-1;

4. Ensure the UE is in Side link test mode State [5A-V2X] according to TS 36.508 [7] clause [4.5.9].

6.6.3G.1.4.2 Test procedure

1. The V2X UE schedules the V2X RMC with transmission power at P_{UMAX} level according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.6.3G.1.4.1-1;

2. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3G.1.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3G.1.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6, with the following exception

Table 6.6.3G.1.4.3-1: SL-V2X-PreconfigFreqInfo-r14-DEFAULT

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-Preconfiguration-r14 ::= SEQUENCE {			
v2x-PreconfigFreqList-r14 SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE {	One entry of v2x-PreconfigFreqInfo		
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
maxTxPower-r12	23		Power class3
	26		Power class2
sl-bandwidth-r12	n50	10Mhz	
	n100	20Mhz	
}			
}			
v2x-CommPreconfigSync-r14 SEQUENCE {		SL-PreconfigSync-r12	
syncOffsetIndicators-r14 SEQUENCE {			
syncOffsetIndicator1-r14	Not Present	Double synchronization signal transmission	
}			
}			
v2x-CommRxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-RxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {	1 entry		
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.6.3G.1.4.3-2		
}			
v2x-CommTxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-TxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {			
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.6.3G.1.4.3-2		
}			
}			

Table 6.6.3G.1.4.3-2: SL-V2X-PreconfigCommPool-r14-DEFAULT

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-CommResroucePoolV2X-r14-DEFAULT ::= SEQUENCE {			
sl-Subframe-r14 CHOICE {			
bs20-r14	1111111111111111111		BITMAP_6
}			
sizeSubchannel-r14	N1		RB allocation is 1
	N48		RB allocation is 48
	N96		RB allocation is 96
numSubchannel-r14	n1		
dataTxParameters-r14 SEQUENCE {			
p0-r12	31	It's set to the maximum value to disable its effect on transmission power.	
}			
}			

6.6.3G.1.5 Test requirement

The measured average power of transmitter spurious emissions measured in step2 shall not exceed the value in table 6.6.3G.1.5-1.The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth shown in Table 6.6.3G.1.3-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3G.1.5-1: General spurious emissions test requirements

Frequency Range	Maximum Level	Measurement bandwidth	NOTE
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	1
12.75 GHz < f < 26GHz	-30dBm	1MHz	2
NOTE 1: Applies for Band 22, Band 42, Band 43 and Band 48. NOTE 2: Applies for Band 46 and Band 47.			

6.6.3G.1_1 Spurious emission band UE co-existence for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The clause number of reference to test mode in 36.508 is left TBD.
- Network signal for additional spectrum emission of NS_33,NS_34 is TBD in RAN2

6.6.3G.1_1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions.

6.6.3G.1_1.2 Test applicability

This test case applies to E-UTRA UE release 14 and forward which support V2X communication.

6.6.3G.1_1.3 Minimum conformance requirements

This clause specifies the requirements for the specified E-UTRA band for coexistence with protected bands as indicated in Tables 6.6.3G.1_1.3-1.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3G.1_1.3-1: Spurious emission band UE co-existence limits Rel-14

E-UTRA Band	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
1	E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	15
	Frequency range	1880		1895	-40	1	15, 27
	Frequency range	1895		1915	-15.5	5	15, 26, 27
	Frequency range	1915		1920	+1.6	5	15, 26, 27
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
3	E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	13
4	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 41, 43, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
5	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 18, 19	F_{DL_low}	-	F_{DL_high}	-40	1	39
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	39
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 39
6	E-UTRA Band 1, 9, 11, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	860	-	875	-37	1	
	Frequency range	875	-	895	-50	1	
	Frequency range	1884.5	-	1919.6	-41	0.3	7
		1884.5	-	1915.7			8
7	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 20, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 66, 67, 68	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	15, 21, 26
	Frequency range	2575	-	2595	-15.5	5	15, 21, 26
	Frequency range	2595	-	2620	-40	1	15, 21
8	E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 7, 22, 41, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	23
	Frequency range	860	-	890	-40	1	15, 23
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 23
9	E-UTRA Band 1, 11, 18, 19, 21, 26, 28, 34	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 41, 43, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22, 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
11	E-UTRA Band 1, 11, 18, 19, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
12	E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 48,	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 25, 26, 27, 29, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24, 30	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	12, 15
	Frequency range	799	-	805	-35	0.00625	11, 12, 15
17	E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 48	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 12	F_{DL_low}	-	F_{DL_high}	-50	1	15
18	E-UTRA Band 1, 11, 21, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	758	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	860	-	890	-40	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
19	E-UTRA Band 1, 11, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	

20	E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 65, 67	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 38, 42, 69	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	758	-	788	-50	1	
21	E-UTRA Band 1, 18, 19, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
22	E-UTRA Band 1, 3, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 43, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	3510	-	3525	-40	1	15
	Frequency range	3525	-	3590	-50	1	
23	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 23, 24, 26, 27, 29, 30, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
24	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
25	E-UTRA Band 4, 5, 10,12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 25	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 17, 18,19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	703	-	799	-50	1	
	Frequency range	799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
27	E-UTRA Band 1, 2, 3, 4, 5, 7, 10, 12, 13, 14, 17, 25, 26, 27, 29, 30, 31, 38, 40, 41, 42, 43, 65, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 28	F_{DL_low}	-	790	-50	1	
	Frequency range	799	-	805	-35	0.00625	
28	E-UTRA Band 1, 4, 10, 22, 42, 43, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	19, 25
	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24
	Frequency range	470	-	694	-42	8	15, 35
	Frequency range	470	-	710	-26.2	6	34
	Frequency range	662	-	694	-26.2	6	15
	Frequency range	758	-	773	-32	1	15
	Frequency range	773	-	803	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
30	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
31	E-UTRA Band 1, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 40, 42, 43, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	2
…							
33	E-UTRA Band 1, 7, 8, 20, 22, 28, 31, 32, 34, 38, 40, 42, 43, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
34	E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 31, 32, 33, 38,39, 40, 41, 42, 43, 44, 45, 65, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	1884.5	-	1915.7	-41	0.3	8
35							
36							
37							

38	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 65, 66, 67, 68	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2620	-	2645	-15.5	5	15, 22, 26
	Frequency range	2645	-	2690	-40	1	15, 22
39	E-UTRA Band 1, 8, 22, 26, 34, 40, 41, 42, 44, 45	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1805		1855	-40	1	33
	Frequency range	1855		1880	-15.5	5	15,26,33
40	E-UTRA Band 1, 3, 5, 7, 8, 20, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44, 45, 65, 67, 68, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
41	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 45, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	30
	Frequency range	1884.5		1915.7	-41	0.3	8, 30
42	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 25, 26, 27, 28, 31, 32, 33, 34, 38, 40, 41, 44, 45, 65, 66, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
43	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 31,32, 33, 34, 38, 40, 65, 66, 67, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 22	F_{DL_low}	-	F_{DL_high}	[-50]	[1]	3
44	E-UTRA Band 1, 40, 42, 45	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 3, 5, 8, 34, 39, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
45	E-UTRA Band 1, 3, 5, 8, 34, 39, 40, 41, 42.44	F_{DL_low}	-	F_{DL_high}	-50	1	
…							
47	E-UTRA Band 1, 3, 5, 7, 8, 22, 26, 28, 34, 39, 40, 41, 42, 44, 45, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	5925	-	5950	-30	1	38, 40
	Frequency range	5815	-	5855	-30	1	38
48	E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 66, 70	FD_{L_low}	-	FD_{L_high}	-50	1	
65	E-UTRA Band 1, 7, 8, 20, 22, 28, 31, 32, 38, 40, 42, 43, 65, 69	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 5, 11, 18, 19, 21, 26, 27, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 34	F_{DL_low}	-	F_{DL_high}	-50	1	36
	Frequency range	1884.5	-	1915.7	-41	0.3	37
	Frequency range	1900	-	1915	-15.5	5	15, 26, 27
	Frequency range	1915	-	1920	+1.6	5	15, 26, 27
66	E-UTRA Band 2, 4, 5, 7, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 38, 41, 43, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42, 48	F_{DL_low}	-	F_{DL_high}	-50	1	2
68	E-UTRA Band 3, 7, 8, 28, 38, 40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	2
…							
70	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5.5-1
NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, [5] for the 2nd, 3rd, 4th [or 5th] harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.
NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band
NOTE 4: N/A
NOTE 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band
NOTE 6: N/A
NOTE 7: Applicable when co-existence with PHS system operating in 1884.5 -1919.6MHz.
NOTE 8: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz.
NOTE 9: N/A
NOTE 10: N/A
NOTE 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD
NOTE 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB
NOTE 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.
NOTE 14: N/A
NOTE 15: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth.
NOTE 16: N/A
NOTE 17: N/A
NOTE 18: N/A
NOTE 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.
NOTE 20: N/A
NOTE 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
NOTE 22: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.
For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE *P-Max*.
NOTE 23: This requirement is applicable only for the following cases:
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz ≤ F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB
- for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz ≤ F_c ≤ 912.5 MHz without any restriction on uplink transmission bandwidth.
- for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is F_c = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB_{start} > 3.
NOTE 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).
NOTE 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.
NOTE 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink

transmission bandwidth less than or equal to 54 RB.
NOTE 28: N/A
NOTE 29: N/A
NOTE 30: This requirement applies when the E-UTRA carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz
NOTE 31: N/A
NOTE 32: Void
NOTE 33: This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.
NOTE 34: This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart<48.
NOTE 35: This requirement is applicable in the case of a 10 MHz E-UTRA carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.
NOTE 36: This requirement is applicable for E-UTRA channel bandwidth allocated within 1920-1980 MHz.
NOTE 37: Applicable when the upper edge of the channel bandwidth frequency is greater than 1980MHz.
NOTE 38: Applicable when NS_XX is configured by the pre-configured radio parameters.
NOTE 39: Applicable only when the assigned E-UTRA carrier is confined within 824 MHz and 849 MHz for UE category M1, M2 and UE category NB1 and NB2.
NOTE 40: In the frequency range x-5950MHz, SE requirement of -30dBm/MHz should be applied; where x = max (5925, fc + 15), where fc is the channel centre frequency.

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3.2.

6.6.3G.1_1.4 Test description

6.6.3G.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.3G.1_1.4.1-1 the details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3 and refer GNSS system simulator configuration to Annex C Table C.2-8.

Table 6.6.3G.1_1.4.1-1: Test Configuration for V2X sidelink transmission

Initial Conditions		
Test Environment (as specified in TS 36.508 [7] subclause 4.1)		NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies (as specified in TS36.508 [7] subclause 4.3.1)		Low range, Mid range, High range
Test Channel Bandwidths (as specified in subclause 5.4.2G)		Lowest, Mid, Highest
Test Parameters for Channel Bandwidths		
	V2X sidelink transmission	
Ch BW	Mod'n	RB Allocation
10MHz	QPSK	1
10MHz	QPSK	48
20MHz	QPSK	1
20MHz	QPSK	96
Note 1: Test Channel Bandwidths are checked separately for operating bands for V2X sidelink communication specified in 5. 2G. Note 2: The 1 RB allocation shall be tested at both RB #0 and RB #max.		

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.67.

2. Propagation conditions are set according to Annex B.0

3. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to SL-V2X-Preconfiguration in TS36.508 [7] subclause Table 6.8.2.1-1 with the exception specified in table 6.6.3G.1_1.4.3-1;

4. Ensure the UE is in Side link test mode State [5A-V2X] according to TS 36.508 [7] clause [4.5.9].

6.6.3G.1_1.4.2 Test procedure

1. The V2X UE schedules the V2X RMC with transmission power at P_{UMAX} level (UE should be already transmitting P_{UMAX} after Initial Conditions setting) according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.6.3G.1_1.4.1-1;

2. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3G.1_1.3-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3G.1_1.3-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3G.1_1.4.3 Message contents

Refer to 6.6.3G.1.4.3 with the following exceptions.

Table 6.6.3G.1_1.4.3-1: SL-V2X-PreconfigFreqInfo-r14-DEFAULT

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-Preconfiguration-r14 ::= SEQUENCE {			
v2x-PreconfigFreqList-r14 SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE {	One entry of v2x-PreconfigFreqInfo		
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
additionalSpectrumEmission-r12	[TBD]	NS_33	Power class3
	[TBD]	NS_34	Power class2
}			
}			

6.6.3G.1_1.5 Test requirement

The measured average power of spurious emission, derived in step 2, shall not exceed the described value in table 6.6.3G.1_1.3-1 for the operating bands for V2X sidelink communication specified in 5. 2G.

6.6.3G.2

6.6.3G.3 Introduction of Spurious emission for V2X Communication / Intra-band contiguous MCC operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The test tolerance is left FFS for carrier frequency operating on band 47 f > 5GHz
- Test mode of side link State [5A-V2X] in 36.508 is FFS.

6.6.3G.3.1 Test purpose

To verify that transmitter of UE that support V2X MCC operation does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.6.3G.3.2 Test applicability

This test case applies to E-UTRA UE release 14 and forward which support V2X communication.

6.6.3G.3.3 Minimum conformance requirements

For intra-band contiguous carrier aggregation the spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in Table 6.6.3G.3.3-1from the edge of the aggregated channel bandwidth (Table 5.6A-1). For frequencies ΔfOOB greater than FOOB the spurious emission requirements in Table 6.6.3G.3.3-2 are applicable.

Table 6.6.3G.3.3-1: Boundary between E-UTRA out of band and spurious emission domain for intra-band contiguous carrier aggregation

CA Bandwidth Class	OOB boundary F_{OOB} (MHz)
A	Table 6.6.3.1.3-1
B	$BW_{Channel_CA}$ + 5
C	$BW_{Channel_CA}$ + 5

Table 6.6.3G.3.3-1: Spurious emissions limits

Frequency Range	Maximum Level	Measurement bandwidth	NOTE
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	1
12.75 GHz < f < 26GHz	-30dBm	1MHz	2
NOTE 1: Applies for Band 22, Band 42, Band 43 and Band 48. NOTE 2: Applies for Band 46 and Band 47.			

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3G.

6.6.3G.3.4 Test description

6.6.3G.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.3G.3.4.1-1 the details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3 and reference GNSS configuration as defined in Table C.2-8.

Table 6.6.3G.3.4.1-1: Test Configuration for V2X sidelink transmission

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Low range, Mid range , High range			
Test Channel Bandwidths as specified in subclause 5.4.2G			Lowest N_{RB_agg}, Highest N_{RB_agg}			
Test Parameters for V2X MCC Configuration						
V2X MCC Channel Bandwidth			**V2X Sidelink Configuration**			
Configuration ID	**CC1 N_{RB}**	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**N_{RB_agg}**	**CC1 and CC2 RB Allocation (LCRB @ RBstart)**	
1	50	50	QPSK	48	CC1_48@0	CC2_0@0
2	50	50	QPSK	1	CC1_1@0	CC2_0@0
3	50	50	QPSK	1	CC1_1@49	CC2_0@0
4	50	50	QPSK	2	CC1_1@0	CC2_1@49
5	50	50	QPSK	96	CC1_48@0	CC2_48@2
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2G Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure [A.89a].

2. Propagation conditions are set according to Annex B.0

3. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to SL-V2X-Preconfiguration in TS36.508 [7] subclause Table [6.8.2.1-1A] with the exception specified in table 6.6.3G.3.4.3-1;

4. Ensure the UE is in Side link State [5A-V2X], according to TS 36.508 [7] clause [4.5.9]. Message contents are defined in clause 6.6.3G.3.4.3

6.6.3G.3.4.2 Test procedure

1. The V2X UE schedules the V2X RMC with transmission power at P_{UMAX} level according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.6.3G.3.4.1-1;

2. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3G.3.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3G.3.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3G.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with following exceptions.

Table 6.6.3G.3.4.3-1: SL-V2X-PreconfigFreqInfo-r14-DEFAULT for CC1 & CC2

Derivation Path: 36.331 clause 9.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-V2X-Preconfiguration-r14 ::= SEQUENCE {			
v2x-PreconfigFreqList-r14 SEQUENCE (SIZE (1..maxFreq)) OF SEQUENCE {	One entry of v2x-PreconfigFreqInfo		
v2x-CommPreconfigGeneral-r14 SEQUENCE {		SL-PreconfigGeneral-r12	
maxTxPower-r12	23		Power class3
sl-bandwidth-r12	n50	10Mhz	
}			
}			
v2x-CommPreconfigSync-r14 SEQUENCE {		SL-PreconfigSync-r12	
syncOffsetIndicators-r14 SEQUENCE {			
syncOffsetIndicator1-r14	Not Present	Double synchronization signal transmission	
}			
}			
v2x-CommRxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-RxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {	1 entry		
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.6.3G.3.4.3-2		
}			
v2x-CommTxPoolList-r14 SEQUENCE (SIZE (1..maxSL-V2X-TxPoolPreconf-r14)) OF SL-V2X-PreconfigCommPool-r14 {			
SL-V2X-PreconfigCommPool-r14[1]	SL-V2X-PreconfigCommPool-r14-DEFAULT using condition BITMAP_6 and exception listed in Table 6.6.3G.3.4.3-2		
}			
}			

Table 6.6.3G.3.4.3-2: SL-V2X-PreconfigCommPool-r14-DEFAULT

Derivation Path: 36.331 clause 6.3.8			
Information Element	**Value/remark**	**Comment**	**Condition**
SL-CommResroucePoolV2X-r14-DEFAULT ::= SEQUENCE {			
sl-Subframe-r14 CHOICE {			
bs20-r14	11111111111111111111		BITMAP_6
}			
sizeSubchannel-r14	As required in Table 6.6.3G.3.4.1-1		BW10
numSubchannel-r14	n1		
dataTxParameters-r14 SEQUENCE {			
p0-r12	31	It's set to the maximum value to disable its effect on transmission power.	PSSCH+PSCCH TP1, PSSCH+PSCCH TP2, PSSCH+PSCCH TP3
}			
syncAllowed-r14 ::= SEQUENCE {			
gnss-Sync-r14	True	The resource of CC1 can be used if the UE is directly or indirectly synchronized to GNSS	CC with LCRB >0
enb-Sync-r14	True	The resource of CC1 can be used if the UE is directly or indirectly synchronized to enb	CC with LCRB =0
}			
}			

6.6.3G.3.5 Test requirement

The measured average power of transmitter spurious emissions measured in step2 shall not exceed the value in table 6.6.3G.3.3-1.The spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth shown in Table 6.6.3G.3.3-1.

6.6.3G.3_1 Spurious emission band UE co-existence for V2X Communication / Intra-band contiguous MCC operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- The clause number of reference to test mode in 36.508 is left TBD.

6.6.3G.3_1.1 Test purpose

To verify that V2X UE transmitter does not cause unacceptable interference to co-existing systems for the specified bands which has specific requirements in terms of transmitter spurious emissions, when UE is configured for E-UTRA V2X sidelink transmissions with Intra-band contiguous MCC operation.

6.6.3G.3_1.2 Test Applicability

This test case applies to E-UTRA UE release 14 and forward which support V2X communication.

6.6.3G.3_1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions with Intra-band contiguous MCC operation, for intra-band contiguous multi-carrier operation, the spurious emission requirements in Table 6.6.3G.3_1.3-1 shall apply for coexistence with protected bands.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.6.3G.3_1.3-1: Requirements for intraband multi-carrier V2X operation

V2X multi-carrier Configuration	Spurious emission					
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
V2X_47 B	E-UTRA Band 1, 3, 5, 7, 8, 22, 26, 28, 34, 39, 40, 41, 42, 44, 45, 65	F_{DL_low}	-	F_{DL_high}	-50	1	

The normative reference for this requirement is TS 36.101 [2] subclause 6.6.3G.

6.6.3G.3_1.4 Test Description

6.6.3G.3_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2G. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.6.3G.3_1.4.1-1 the details of the V2X reference measurement channels (RMCs) are specified in sub-clause A.8.3 and reference GNSS configuration as defined in Table C.2-8.

Table 6.6.3G.3_1.4-1: Test Configuration for V2X sidelink transmission

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Low range, Mid range , High range					
Test Channel Bandwidths as specified in subclause 5.4.2G	Lowest N_{RB_agg}, Highest N_{RB_agg}					
Test Parameters for V2X MCC Configuration						
V2X MCC Channel Bandwidth			**V2X Sidelink Configuration**			
Configuration ID	**CC1 N_{RB}**	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**N_{RB_agg}**	**CC1 and CC2 RB Allocation (LCRB @ RBstart)**	
1	50	50	QPSK	48	CC1_48@0	CC2_0@0
2	50	50	QPSK	1	CC1_1@0	CC2_0@0
3	50	50	QPSK	1	CC1_1@49	CC2_0@0
4	50	50	QPSK	2	CC1_1@0	CC2_1@49
5	50	50	QPSK	96	CC1_48@0	CC2_48@49
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2G Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.89a.

2. Propagation conditions are set according to Annex B.0

3. Set the V2X sidelink communication parameters for both the V2X sidelink capable UE (hereinafter referred to as V2X UE) and SS according to SL-V2X-Preconfiguration in TS36.508 [7] subclause Table [6.8.2.1-1A] with the exception specified in subclause 6.6.3G.3_1.4.3;

4. Ensure the UE is in Side link State [5A-V2X], according to TS 36.508 [7] clause [4.5.9].

6.6.3G.3_1.4.2 Test procedure

1. The V2X UE schedules the V2X RMC with transmission power at P_{UMAX} level according to *SL-V2X-Preconfiguration* which is in line with the test configuration in Table 6.6.3G.3_1.4.1-1;

2. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.6.3G.3_1.4-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.6.3G.3_1.4-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.6.3G.3_1.4.3 Message contents

The message contents are the same as in clause 6.6.3G.3.4.3

6.6.3G.3_1.5 Test requirement

The measured average power of transmitter spurious emissions measured in step2 shall not exceed the value in table 6.6.3G.3_1.3-1.

6.7 Transmit intermodulation

6.7.1 Test purpose

To verify that the UE transmit intermodulation does not exceed the described value in the test requirement.

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

6.7.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

6.7.3 Minimum conformance requirements

User Equipment(s) transmitting in close vicinity of each other can produce intermodulation products, which can fall into the UE, or eNode B receive band as an unwanted interfering signal. The UE intermodulation attenuation is defined by the ratio of the mean power of the wanted signal to the mean power of the intermodulation product when an interfering CW signal is added at a level below the wanted signal at each of the transmitter antenna port with the other antenna port(s) if any is terminated. Both the wanted signal power and the intermodulation product power are measured through E-UTRA rectangular filter with measurement bandwidth shown in Table 6.7.3-1.

The requirement of transmitting intermodulation is prescribed in Table 6.7.3-1.

Table 6.7.3-1: Transmit Intermodulation

BWChannel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.7.1.

6.7.4 Test description

6.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.7.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.7.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz and Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Transmit Intermodulation	Mod'n	RB allocation	
			FDD	TDD
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.2.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.7.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.7.4.3.

6.7.4.3 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.7.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE until the UE transmits at its P_{UMAX} level.
3. Measure the rectangular filtered mean power of the UE. For TDD slots with transient periods are not under test for the wanted signal and for the intermodulation product.
4. Set the interference signal frequency below the UL carrier frequency using the first offset in table 6.7.5-1.
5. Set the interference CW signal level according to table 6.7.5-1.
6. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.
7. Set the interference signal frequency above the UL carrier frequency using the first offset in table 6.7.5-1.
8. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.

Repeat the measurement using the second offset in table 6.7.5-1.

6.7.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.7.5 Test requirement

The ratio derived in step 5 and 7, shall not exceed the described value in table 6.7.5-1.

Table 6.7.5-1: Transmit Intermodulation

BWChannel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz
Note 1: The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of the downlink signal.								

6.7A Transmit intermodulation for CA

6.7A.0 Minimum conformance requirements

User Equipment(s) transmitting in close vicinity of each other can produce intermodulation products, which can fall into the UE, or eNode B receive band as an unwanted interfering signal. The UE intermodulation attenuation is defined by the ratio of the mean power of the wanted signal to the mean power of the intermodulation product on both component carriers when an interfering CW signal is added at a level below the wanted signal at each of the transmitter antenna port with the other antenna port(s) if any is terminated. Both the wanted signal power and the intermodulation product power are measured through rectangular filter with measurement bandwidth shown in Table 6.7A.0-1.

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands, the requirement is specified in Table 6.7.3-1 which shall apply on each component carrier with both component carriers active.

For intra-band contiguous carrier aggregation the requirement of transmitting intermodulation is specified in Table 6.7A.0-1.

Table 6.7A.0-1: Transmit Intermodulation

CA bandwidth class(UL)	B and C	
Interference Signal Frequency Offset	$BW_{Channel_CA}$	$2*BW_{Channel_CA}$
Interference CW Signal Level	-40dBc	
Intermodulation Product	-29dBc	-35dBc
Measurement bandwidth	$BW_{Channel_CA}$- 2* BW_{GB}	

The normative reference for this requirement is TS 36.101 [2] clause 6.7.1A.

6.7A.1 Transmit intermodulation for CA (intra-band contiguous DL CA and UL CA)

6.7A.1.1 Test purpose

To verify that the UE transmit intermodulation does not exceed the described value in the test requirement.

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

6.7A.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports intra-band contiguous DL CA and UL CA.

6.7A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.7A.0.

6.7A.1.4 Test description

6.7A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.7A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.7A.1.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.			Mid range					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)					
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
25	50		QPSK	8	P_8@0	S_0@0	-	-
50	50		QPSK	12	P_12@0	S_0@0	-	-
75	75		QPSK	16	P_16@0	S_0@0	-	-
100	25	N/A	QPSK	8	P_8@0	S_0@0	-	-
100	50		QPSK	12	P_12@0	S_0@0	-	-
100	100		QPSK	18	P_18@0	S_0@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1 Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.37 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.7A.1.4.3.

6.7A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.7A.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.7A.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands on PCC and SCC to the UE until the UE transmits at its P_{UMAX} level; allow at least 200ms for the UE to reach PUMAX level.

6. Measure the rectangular filtered mean power of the UE. For TDD slots with transient periods are not under test for the wanted signal and for the intermodulation product.
7. Set the interference signal frequency below F_{CA_low} using the first offset in table 6.7A.0-1.
8. Set the interference CW signal level according to table 6.7A.0-1.
9. Search the intermodulation product signals below and above the aggregated UL carrier, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 6.
10. Set the interference signal frequency above F_{CA_high} using the first offset in table 6.7A.0-1.
11. Search the intermodulation product signals below and above the aggregated UL carrier, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 6.
12. Repeat the measurement using the second offset in table 6.7A.0-1.

6.7A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.7A.1.5 Test requirement

The ratio derived in step 9 and 11, shall not exceed the described value in table 6.7A.1.5-1.

Table 6.7A.1.5-1: Transmit Intermodulation

CA bandwidth class(UL)	B and C	
Interference Signal Frequency Offset	$BW_{Channel_CA}$	$2*BW_{Channel_CA}$
Interference CW Signal Level	-40dBc	
Intermodulation Product	-29dBc	-35dBc
Measurement bandwidth	$BW_{Channel_CA}$- 2* BW_{GB}	
Note 1: The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.		

6.7A.2 Transmit intermodulation for CA (inter-band DL CA and UL CA)

6.7A.2.1 Test purpose

To verify that the UE transmit intermodulation does not exceed the described value in the test requirement.

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

6.7A.2.2 Test applicability

This test applies to all types of E-UTRA UE release 11 and forward that supports inter-band DL CA and UL CA.

6.7A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.7A.0.

6.7A.2.4 Test description

6.7A.2.4.1 Initial conditions

Same as in clause 6.7A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1 → use Table 5.4.2A.1-2 for CA configurations with two bands or Table 5.4.2A.1-2a for CA configurations with three bands.
- Instead of Table 6.7A.1.4.1-1 → use Table 6.7A.2.4.1-1.
- Instead of clause 6.7A.1.4.3 → use clause 6.7A.2.4.3.

Table 6.7A.2.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes.		Mid range for PCC and SCC						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2, 3)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
		N/Afor this test						
25	25		QPSK	16	P_8@0	S_8@0	-	-
25	50		QPSK	20	P_8@0	S_12@0	-	-
50	25		QPSK	20	P_12@0	S_8@0	-	-
50	50		QPSK	24	P_12@0	S_12@0	-	-
50	75		QPSK	28	P_12@0	S_16@0	-	-
50	100		QPSK	30	P_12@0	S_18@0	-	-
75	50		QPSK	28	P_16@0	S_12@0	-	-
75	75		QPSK	32	P_16@0	S_16@0	-	-
75	100		QPSK	34	P_16@0	S_18@0	-	-
100	50		QPSK	30	P_18@0	S_12@0	-	-
100	75		QPSK	34	P_18@0	S_16@0	-	-
100	100		QPSK	36	P_18@0	S_18@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2 Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list. Note 3: If in the CA Configuration UE supports CC Combinations with channel BW below 5MHz on at least one CC, these CC Combinations are disregarded for Lowest N_{RB_agg}. Only CC Combinations which have channel BW 5MHz or above on both component carriers are considered for Lowest N_{RB_agg}.								

6.7A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.7A.2.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.7A.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

5. Send continuously uplink power control "up" commands on PCC and SCC to the UE until the UE transmits at its P_{UMAX} level; allow at least 200ms for the UE to reach PUMAX level.

6. Measure the rectangular filtered mean power of the UE. For TDD slots with transient periods are not under test for the wanted signal and for the intermodulation product.

7. Set the interference signal frequency below the UL carrier frequency of the PCC using the first offset in table 6.7.3-1.

8. Set the interference CW signal level according to table 6.7.3-1.

9. Search the intermodulation product signals below and above the UL carrier of the PCC, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 6.

10. Set the interference signal frequency above the UL carrier frequency of the PCC using the first offset in table 6.7.3-1.

11. Search the intermodulation product signals below and above the UL carrier of the PCC, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 6.

12. Set the interference signal frequency below the UL carrier frequency of the SCC using the first offset in table 6.7.3-1.

13. Search the intermodulation product signals below and above the UL carrier of the SCC, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 6.

14. Set the interference signal frequency above the UL carrier frequency of the SCC using the first offset in table 6.7.3-1.

15. Search the intermodulation product signals below and above the UL carrier of the SCC, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 6.

16. Repeat the measurement using the second offset in table 6.7.3-1.

6.7A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.7A.2.5 Test requirement

The ratio derived in step 9, 11, 13 and 15, shall not exceed the described value in table 6.7A.2.5-1.

Table 6.7A.2.5-1: Transmit Intermodulation

BWChannel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz
Note 1: The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.								

6.7A.3

6.7A.4 Transmit intermodulation for CA (3DL CA and 3UL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

-Test Configuration Table is incomplete

-Intermodulation Product in Test Requirements Table is not specified

-The test applicability needs to be added to TS36.521-2

6.7A.4.1 Test purpose

To verify that the UE transmit intermodulation does not exceed the described value in the test requirement.

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non-linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

6.7A.4.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward that supports 3DL CA and 3UL CA.

6.7A.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.7A.0.

6.7A.4.4 Test description

6.7A.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1, 5.4.2.A1-2 and 5.4.2.A1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.7A.4.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.7A.4.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 6.1-2.		Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration		Lowest N_{RB_agg} Highest N_{RB_agg} (Note 2)						
Test Parameters for CA Configurations								
CA Configuration / N_{RB_agg}		**DL Allocation**	**CC MOD**	**UL Allocation**				
PCC N_{RB}	**SCCs N_{RB}**	**PCC & SCC RB allocation**		**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
TBD	TBD	N/A for this test	TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
TBD	TBD		TBD	TBD	TBD	TBD	TBD	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1, 5.4.2.A1-2 and 5.4.2.A1-2a. Note 2: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , only the first of those is tested, according to the order on the Test Configuration Table list.								

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.37 as appropriate.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.7A.4.1.4.3.

6.7A.4.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.0 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 6.7A.4.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.7A.4.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
5. Send continuously uplink power control "up" commands on PCC and SCC to the UE until the UE transmits at its P_{UMAX} level; allow at least 200ms for the UE to reach PUMAX level.
6. Measure the rectangular filtered mean power of the UE. For TDD slots with transient periods are not under test for the wanted signal and for the intermodulation product.
7. Set the interference signal frequency below F_{CA_low} using the first offset in table 6.7A.0-1.
8. Set the interference CW signal level according to table 6.7A.0-1.
9. Search the intermodulation product signals below and above the aggregated UL carrier, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 6.
10. Set the interference signal frequency above F_{CA_high} using the first offset in table 6.7A.0-1.
11. Search the intermodulation product signals below and above the aggregated UL carrier, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 6.
12. Repeat the measurement using the second offset in table 6.7A.0-1.

6.7A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

6.7A.4.5 Test requirement

The ratio derived in step 9 and 11, shall not exceed the described value in table 6.7A.4.1.5-1

Table 6.7A.4.1.5-1: Transmit Intermodulation

CA bandwidth class(UL)	**D**	
Interference Signal Frequency Offset	$BW_{Channel_CA}$	$3*BW_{Channel_CA}$
Interference CW Signal Level	-40dBc	
Intermodulation Product	TBD	TBD
Measurement bandwidth	$BW_{Channel_CA}$- 3* BW_{GB}	

6.7B Transmit intermodulation for UL-MIMO

6.7B.1 Test purpose

To verify that the UE transmit intermodulation at each transmit antenna does not exceed the described value in the test requirement.

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

6.7B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

6.7B.3 Minimum conformance requirements

For UE with multiple antenna transmit connectors, the transmit intermodulation requirements are specified at each transmit antenna connector and the wanted signal is defined as the sum of output power at each transmit antenna connector.

For UEs with two transmit antenna connectors supporting dual-layer transmission, the requirements in subclause 6.7.3-1 apply to each transmit antenna connector with the UL-MIMO configurations specified in Table 6.2.2B.3-2.

The normative reference for this requirement is TS 36.101 [2] clause 6.7.1B.

6.7B.4 Test description

6.7B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.7B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.7B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal			
Test Frequencies as specified in **TS36.508 [7] subclause 4.3.1**	Mid range			
Test Channel Bandwidths as specified in **TS 36.508 [7] subclause 4.3.1**	5MHz and Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A for Transmit Intermodulation	Mod'n	RB allocation	
			FDD	TDD
5MHz		QPSK	8	8
10MHz		QPSK	12	12
15MHz		QPSK	16	16
20MHz		QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.39.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.7B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.7B.4.3.

6.7B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.7B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE until the UE transmits at its P_{UMAX} level.
3. Measure the rectangular filtered mean power of the UE. For TDD slots with transient periods are not under test for the wanted signal and for the intermodulation product.
4. Set the interference signal frequency below the UL carrier frequency using the first offset in table 6.7B.5-1.
5. Set the interference CW signal level according to table 6.7B.5-1.
6. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.
7. Set the interference signal frequency above the UL carrier frequency using the first offset in table 6.7B.5-1.
8. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.
9. Repeat the measurement using the second offset in table 6.7B.5-1.
10. Repeat step 3) until 9) for each of transmit antenna of the UE.

6.7B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.6.7B.5 Test requirement

The ratio derived in step 5 and 7 at each transmit antenna of UE shall not exceed the described value in table 6.7B.5-1.

Table 6.7B.5-1: Transmit Intermodulation

BWChannel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz (Note 1)
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz
Note 1: For Band 20, only applicable for interference signal frequency above the UL carrier frequency.								

6.7E Transmit intermodulation for UE category 0

6.7E.1 Test purpose

Same test purpose as in clause 6.7.1.

6.7E.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward of UE category 0.

6.7E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.7.3.

6.7E.4 Test description

6.7E.4.1 Initial conditions

Same initial conditions as in clause 6.7.4.1 with following exceptions for HD-FDD:

- Connect SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.4 using only main UE Tx/Rx antenna.

6.7E.4.2 Test procedure

Same test procedure as in clause 6.7.4.2 with following exception for HD-FDD:

- In step 3, slots with transient periods are not under test. Half-duplex guard subframe are not under test.

6.7E.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

6.7E.5 Test requirement

The ratio derived in step 5 and 7, shall not exceed the described value in table 6.7E.5-1

Table 6.7E.5-1: Transmit Intermodulation

BWChannel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz (Note 1)
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz
Note 1: For Band 20, only applicable for interference signal frequency above the UL carrier frequency.								

6.7EA Transmit intermodulation for UE category M1

6.7EA.1 Test purpose

To verify that the UE transmit intermodulation does not exceed the described value in the test requirement.

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

6.7EA.2 Test applicability

This test case applies to all types of E-UTRA UE release 13 and forward of UE category M1.

6.7EA.3 Minimum conformance requirements

User Equipment(s) transmitting in close vicinity of each other can produce intermodulation products, which can fall into the UE, or eNode B receive band as an unwanted interfering signal. The UE intermodulation attenuation is defined by the ratio of the mean power of the wanted signal to the mean power of the intermodulation product when an interfering CW signal is added at a level below the wanted signal at each of the transmitter antenna port with the other antenna port(s) if any is terminated. Both the wanted signal power and the intermodulation product power are measured through E-UTRA rectangular filter with measurement bandwidth shown in Table 6.7EA.3-1.

The requirement of transmitting intermodulation is prescribed in Table 6.7EA.3-1.

Table 6.7EA.3-1: Transmit Intermodulation

BWChannel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz

The normative reference for this requirement is TS 36.101 [2] clause 6.7.1.

6.7EA.4 Test description

6.7EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in sub-clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.7EA.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 6.7EA.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal				
Test Frequencies as specified in TS 36.508 [7] subclause [4.3.1]	Mid range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause [4.3.1]	5MHz and Highest				
Test Parameters for Channel Bandwidths and Narrowband positions					
	Downlink Configuration	**Uplink Configuration**			
Ch BW	N/A for Transmit Intermodulation test case	Mod'n	RB allocation		
			FDD and HD-FDD	TDD	Narrowband index[1]
Low range, Mid range					
5MHz		QPSK	6	6	0
10MHz		QPSK	6	6	0
15MHz		QPSK	6	6	0
20MHz		QPSK	6	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4 Note 2: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.2 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channels are set according to Table 6.7EA.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 6.7EA.4.3.

6.7EA.4.2 Test procedure

1. SS sends uplink scheduling information via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 6.7EA.4.1-1. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE until the UE transmits at its P_{UMAX} level.
3. Measure the rectangular filtered mean power of the UE. For TDD slots with transient periods are not under test for the wanted signal and for the intermodulation product. For HD-FDD slots with transient periods and Half-duplex guard subframe are not under test.
4. Set the interference signal frequency below the UL carrier frequency using the first offset in table 6.7EA.5-1.
5. Set the interference CW signal level according to table 6.7EA.5-1.
6. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.
7. Set the interference signal frequency above the UL carrier frequency using the first offset in table 6.7EA.5-1.
8. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.

Repeat the measurement using the second offset in table 6.7EA.5-1.

6.7EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA.

6.7EA.5 Test requirement

The ratio derived in step 5 and 7, shall not exceed the described value in table 6.7EA.5-1

Table 6.7EA.5-1: Transmit Intermodulation

BWChannel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz (Note 1)
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz
Note 1: For Band 20, only applicable for interference signal frequency above the UL carrier frequency.								

6.7F Transmit intermodulation for category NB1

6.7F.1 Test purpose

To verify that the UE transmit intermodulation does not exceed the described value in the test requirement.

6.7F.2 Test applicability

This test case applies to all types of UE release 13 and forward of UE category NB1.

6.7F.3 Minimum conformance requirements

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

The UE category NB1 transmitter intermodulation attenuation is defined by the ratio of the mean power of the wanted signal to the mean power of the intermodulation product as defined in Table 6.7F.3-1 when an interfering CW signal is added at a level below the wanted signal at the transmitter antenna port. Both the wanted signal power and the intermodulation product power are measured through rectangular filter with measurement bandwidth shown in Table 6.7F.3-1.

Table 6.7F.3-1: UE category NB1 transmitter IM requirement

Parameters for transmitter intermodulation		
BW Channel (UL)	15 kHz (1 tone at sub-carrier 5 or 6)	
Interference Signal Frequency Offset	180 kHz	360 kHz
Interference CW Signal Level	-40dBc	
Intermodulation Product	-20 dBc	-39 dBc
Measurement bandwidth	30 kHz	30 kHz

The normative reference for this requirement is TS 36.101 [2] clause 6.7.1F.

6.7F.4 Test description

6.7F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters shown in table 6.7F.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2.4. Configurations of NPDSCH and NPDCCH before measurement are specified in [Annex C.2].

Table 6.7F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] subclause 8.1.1		Normal		
Test Frequencies as specified in TS 36.508 [7] subclause 8.1.3.1		Frequency ranges defined in Annex K.1.1		
Test Parameters				
Configuration ID	**Downlink Configuration**	**Uplink Configuration**		
	N/A	Modulation	N_{tones}	Sub-carrier spacing (kHz)
1		QPSK	1@5	15kHz

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.2 using only main Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1.1 and H.4.0.
4. The UL Reference Measurement channels are set according to Table 6.7F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 6.7F.4.3.

6.7F.4.3 Test procedure

1. SS sends uplink scheduling information for the UL HARQ process via NPDCCH DCI format N0 for C_RNTI to schedule the UL RMC according to Table 6.7F.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. (UE should be already transmitting P_{UMAX} after Initial Conditions setting).
2. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration, which shall meet the requirements described in Table 6.2.3F.5-1. The measurement period is at least one sub-frame **(**1ms) for 15 KHz channel spacing. The centre frequency of the measurement filter shall be (the UL carrier frequency - 7.5 kHz).
3. Set the interference signal frequency below the UL carrier frequency using the first offset in table 6.7F.5-1.
4. Set the interference CW signal level according to table 6.7F.5-1.
5. Measure the rectangular filtered mean power of transmitting intermodulation product signals below and above the UL carrier frequency, and calculate the ratios with the power measured in step 2. The centre frequency of the measurement filter shall be (Interference signal frequency - Interference Signal Frequency Offset + 7.5kHz) and (UL carrier frequency - 15 kHz + Interference Signal Frequency Offset), respectively.
6. Set the interference signal frequency above the UL carrier frequency using the first offset in table 6.7F.5-1.

7. Measure the rectangular filtered mean power of transmitting intermodulation product signals below and above the UL carrier frequency, and calculate the ratios with the power measured in step 2. The centre frequency of the measurement filter shall be (UL carrier frequency - 15 kHz - Interference Signal Frequency Offset) and (Interference signal frequency + Interference Signal Frequency Offset + 7.5kHz) respectively.

Repeat the measurement using the second offset in table 6.7F.5-1.

6.7F.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

6.7F.5 Test requirement

The ratio derived in step 5 and 7, shall not exceed the described value in table 6.7F.5-1

Table 6.7F.5-1: Transmit Intermodulation

BW Channel (UL)	15 kHz (1 tone)	
Interference Signal Frequency Offset	180 kHz	360 kHz
Interference CW Signal Level	-40dBc	
Intermodulation Product	-20 dBc	-39 dBc
Measurement bandwidth	30 kHz	30 kHz

6.7G Transmit intermodulation for V2X Communication

6.7G.1 Transmit intermodulation for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- RB allocation

- The UE test mode is FFS

-Message Content is FFS

6.7G.1.1 Test purpose

Same test purpose as in clause 6.7.1.

6.7G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X communication.

6.7G.1.3 Minimum conformance requirements

When UE is configured for E-UTRA V2X sidelink transmissions non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table Table 5.5G-1, the requirements in subclause 6.7.1 apply for E-UTRA V2X sidelink transmission.

The normative reference for this requirement is TS 36.101 [2] clause 6.7.1G.

6.7G.1.4 Test description

6.7G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on E-UTRA operating bands specidied in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.7G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annexes A.8.3 and reference GNSS configuration as defined in Table C.2-8 in Annex C.2.

Table 6.7G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.92.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 6.7G.1.4.3.
3. The V2X reference measurement channel is set according to Table 6.7G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode - FFS.

6.7G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.2. Send continuously uplink power control "up" commands to the UE until the UE transmits at its P_{UMAX} level.
3. Measure the rectangular filtered mean power of the UE. For TDD slots with transient periods are not under test for the wanted signal and for the intermodulation product.
4. Set the interference signal frequency below the UL carrier frequency using the first offset in table 6.7G.1.5-1.
5. Set the interference CW signal level according to table 6.7G.1.5-1.
6. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.
7. Set the interference signal frequency above the UL carrier frequency using the first offset in table 6.7G.1.5-1.
8. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.

Repeat the measurement using the second offset in table 6.7G.1.5-1.

6.7G.1.4.3 Message contents

FFS

6.7G.1.5 Test requirements

The ratio derived in step 5 and 7, shall not exceed the described value in table 6.7G.1.5-1.

Table 6.7G.1.5-1: Transmit Intermodulation

BW Channel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz

6.7G.2 Transmit intermodulation for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- RB allocation

- Connection diagram

- The UE test mode is FFS

-Message Content is FFS

6.7G.2.1 Test purpose

Same test purpose as in clause 6.7.1.

6.7G.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support E-UTRA and V2X sidelink communication.

6.7G.2.3 Minimum conformance requirements

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 6.7.1 apply for V2X sidelink transmission and the E-UTRA uplink transmission.

The normative reference for this requirement is TS 36.101 [2] clause 6.7.1G.

6.7G.2.4 Test description

6.7G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on E-UTRA operating bands specidied in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test

parameters for each channel bandwidth, and are shown in table 6.7G.2.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annexes A.8.3.

Table 6.7G.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Mid range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		5MHz and Highest				
Test Parameters for Channel Bandwidths						
	Downlink	**Uplink Configuration**		**V2X Configuration**		
Ch BW	N/A for Occupied bandwidth	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
5 MHz		QPSK	8	10 MHz	QPSK	[48]
10 MHz		QPSK	12	20 MHz	QPSK	[96]
15 MHz		QPSK	16			
20 MHz		QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 6.7G.2.4.3.
3. The V2X reference measurement channel is set according to Table 6.7G.2.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode - FFS.

6.7G.2.4.2 Test procedure

1. The SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 6.7G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.2. Send continuously uplink power control "up" commands to the UE until the UE transmits at its P_{UMAX} level.
3. Measure the rectangular filtered mean power of the UE. For TDD slots with transient periods are not under test for the wanted signal and for the intermodulation product.
4. Set the interference signal frequency below the UL carrier frequency using the first offset in table 6.7G.2.5-1.
5. Set the interference CW signal level according to table 6.7G.2.5-1.
6. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.
7. Set the interference signal frequency above the UL carrier frequency using the first offset in table 6.7G.2.5-1.
8. Search the intermodulation product signals below and above the UL carrier frequency, then measure the rectangular filtered mean power of transmitting intermodulation for both signals, and calculate the ratios with the power measured in step 3.

Repeat the measurement using the second offset in table 6.7G.2.5-1.

6.7G.2.4.3 Message contents

FFS

6.7G.2.5 Test requirements

The ratio derived in step 5 and 7, shall not exceed the described value in table 6.7G.2.5-1.

Table 6.7G.2.5-1: Transmit Intermodulation

BW Channel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz
Interference CW Signal Level	-40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz

6.8 Time alignment

FFS.

6.8.1 Void

6.8A Void

6.8B Time alignment error for UL-MIMO

6.8B.1 Test purpose

To verify that the error of time alignment in UL MIMO does not exceed the range prescribed by the specified UL MIMO Time Alignment Error (TAE) and tolerance.

An excess time alignment error has the possibility to interfere to other channels or other systems and decrease UL MIMO performance because of the timing unsynchronization.

6.8B.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support UL MIMO.

6.8B.3 Minimum conformance requirements

For UE(s) with multiple transmit antenna connectors, the Time Alignment Error (TAE) shall not exceed 130 ns.

Table 6.8B.3-1: UL-MIMO configuration in closed-loop spatial multiplexing scheme

Transmission mode	DCI format	Codebook Index
Mode 2	DCI format 4	Codebook index 0

The normative reference for this requirement is TS 36.101 [2] clause 6.8B.

6.8B.4 Test description

6.8B.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 6.8B.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.8B.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508[7] clause 4.1	Normal			
Test Frequencies as specified in TS36.508 [7] clause 4.3.1	Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1	Lowest, 5MHz, Highest			
Test Parameters for Channel Bandwidths				
	Downlink Configuration	**Uplink Configuration**		
Ch BW	N/A	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	6	6
3MHz		QPSK	15	15
5MHz		QPSK	25	25
10MHz		QPSK	50	50
15MHz		QPSK	75	75
20MHz		QPSK	100	100
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.				

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL Reference Measurement channel is set according to Table 6.8B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 6.8B.4.3.

6.8B.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 6.8B.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200ms for the UE to reach PUMAX level for UE.
3. Measure the timing of one sub-frame at each antenna connector.

6.8B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

6.8B.5 Test requirements

For UE(s) with multiple transmit antenna connectors, the Time Alignment Error (TAE) shall not exceed 155 ns.

7 Receiver Characteristics

7.1 General

Unless otherwise stated the receiver characteristics are specified at the antenna connector(s) of the UE. For UE(s) with an integral antenna only, a reference antenna(s) with a gain of 0 dBi is assumed for each antenna port(s). UE with an integral antenna(s) may be taken into account by converting these power levels into field strength requirements, assuming a 0 dBi gain antenna. For UEs with more than one receiver antenna connector, identical interfering signals shall be applied to each receiver antenna port if more than one of these is used (diversity).

Unless otherwise stated, the test signal levels are defined at each antenna port, and specified in the respective sections below. Any specific test conditions are defined in the paragraph for each test. Unless stated otherwise, power control of the Downlink is OFF.

In general, the UE is set into the correct state in the "Initial conditions" part of the test, using normal SS signalling procedures over the air interface under easy radio conditions to ensure reliable message exchange. In the "Test procedure" part of the test, specific radio conditions are applied according to the test requirement and the desired measurement is made or the desired response is tested.

The ACS, blocking, spurious emissions and intermodulation requirements in sections 7.5, 7.6, 7.7 and 7.8 are defined for full band width signals i.e. for signals where all resource blocks are allocated for a specific user.

With the exception of Clause 7.3, the requirements shall be verified with the network signalling value NS_01 configured (Table 6.2.4.3-1).

All the parameters in clause 7 are defined using the UL reference measurement channels specified in Annexes A.2.2 and A.2.3, the DL reference measurement channels specified in Annex A.3.2 and using the set-up specified in Annex C.3.1.

For the additional requirements for intra-band non-contiguous carrier aggregation of two component carriers (one component carrier per sub-block), an in-gap test refers to the case when the interfering signal is located at a negative offset with respect to the assigned channel frequency of the highest carrier frequency and located at a positive offset with respect to the assigned channel frequency of the lowest carrier frequency.

For the additional requirements for intra-band non-contiguous carrier aggregation of two component carriers (one component carrier per sub-block), an out-of-gap test refers to the case when the interfering signal(s) is (are) located at a positive offset with respect to the assigned channel frequency of the highest carrier frequency, or located at a negative offset with respect to the assigned channel frequency of the lowest carrier frequency.

For the additional requirements for intra-band non-contiguous carrier aggregation of two component carriers with channel bandwidth larger than or equal to 5 MHz (one component carrier per sub-block), the existing adjacent channel selectivity requirements, in-band blocking requirements (for each case), and narrow band blocking requirements apply for in-gap tests only if the corresponding interferer frequency offsets with respect to the two measured carriers satisfy the following condition in relation to the sub-block gap size W_{gap} for at least one of these carriers j, j = 1,2, so that the interferer frequency position does not change the nature of the core requirement tested:

$$Wgap \geq 2 \cdot |FInterferer\ (offset)_j| - BWChannel(_j)$$

where $F_{Interferer\ (offset),j}$ is the interferer frequency offset with respect to carrier j as specified in subclause 7.5.1A, subclause 7.6.1A and subclause 7.6.3A for the respective requirement and $BW_{Channel(j)}$ the channel bandwidth of carrier j. The interferer frequency offsets for adjacent channel selectivity, each in-band blocking case and narrow- band blocking shall be tested separately with a single in-gap interferer at a time.

For a ProSe UE that supports both ProSe Direct Discovery and ProSe Direct Communication, the receiver characteristics specified in clause 7 for ProSe Direct Communication shall apply.

For ProSe Direct Discovery and ProSe Direct Communication on E-UTRA ProSe operating bands that correspond to TDD E-UTRA operating bands as specified in clause 5.2D, the only additional requirement for ProSe specified in clause 7.4.1D is applicable.

For CA tests, Cell ID = 0 applies to P-Cell, and Cell ID = n (where n is 1,2,3..) applies to S-Celln (where n is 1,2,3..), respectively.

Parameters given in table 7.1-1 are used throughout this section for CA, unless otherwise stated by the test case.

Table 7.1-1: Common Test Parameters

Parameter	Value	Comments
Cross carrier scheduling	Not configured	

For CA testing, unless otherwise stated, the logical carriers PCC / SCCs are mapped to physical frequencies as defined in Table 7.1-2.

Table 7.1-2: PCC/SCCs frequency mapping

CA Configuration	PCC-SCC mapping	Notes
Intra-band contiguous CA	CC1-CC2 (Note 4) or CC2-CC1 (Note 5)	1
Inter-band CA (CA_x-y)	Bx-By and By-Bx	2, 3
Intra-band non-contiguous CA	CC2-CC1 (Note 4) or CC1-CC2 (Note 5)	1
Note 1: Notation CCi-CCj means PCC on component carrier CCi and SCC on component carrier CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous / non-contiguous CA band in TS36.508 [7]. Note 2: Notation Bi–Bj means PCC on component Band i and SCC on component Band j, with single Band i/j frequencies defined in TS36.508 [7]. Note 3: Applicable for UE declared capability of UL support (within CA operation) in the individual bands. If UE does not support both PCC-SCC mappings, only the supported mapping is applicable. Note 4: Applicable for TDD CA and FDD CA bands with UL frequency < DL frequency. Note 5: Applicable for FDD CA bands with UL frequency > DL frequency and intra-band non-contiguous CA bands with wider DL operating bandwidth than UL.		

For testing of category 0 HD-FDD UE in FDD operating bands, the SS shall ensure downlink transmission is only configured in downlink subframes and that UL grants are given to ensure UE is transmitting only in uplink subframes throughout the test. The subframes reserved for uplink and downlink respectively are specified in the RMC definition in Annex A.2 for uplink and Annex A.3 for downlink.

For ProSe testing, DRX configuration specified in Table 7.1-3 is used, so that Sidelink traffic takes place only in the DRX off part of the DRX cycle.

Table 7.1-3: Reference DRX configuration

Parameter	Value	Comments
onDurationTimer	psf1	
drx-InactivityTimer	psf1	
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	sf2560, 0	
shortDRX	disabled	
NOTE: For further information see clause 6.3.2 in TS 36.331.		

For testing of category NB1 in all operation bands, standalone is used as default operation mode unless otherwise stated by the test case.

7.2 Diversity characteristics

The requirements in Section 7 assume that the receiver is equipped with two Rx port as a baseline. These requirements apply to all UE categories unless stated otherwise. Additional requirements apply for UE(s) equipped with four Rx ports. With the exception of clause 7.9, all requirements shall be verified by using both (all) antenna ports simultaneously.

NOTE 1: for an operating band in which the UE can operate using up to four Rx ports, it suffices to verify for conformance the additional requirements applicable for four Rx ports [except for REFSENS].

NOTE 2: Implementation of 4 antenna ports for all operating bands supported by the UE is not mandated. For a category 0 UE the requirements in Section 7 assume that the receiver is equipped with single Rx port.

For a category NB1 UE the requirements in Section 7 assume that the receiver is equipped with single Rx port.

7.3 Reference sensitivity level

Editor's note: FDD/TDD aspects missing or not yet determined:

- The Maximum Sensitivity Degradation figures for large transmission configurations are not finalised in the core specification.

- This clause is also incomplete for CA_42A-46A and CA_7A-8A-20.

- $\Delta R_{IB,c}$ is in square brackets (awaiting for RAN4 decision).

- Clarification to the use of signalling the non-default Tx-Rx separation of 295MHz for Band 70 testing is under discussion.

7.3.1 Test purpose

To verify the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.3.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.3-1 and Table 7.3.3-2.

Table 7.3.3-1: Reference sensitivity QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
1			-100	-97	-95.2	-94	FDD
2	-102.7	-99.7	-98	-95	-93.2	-92	FDD
3	-101.7	-98.7	-97	-94	-92.2	-91	FDD
4	-104.7	-101.7	-100	-97	-95.2	-94	FDD
5	-103.2	-100.2	-98	-95			FDD
6			-100	-97			FDD
7			-98	-95	-93.2	-92	FDD
8	-102.2	-99.2	-97	-94			FDD
9			-99	-96	-94.2	-93	FDD
10			-100	-97	-95.2	-94	FDD
11			-100	-97			FDD
12	-101.7	-98.7	-97	-94			FDD
13			-97	-94			FDD
14			-97	-94			FDD
...							
17			-97	-94			FDD
18			-100[7]	-97[7]	-95.2[7]		FDD
19			-100	-97	-95.2		FDD
20			-97	-94	-91.2	-90	FDD
21			-100	-97	-95.2		FDD
22			-97	-94	-92.2	-91	FDD
23	-104.7	-101.7	-100	-97	-95.2	-94	FDD
24			-100	-97			FDD
25	-101.2	-98.2	-96.5	-93.5	-91.7	-90.5	FDD
26	-102.7	-99.7	-97.5[6]	-94.5[6]	-92.7[6]		FDD
27	-103.2	-100.2	-98	-95			FDD
28		-100.2	-98.5	-95.5	-93.7	-91	FDD
30			-99	-96			FDD
31	-99.0	-95.7	-93.5				FDD
...							
33			-100	-97	-95.2	-94	TDD
34			-100	-97	-95.2		TDD
35	-106.2	-102.2	-100	-97	-95.2	-94	TDD
36	-106.2	-102.2	-100	-97	-95.2	-94	TDD
37			-100	-97	-95.2	-94	TDD
38			-100	-97	-95.2	-94	TDD
39			-100	-97	-95.2	-94	TDD
40			-100	-97	-95.2	-94	TDD
41			-98	-95	-93.2	-92	TDD
42			-99	-96	-94.2	-93	TDD
43			-99	-96	-94.2	-93	TDD
44		[-100.2]	[-98]	[-95]	[-93.2]	[-92]	TDD
45			-100	-97	-95.2	-94	TDD
48			-99	-96	-94.2	-93	TDD
…							
65	-104.2	-101.2	-99.5	-96.5	-94.7	-93.5	FDD
66	-104.2	-101.2	-99.5	-96.5	-94.7	-93.5	FDD
68			-98.5	-95.5	-93.7		FDD
…							

70			-100	-97	-95.2	-94	FDD

Note 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5Note 2: The Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1

Note 3: signal power is specified per port

Note 4: For the UE which supports both Band 3 and Band 9 the reference sensitivity level is FFS.

Note 5: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.

Note 6: [6] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.

Note 7: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.

For UE(s) equipped with 4 antenna ports, the minimum requirement for reference sensitivity in Table 7.3.3-1 shall be modified by the amount given in $\Delta R_{IB,4R}$ in Table 7.3.3-1a for the applicable E-UTRA bands.

Table 7.3.3-1a: $\Delta R_{IB,4R}$

E-UTRA Band	$\Delta R_{IB,4R}$ [dB]
1, 2, 3, 7, 20, 21, 25, 39, 40, 41	- 2.7
42	- 2.2

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3.3-1 (two antenna ports) and Table 7.3.3-1a (four antenna ports) shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.3-2.

NOTE: Table 7.3.3-2 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors. Typical receiver sensitivity performance with HARQ retransmission enabled and using a residual BLER metric relevant for e.g. Speech Services is given in the Annex G of TS 36.101 [2] (informative).

For the UE which supports inter-band carrier aggregation configuration with the uplink in one or two E-UTRA bands, the minimum requirement for reference sensitivity in Table 7.3.3-1 and Table 7.3.3-1a shall be increased by the amount given in $\Delta R_{IB,c}$ in Table 7.3.3-1A, Table 7.3.3-1B and Table 7.3.3-1C for the applicable E-UTRA bands.

Table 7.3.3-1A: $\Delta R_{IB,c}$ (two bands)

Inter-band CA Configuration	E-UTRA Band	$\Delta R_{IB,c}$ [dB]
CA_1A-3A	1	0
	3	0
CA_1A-1A-3A	1	0
	3	0
CA_1A-3A-3A	1	0
	3	0
CA_1A-3C	1	0
	3	0
CA_1A-1A-3C	1	0
	3	0
CA_1C-3A	1	0
	3	0
CA_1A-5A	1	0
	5	0
CA_1A-1A-5A	1	0
	5	0
CA_1A-7A	1	0
	7	0
CA_1A-7A-7A	1	0
	7	0
CA_1A-7C	1	0
	7	0
CA_1A-8A	1	0
	8	0
CA_1A-11A	1	0
	11	0
CA_1A-18A	1	0
	18	0
CA_1A-19A	1	0
	19	0
CA_1A-20A	1	0
	20	0
CA_1A-21A	1	0
	21	0
CA_1A-26A	1	0
	26	0
CA_1A-28A	1	0
	28	0.2
CA_1A-1A-28A	1	0
	28	0.2
CA_1A-38A	1	0
	38	0
CA_1A-40A	1	0
	40	0
CA_1A-40C	1	0
	40	0
CA_1A-41A[8]	1	0
	41	0
CA_1A-41C[8]	1	0
	41	0
CA_1A-42A	1	0
	42	0.5
CA_1A-42C	1	0
	42	0.5
CA_1A-46A	1	0
CA_1A-46E	1	0
CA_2A-4A	2	0.3
	4	0.3
CA_2A-2A-4A	2	0.3
	4	0.3
CA_2A-4A-4A	2	0.3

	4	0.3
CA_2A-2A-4A-4A	2	0.3
	4	0.3
CA_2A-5A	2	0
	5	0
CA_2A-2A-5A	2	0
	5	0
CA_2A-5B	2	0
	5	0
CA_2C-5A	2	0
	5	0
CA_2C-5B	2	0
	5	0
CA_2A-7A	2	0
	7	0
CA_2A-7C	2	0
	7	0
CA_2A-7A-7A	2	0
	7	0
CA_2A-12A	2	0
	12	0
CA_2A-12A-12A	2	0
	12	0
CA_2A-2A-12A	2	0
	12	0
CA_2A-2A-12A-12A	2	0
	12	0
CA_2A-2A-12B	2	0
	12	0
CA_2A-12B	2	0
	12	0
CA_2C-12A	2	0
	12	0
CA_2A-13A	2	0
	13	0
CA_2A-2A-13A	2	0
	13	0
CA_2A-17A	2	0
	17	0.5
CA_2A-28A	2	0
	28	0
CA_2A-29A	2	0
CA_2A-2A-29A	2	0
CA_2A-30A	2	0.4
	30	0.5
CA_2A-2A-30A	2	0.4
	30	0.5
CA_2C-29A	2	0
CA_2C-30A	2	0.4
	30	0.5
CA_2A-46A-46D	2	0
CA_2A-48A	2	0.2
	48	0.5
CA_2A-48A-48A	2	0.2
	48	0.5
CA_2A-48C	2	0.2
	48	0.5
CA_2A-66A	2	0.3
	66	0.3
CA_2A-66B	2	0.3
	66	0.3
CA_2A-66C	2	0.3
	66	0.3
CA_2A-66D	2	0.3

	66	0.3
CA_2A-2A-66A	2	0.3
	66	0.3
CA_2A-2A-66A-66A	2	0.3
	66	0.3
CA_2A-2A-66A-66B	2	0.3
	66	0.3
CA_2A-2A-66A-66C	2	0.3
	66	0.3
CA_2A-46A	2	0
CA_2A-66A-66A	2	0.3
	66	0.3
CA_2A-66A-66B	2	0.3
	66	0.3
CA_2A-66A-66C	2	0.3
	66	0.3
CA_2A-2A-66B	2	0.3
	66	0.3
CA_2A-2A-66C	2	0.3
	66	0.3
CA_2A-2A-66D	2	0.3
	66	0.3
CA_3A-5A	3	0
	5	0
CA_3C-5A	3	0
	5	0
CA_3A-7A	3	0
	7	0
CA_3A-3A-7A	3	0
	7	0
CA_3A-3A-7A-7A	3	0
	7	0
CA_3A-7A-7A	3	0
	7	0
CA_3A-7B	3	0
	7	0
CA_3A-7C	3	0
	7	0
CA_3C-7A	3	0
	7	0
CA_3C-7C	3	0
	7	0
CA_3A-8A	3	0
	8	0
CA_3A-3A-8A	3	0
	8	0
CA_3C-8A	3	0
	8	0
CA_3A-11A	3	0.3
	11	0.5
CA_3A-19A	3	0
	19	0
CA_3A-20A	3	0
	20	0
CA_3C-20A	3	0
	20	0
CA_3A-3A-20A	3	0
	20	0
CA_3A-21A	3	0.3
	21	0.5
CA_3A-26A	3	0
	26	0
CA_3A-27A	3	0
	27	0
CA_3A-28A	3	0

	28	0
CA_3C-28A	3	0
	28	0
CA_3A-31A	3	0
	31	0.2
CA_3A-32A	3	0
	32	0
CA_3A-38A	3	0
	38	0
CA_3A-40A	3	0
	40	0
CA_3A-40A-40A	3	0
	40	0
CA_3A-40C	3	0
	40	0
CA_3A-40D	3	0
	40	0
CA_3A-40E	3	0
	40	0
CA_3C-40A	3	0
	40	0
CA_3C-40C	3	0
	40	0
CA_3A-41A	3	0
	41	0[10]
		0.5[11]
CA_3A-41C	3	0
	41	0[10]
		0.5[11]
CA_3A-41D	3	0
	41	0[10]
		0.5[11]
CA_3A-3A-41A	3	0
	41	0[10]
		0.5[11]
CA_3C-41A	3	0
	41	0[10]
		0.5[11]
CA_3C-41C	3	0
	41	0[10]
		0.5[11]
CA_3C-41D	3	0
	41	0[10]
		0.5[11]

CA_3A-42A	3	0.2
	42	0.5
CA_3A-42C	3	0.2
	42	0.5
CA_3A-46A	3	0
CA_3A-46E	3	0
CA_4A-5A	4	0
	5	0
CA_4A-4A-5A	4	0
	5	0
CA_4A-5B	4	0
	5	0
CA_4A-4A-5B	4	0
	5	0
CA_4A-7A	4	0.5
	7	0.5
CA_4A-4A-7A	4	0.5
	7	0.5
CA_4A-4A-29A	4	0
CA_4A-7A-7A	4	0.5
	7	0.5
CA_4A-7C	4	0.5
	7	0.5
CA_4A-12A	4	0
	12	0.5
CA_4A-12B	4	0
	12	0.5
CA_4A-4A-12A	4	0
	12	0.5
CA_4A-4A-12A-12A	4	0
	12	0.5
CA_4A-4A-12B	4	0
	12	0.5
CA_4A-12A-12A	4	0
	12	0.5
CA_4A-4A-13A	4	0
	13	0
CA_4A-13A	4	0
	13	0
CA_4A-17A	4	0
	17	0.5
CA_4A-27A	4	0
	27	0
CA_4A-28A	4	0
	28	0.2
CA_4A-29A	4	0
CA_4A-30A	4	0.4
	30	0.5
CA_4A-4A-30A	4	0.4
	30	0.5
CA_4A-46A	4	0
CA_4A-46A-46D	4	0
CA_5A-7A	5	0
	7	0
CA_5A-7A-7A	5	0
	7	0
CA_5A-7C	5	0
	7	0
CA_5A-12A	5	0.5
	12	0.3
CA_5A-12A-12A	5	0.5
	12	0.3
CA_5A-12B	5	0.5
	12	0.3

CA_5A-13A	5	0
	13	0
CA_5A-17A	5	0.5
	17	0.3
CA_5A-25A	5	0
	25	0
CA_5A-29A	5	0
CA_5A-30A	5	0
	30	0
CA_5B-30A	5	0
	30	0
CA_5A-38A	5	0
	38	0
CA_5A-40A	5	0
	40	0
CA_5A-5A-40A	5	0
	40	0
CA_5A-40A-40A	5	0
	40	0
CA_5A-40C	5	0
	40	0
CA_5A-41A	5	0
	41	0
CA_5A-46E	5	0
CA_5A-48A	5	0
	48	0
CA_5A-66A	5	0
	66	0
CA_5A-5A-66A	5	0
	66	0
CA_5A-5A-66A-66A	5	0
	66	0
CA_5A-5A-66A-66B	5	0
	66	0
CA_5A-5A-66A-66C	5	0
	66	0
CA_5A-5A-66B	5	0
	66	0
CA_5A-5A-66C	5	0
	66	0
CA_5A-5A-66D	5	0
	66	0
CA_5A-66A-66A	5	0
	66	0
CA_5A-66A-66B	5	0
	66	0
CA_5A-66A-66C	5	0
	66	0
CA_5A-66B	5	0
	66	0
CA_5A-66C	5	0
	66	0
CA_5A-66D	5	0
	66	0
CA_5B-66A	5	0
	66	0
CA_5B-66A-66A	5	0
	66	0
CA_5B-66A-66B	5	0
	66	0
CA_5B-66A-66C	5	0
	66	0
CA_5B-66B	5	0
	66	0
CA_5B-66C	5	0

	66	0
CA_7A-8A	7	0
	8	0.2
CA_7A-7A-8A	7	0
	8	0.2
CA_7A-12A	7	0
	12	0
CA_7A-20A	7	0
	20	0
CA_7A-22A	7	0
	22	0.5
CA_7A-26A	7	0
	26	0
CA_7A-7A-26A	7	0
	26	0
CA_7A-28A	7	0
	28	0
CA_7B-28A	7	0
	28	0
CA_7C-28A	7	0
	28	0
CA_7A-32A	7	0
	32	0
CA_7A-40A	7	0
	40	0.5
CA_7A-40C	7	0
	40	0.5
CA_7A-42A	7	0
	42	0.5
CA_7A-42A-42A	7	0
	42	0.5
CA_7A-46A	7	0
CA_7A-46C	7	0
CA_7A-46E	7	0
CA_7C-46A	7	0
CA_7C-46C	7	0
CA_7C-46D	7	0
CA_7A-66A	7	0.5
	66	0.5
CA_8A-11A	8	0
	11	0
CA_8A-20A	8	0
	20	0
CA_8A-28A[13]	8	0.2
	28	0.1
CA_8A-39A	8	0
	39	0
CA_8A-39C	8	0
	39	0
CA_8B-39A	8	0
	39	0
CA_8B-39C	8	0
	39	0
CA_8A-40A	8	0
	40	0
CA_8A-41A	8	0
	41	0
CA_8A-41C	8	0
	41	0
CA_8A-41D	8	0
	41	0
CA_8B-41A	8	0
	41	0
CA_8B-41C	8	0
	41	0

CA_8B-41D	8	0
	41	0
CA_8A-42A	8	0.2
	42	0.5
CA_8A-42C	8	0.2
	42	0.5
CA_8A-46A	8	0
CA_8A-46C	8	0
CA_8A-46D	8	0
CA_8A-46E	8	0
CA_8B-46A	8	0
CA_8B-46C	8	0
CA_8B-46D	8	0
CA_11A-18A	11	0
	18	0
CA_11A-28A	11	0
	28	0.2
CA_11A-41A	11	0
	41	0
CA_11A-41C	11	0
	41	0
CA_11A-42A	11	0
	42	0.5
CA_11A-42C	11	0
	42	0.5
CA_11A-46A	11	0
CA_11A-46C	11	0
CA_11A-46D	11	0
CA_11A-46E	11	0
CA_12A-25A	12	0
	25	0
CA_12A-30A	12	0
	30	0
CA_12A-66A	12	0.5
	66	0
CA_12A-66A-66A	12	0.5
	66	0
CA_12A-66C	12	0.5
	66	0
CA_12B-66A	12	0.5
	66	0
CA_12B-66A-66A	12	0.5
	66	0
CA_13A-46E	13	0
CA_13A-48A	13	0
	48	0
CA_13A-66A	13	0
	66	0
CA_13A-66A-66A	13	0
	66	0
CA_13A-66A-66B	13	0
	66	0
CA_13A-66A-66C	13	0
	66	0
CA_13A-66B	13	0
	66	0
CA_13A-46C	13	0
CA_13A-66C	13	0
	66	0
CA_13A-66D	13	0
	66	0
CA_18A-28A[9]	18	0
	28	0
CA_19A-21A	19	0
	21	0

CA_19A-28A[9]	19	0
	28	0
CA_19A-42A	19	0
	42	0.5
CA_19A-42C	19	0
	42	0.5
CA_19A-46A	19	0
CA_19A-46C	19	0
CA_19A-46D	19	0
CA_19A-46E	19	0
CA_20A-28A	20	0
	28	0
CA_20A-31A	20	0
	31	0
CA_20A-32A	20	0
CA_20A-38A	20	0
	38	0
CA_20A-40A	20	0
	40	0
CA_20A-42A	20	0
	42	0.5
CA_20A-42A-42A	20	0
	42	0.5
CA_20A-67A	20	0
CA_21A-28A	21	0
	28	0
CA_21A-42A	21	0
	42	0.5
CA_21A-42C	21	0
	42	0.5
CA_21A-46A	21	0
CA_21A-46C	21	0
CA_21A-46D	21	0
CA_21A-46E	21	0
CA_23A-29A	23	0
CA_25A-26A	25	0
	26	0
CA_25A-41A[8]	25	0
	41	0
CA_25A-41C[8]	25	0
	41	0
CA_25A-41D[8]	25	0
	41	0
CA_26A-41A	26	0
	41	0
CA_26A-41C	26	0
	41	0
CA_26A-46A	26	0
CA_28A-40A	28	0
	40	0
CA_28A-40C	28	0
	40	0
CA_28A-40D	28	0
	40	0
CA_28A-41A	28	0
	41	0
CA_28A-41C	28	0
	41	0
CA_28A-42A	28	0.2
	42	0.5
CA_28A-42C	28	0.2
	42	0.5
CA_28A-46A	28	0
CA_28A-46C	28	0
CA_28A-46D	28	0

CA_28A-46E	28	0
CA_29A-30A	30	0
CA_29A-66A	66	0
CA_29A-66A-66A	29	0
	66	0
CA_29A-66C	29	0
	66	0
CA_29A-70A	70	0
CA_30A-66A	30	0.5
	66	0.4
CA_30A-66A-66A	30	0.5
	66	0.4
CA_38A-40A	38	0.5[4]
	40	0.5[4]
CA_38A-40A-40A	38	0.5[4]
	40	0.5[4]
CA_38A-40C	38	0.5[4]
	40	0.5[4]
CA_39A-40A	39	0.3[4]
	40	0.3[4]
CA_39A-40C	39	0.3[4]
	40	0.3[4]
CA_39A-40D	39	0.3
	40	0.3
CA_39A-40E	39	0.3[4]
	40	0.3[4]
CA_39C-40A	39	0.3[4]
	40	0.3[4]
CA_39C-40C	39	0.3
	40	0.3
CA_39C-40D	39	0.3[4]
	40	0.3[4]
CA_39A-41A	39	0.2[4]
	41	0.2[4]
CA_39A-41A	39	0.2[7]
	41	0.2[7]
CA_39A-41C	39	0.2[4]
	41	0.2[4]
CA_39A-41C	39	0.2[7]
	41	0.2[7]
CA_39A-41D	39	0.2[4]
	41	0.2[4]
CA_39C-41A	39	0.2[4]
	41	0.2[4]
CA_39C-41A	39	0.2[7]
	41	0.2[7]
CA_39C-41C	39	0.2[4]
	41	0.2[4]
CA_39C-41D	39	0.2[4]
	41	0.2[4]
CA_39A-42A	39	0[4]
	42	0.5[4]
CA_39A-42C	39	0[4]
	42	0.5[4]
CA_39A-42D	39	0
	42	0.5
CA_39A-42E	39	0[4]
	42	0.5[4]
CA_39C-42A	39	0[4]
	42	0.5[4]
CA_39C-42C	39	0
	42	0.5
CA_39C-42D	39	0[4]
	42	0.5[4]
CA_39A-46A	39	0

CA_39A-46D	39	0
CA_39A-46E	39	0
CA_39C-46C	39	0
CA_39C-46D	39	0
CA_40A-41A	40	0^{4}
	41	0^{4}
CA_40A-42A	40	0.4^{4}
	42	0.5^{4}
CA_40A-42C	40	0.4^{4}
	42	0.5^{4}
CA_40C-42A	40	0.4^{4}
	42	0.5^{4}
CA_40C-42C	40	0.4^{4}
	42	0.5^{4}
CA_40A-46A	40	0
CA_40A-46C	40	0
CA_40A-46D	40	0
CA_40A-46E	40	0
CA_40C-46A	40	0
CA_40C-46C	40	0
CA_40C-46D	40	0
CA_40D-46A	40	0
CA_40D-46C	40	0
CA_41A-42A	41	0.4^{4}
	42	0.5^{4}
CA_41A-42A	41	0^{7}
	42	0.5^{7}
CA_41A-42C	41	0.4^{4}
	42	0.5^{4}
CA_41A-42C	41	0^{7}
	42	0.5^{7}
CA_41A-42D	41	0.4^{4}
	42	0.5^{4}
CA_41A-46A	41	0
CA_41A-46C	41	0
CA_41A-46D	41	0
CA_41A-46E	41	0
CA_41C-46A	41	0
CA_41C-46C	41	0
CA_41C-46D	41	0
CA_41D-46A	41	0
CA_41D-46C	41	0
CA_41C-42A	41	0.4^{4}
	42	0.5^{4}
CA_41C-42A	41	0^{7}
	42	0.5^{7}
CA_41C-42C	41	0.4^{4}
	42	0.5^{4}
CA_41C-42C	41	0^{7}
	42	0.5^{7}
CA_41D-42A	41	0.4^{4}
	42	0.5^{4}
CA_41C-42D	41	0.4^{4}
	42	0.5^{4}
CA_41D-42C	41	0.4^{4}
	42	0.5^{4}
CA_42A-46A	42	[0]
CA_46A-66A-66A	66	0
CA_46A-66C	66	0
CA_46A-46D-66A	66	0
CA_46E-66A	66	0
CA_46A-70A	70	0
CA_48A-66A	48	0.5

	66	0.2
CA_48A-48A-66A	48	0.5
	66	0.2
CA_48A-48C-66A	48	0.5
	66	0.2
CA_48C-66A	48	0.5
	66	0.2
CA_48D-66A	48	0.5
	66	0.2

NOTE 1: The above additional tolerances are only applicable for the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations

NOTE 2: The above additional tolerances also apply in intra-band and non-aggregated operation for the supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

NOTE 3: In case the UE supports more than one of the above 2DL inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one 2DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the 2DL tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating band among the supported 2DL CA configurations. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 2DL carrier aggregation configurations involving such band shall be applied
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum 2DL tolerance in Table 7.3.3-1A that would apply for that operating band among the supported 2DL CA configurations

NOTE 4: Only applicable for UE supporting inter-band carrier aggregation with uplink in one E-UTRA band and without simultaneous Rx/Tx.

NOTE 5: Unless otherwise specified, in case the UE supports more than one of the above 3DL inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one 3DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 3DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 3DL carrier aggregation configurations involving such band shall be applied.
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 3DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 3DL CA configurations.

NOTE 6: The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.

NOTE 7: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx.

NOTE 8: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in the FDD band.

NOTE 9: For Band 28, the requirements only apply for the restricted frequency range specified for this CA configuration (Table 5.2A-2).

NOTE 10: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz.

NOTE 11: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.

NOTE 12: For UE supporting E-UTRA band 42, 43 or 48 and CA configurations including Band 42, 43 or 48, the applicable $\Delta R_{IB,c}$ in Band 42, 43, or 48 is the max(Band 42 $\Delta R_{IB,c}$, Band 43 $\Delta R_{IB,c}$, Band 48 $\Delta R_{IB,c}$).

NOTE 13: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 8.

NOTE: To meet the $\Delta R_{IB,c}$ requirements for CA_20A-28A state-of-the-art filter combiner technology is needed.

Table 7.3.3-1B: $\Delta R_{IB,c}$ (three bands)

Inter-band CA Configuration	E-UTRA Band	$\Delta R_{IB,c}$ [dB]
CA_1A-3A-5A	1	0
	3	0
	5	0
CA_1A-1A-3A-5A	1	0
	3	0
	5	0
CA_1A-3C-5A	1	0
	3	0
	5	0
CA_1A-3A-7A	1	0
	3	0
	7	0
CA_1A-3A-7A-7A	1	0
	3	0
	7	0
CA_1A-3A-7C	1	0
	3	0
	7	0
CA_1A-3C-7A	1	0
	3	0
	7	0
CA_1A-3C-7C	1	0
	3	0
	7	0
CA_1A-3A-8A	1	0
	3	0
	8	0
CA_1A-3A-3A-8A	1	0
	3	0
	8	0
CA_1A-3C-8A	1	0
	3	0
	8	0
CA_1A-3A-11A	1	0
	3	0.3
	11	0.5

CA_1A-3A-19A	1	0
	3	0
	19	0
CA_1A-3A-20A	1	0
	3	0
	20	0
CA_1A-3A-21A	1	0
	3	0.3
	21	0.5
CA_1A-3A-26A	1	0
	3	0
	26	0
CA_1A-3A-28A	1	0
	3	0
	28	0.2
CA_1A-3C-28A	1	0
	3	0
	28	0.2
CA_1A-3A-38A	1	0
	3	0
	38	0
CA_1A-3A-40A	1	0
	3	0
	40	0
CA_1A-3A-40C	1	0
	3	0
	40	0
CA_1A-3C-40A	1	0
	3	0
	40	0
CA_1A-3C-40C	1	0
	3	0
	40	0
CA_1A-3A-41A	1	0
	3	0
	41	0[5]/0.5[6]
CA_1A-3A-42A	1	0.2
	3	0.2
	42	0.5
CA_1A-3A-42C	1	0.2
	3	0.2
	42	0.5
CA_1A-5A-7A	1	0
	5	0
	7	0
CA_1A-5A-7A-7A	1	0
	5	0
	7	0
CA_1A-5A-40A	1	0
	5	0
	40	0
CA_1A-5A-46A	1	0
	5	0
CA_1A-5A-46C	1	0
	5	0
CA_1A-5A-46D	1	0
	5	0
CA_1A-7A-8A	1	0
	7	0
	8	0.2
CA_1A-7A-20A	1	0
	7	0
	20	0
CA_1A-7A-26A	1	0
	7	0

	26	0
CA_1A-7A-7A-26A	1	0
	7	0
	26	0
CA_1A-7A-28A	1	0
	7	0
	28	0.2
CA_1A-7C-28A	1	0
	7	0
	28	0.2
CA_1A-7A-40A	1	0
	7	0.3
	40	0.8
CA_1A-7A-42A	1	0.2
	7	0.2
	42	0.5
CA_1A-7A-46A	1	0
	7	0
CA_1A-7A-46C	1	0
	7	0
CA_1A-7A-46D	1	0
	7	0
CA_1A-8A-11A	1	0
	8	0
	11	0
CA_1A-8A-20A	1	0
	8	0
	20	0
CA_1A-8A-28A[10]	1	0
	8	0.2
	28	0.2
CA_1A-8A-40A	1	0
	8	0
	40	0
CA_1A-11A-18A	1	0
	11	0
	18	0
CA_1A-11A-28A	1	0
	11	0
	28	0.2
CA_1A-18A-28A	1	0
	18	0
	28	0
CA_1A-19A-21A	1	0
	19	0
	21	0
CA_1A-19A-28A	1	0
	19	0
	28	0
CA_1A-19A-42A	1	0
	19	0
	42	0.5
CA_1A-19A-42C	1	0
	19	0
	42	0.5
CA_1A-20A-28A	1	0
	20	0.2
	28	0.2
CA_1A-20A-42A	1	0
	20	0
	42	0.5
CA_1A-21A-28A	1	0
	21	0
	28	0.2
CA_1A-21A-	1	0

42A	21	0
	42	0.5
CA_1A-28A-42A	1	0
	28	0.2
	42	0.5
CA_1A-28A-42C	1	0
	28	0.2
	42	0.5
CA_1A-21A-42C	1	0
	21	0
	42	0.5
CA_1A-41A-42A[7, 12]	1	0
	41	0
	42	0.5
CA_1A-41A-42C[7, 12]	1	0
	41	0
	42	0.5
CA_1A-41C-42A[7, 12]	1	0
	41	0
	42	0.5
CA_1A-41C-42C[7, 12]	1	0
	41	0
	42	0.5
CA_2A-2A-4A-12A	2	0.3
	4	0.3
	12	0.5
CA_2A-4A-5A	2	0.3
	4	0.3
	5	0
CA_2A-2A-4A-5A	2	0.3
	4	0.3
	5	0
CA_2A-4A-4A-5A	2	0.3
	4	0.3
	5	0
CA_2A-4A-5B	2	0.3
	4	0.3
	5	0
CA_2A-4A-7A	2	0.3
	4	0.5
	7	0.5
CA_2A-4A-7C	2	0.3
	4	0.5
	7	0.5
CA_2A-4A-7A-7A	2	0.3
	4	0.5
	7	0.5
CA_2A-4A-12A	2	0.3
	4	0.3
	12	0.5
CA_2A-4A-12A-12A	2	0.3
	4	0.3
	12	0.5
CA_2A-4A-12B	2	0.3
	4	0.3
	12	0.5
CA_2A-4A-4A-12A	2	0.3
	4	0.3
	12	0.5
CA_2A-4A-13A	2	0.3
	4	0.3
	13	0
CA_2A-4A-29A	2	0.3
	4	0.3
CA_2A-4A-30A	2	0.4

	4	0.4
	30	0.5
CA_2A-5A-12A	2	0
	5	0.5
	12	0.3
CA_2A-2A-5A-12A	2	0.3
	5	0.5
	12	0.3
CA_2A-5A-12A-12A	2	0
	5	0.5
	12	0.3
CA_2A-2A-5A-66A	2	0.3
	5	0
	66	0.3
CA_2A-2A-5A-66A-66A	2	0.3
	5	0
	66	0.3
CA_2A-2A-5A-66B	2	0.3
	5	0
	66	0.3
CA_2A-2A-5A-66C	2	0.3
	5	0
	66	0.3
CA_2A-2A-12B-66A	2	0.3
	12	0.5
	66	0.3
CA_2A-2A-13A-66A	2	0.3
	13	0
	66	0.3
CA_2A-5A-12B	2	0
	5	0.5
	12	0.3
CA_2A-5A-13A	2	0
	5	0
	13	0
CA_2A-5A-29A	2	0
	5	0
CA_2A-5A-30A	2	0.4
	5	0
	30	0.5
CA_2A-2A-5A-30A	2	0.4
	5	0
	30	0.5
CA_2C-5A-30A	2	0.4
	5	0
	30	0.5
CA_2A-5B-30A	2	0.4
	5	0
	30	0.5
CA_2A-5A-66A	2	0.3
	5	0
	66	0.3
CA_2A-5A-66A-66A	2	0.3
	5	0
	66	0.3
CA_2A-5A-66B	2	0.3
	5	0
	66	0.3
CA_2A-5A-66C	2	0.3
	5	0
	66	0.3
CA_2A-5A-66D	2	0.3
	5	0
	66	0.3
CA_2A-5B-66A	2	0.3

	5	0
	66	0.3
CA_2A-5B-66B	2	0.3
	5	0
	66	0.3
CA_2A-5B-66C	2	0.3
	5	0
	66	0.3
CA_2C-5B-30A	2	0.4
	5	0
	30	0.5
CA_2A-7A-12A	2	0
	7	0
	12	0
CA_2A-7A-66A	2	0.3
	7	0.5
	66	0.5
CA_2A-12A-30A	2	0.4
	12	0
	30	0.5
CA_2A-2A-12A-30A	2	0.4
	12	0
	30	0.5
CA_2C-12A-30A	2	0.4
	12	0
	30	0.5
CA_2A-12A-66A	2	0.3
	12	0.5
	66	0.3
CA_2A-2A-12A-66A	2	0.3
	12	0.5
	66	0.3
CA_2A-12A-66A-66A	2	0.3
	12	0.5
	66	0.3
CA_2A-12A-66C	2	0.3
	12	0.5
	66	0.3
CA_2A-12B-66A	2	0.3
	12	0.5
	66	0.3
CA_2A-12B-66A-66A	2	0.3
	12	0.5
	66	0.3
CA_2A-13A-66A	2	0.3
	13	0
	66	0.3
CA_2A-13A-66D	2	0.3
	13	0
	66	0.3
CA_2A-13A-66A-66A	2	0.3
	13	0
	66	0.3
CA_2A-13A-66A-66B	2	0.3
	13	0
	66	0.3
CA_2A-13A-66A-66C	2	0.3
	13	0
	66	0.3
CA_2A-13A-66B	2	0.3
	13	0
	66	0.3
CA_2A-13A-66C	2	0.3
	13	0
	66	0.3

CA_2A-2A-30A-66A	2	0.4
	30	0.5
	66	0.4
CA_2A-29A-30A	2	0.4
	30	0.5
CA_2A-2A-29A-30A	2	0.4
	30	0.5
CA_2A-29A-66A	2	0.3
	66	0.3
CA_2A-30A-66A	2	0.4
	30	0.5
	66	0.4
CA_2A-46A-66A	2	0
	66	0
CA_2A-30A-66A-66A	2	0.4
	30	0.5
	66	0.4
CA_2C-29A-30A	2	0.4
	30	0.5
CA_2A-46A-46A-66A	2	0
	66	0
CA_2A-46C-66A	2	0
	66	0
CA_2A-46A-46C-66A	2	0
	66	0
CA_2A-46D-66A	2	0
	66	0
CA_2A-48A-66A	2	0.3
	48	0.5
	66	0.3
CA_2A-48A-48A-66A	2	0.3
	48	0.5
	66	0.3
CA_3A-5A-7A	3	0
	5	0
	7	0
CA_3A-5A-7A-7A	3	0
	5	0
	7	0
CA_3A-5A-40A	3	0
	5	0
	40	0
CA_3A-5A-40A-40A	3	0
	5	0
	40	0
CA_3A-5A-41A	3	0
	5	0
	41	0[5]
		0.5[6]
CA_3A-3A-7A-7A-8A	3	0
	7	0
	8	0.2
CA_3A-3A-7A-8A	3	0
	7	0
	8	0.2
CA_3A-7A-7A-8A	3	0
	7	0
	8	0.2
CA_3A-7A-8A	3	0
	7	0
	8	0.2
CA_3A-7A-20A	3	0
	7	0
	20	0
CA_3C-7A-20A	3	0

	7	0
	20	0
CA_3A-7A-26A	3	0
	7	0
	26	0
CA_3A-7A-28A	3	0
	7	0
	28	0
CA_3A-7C-28A	3	0
	7	0
	28	0
CA_3C-7A-28A	3	0
	7	0
	28	0
CA_3C-7C-28A	3	0
	7	0
	28	0
CA_3A-7A-32A	3	0
	7	0
CA_3A-7A-38A	3	0
	7	0
	38	0.2
CA_3A-7A-40A	3	0
	7	0.3
	40	0.8
CA_3A-7A-40C	3	0
	7	0.3
	40	0.8
CA_3A-7A-42A	3	0.2
	7	0.2
	42	0.5
CA_3A-8A-11A	3	0.3
	8	0
	11	0.5
CA_3A-8A-20A	3	0
	8	0
	20	0
CA_3A-8A-28A[11]	3	0
	8	0.2
	28	0.1
CA_3A-8A-40A	3	0
	8	0
	40	0
CA_3A-11A-28A	3	0.3
	11	0.5
	28	0.2
CA_3A-19A-21A	3	0.3
	19	0
	21	0.5
CA_3A-19A-42A	3	0.2
	19	0
	42	0.5
CA_3A-19A-42C	3	0.2
	19	0
	42	0.5
CA_3A-20A-28A	3	0
	20	0.1
	28	0.1
CA_3A-20A-32A	3	0
	20	0
	32	0
CA_3A-20A-42A	3	0.2
	20	0
	42	0.5
CA_3A-21A-	3	0.3

28A	21	0.5
	28	0
CA_3A-21A-42A	3	0.3
	21	0.5
	42	0.5
CA_3A-21A-42C	3	0.3
	21	0.5
	42	0.5
CA_3A-28A-40A	3	0
	28	0
	40	0
CA_3A-28A-40C	3	0
	28	0
	40	0
CA_3A-28A-40D	3	0
	28	0
	40	0
CA_3A-28A-41A	3	0
	28	0
	41	$0^5/0.5^6$
CA_3A-28A-41C	3	0
	28	0
	41	$0^5/0.5^6$
CA_3A-28A-42A	3	0.2
	28	0.2
	42	0.5
CA_3A-28A-42C	3	0.2
	28	0.2
	42	0.5
CA_3A-41A-42A[13]	3	0.5
	41	$0^5/0.5^6$
	42	0.5
CA_3A-41A-42C[13]	3	0.5
	41	$0^5/0.5^6$
	42	0.5
CA_3A-41C-42A[13]	3	0.5
	41	$0^5/0.5^6$
	42	0.5
CA_3A-41C-42C[13]	3	0.5
	41	$0^5/0.5^6$
	42	0.5
CA_4A-5A-12A	4	0
	5	0.5
	12	0.5
CA_4A-5A-12A-12A	4	0
	5	0.5
	12	0.5
CA_4A-5A-12B	4	0
	5	0.5
	12	0.5
CA_4A-4A-5A-12A	4	0
	5	0.5
	12	0.5
CA_4A-5A-13A	4	0
	5	0
	13	0
CA_4A-5A-29A	4	0
	5	0
CA_4A-5A-30A	4	0.4
	5	0
	30	0.5
CA_4A-4A-5A-30A	4	0.4
	5	0
	30	0.5
CA_4A-4A-5B-	4	0.4

30A	5	0
	30	0.5
CA_4A-4A-29A-30A	4	0.4
	30	0.5
CA_4A-5B-30A	4	0.4
	5	0
	30	0.5
CA_4A-7A-12A	4	0.5
	7	0.5
	12	0.5
CA_4A-12A-30A	4	0.4
	12	0.5
	30	0.5
CA_4A-4A-12A-30A	4	0.4
	12	0.5
	30	0.5
CA_4A-29A-30A	4	0.4
	30	0.5
CA_5A-7A-46A	5	0
	7	0
CA_5A-7A-46C	5	0
	7	0
CA_5A-7A-46D	5	0
	7	0
CA_5A-12A-66A	5	0
	12	0.5
	66	0.5
CA_5A-30A-66A	5	0
	30	0.5
	66	0.4
CA_5A-30A-66A-66A	5	0
	30	0.5
	66	0.4
CA_5B-30A-66A	5	0
	30	0.5
	66	0.4
CA_5A-40A-41A	5	0
	40	0
	41	0
CA_7A-8A-20A	7	0
	8	0.2
	20	[0.2]
CA_7A-20A-28A	7	0
	20	0.2
	28	0.2
CA_7A-20A-32A	7	0
	20	0
	32	0
CA_7A-20A-38A	7	0
	20	0
	38	0.2
CA_7A-20A-42A	7	0
	20	0
	42	0.5
CA_8A-11A-28A	8	0.2
	11	0
	28	0.2
CA_8A-28A-41A[14]	8	0.2
	28	0.1
	41	0
CA_12A-30A-66A	12	0.5
	30	0.5
	66	0.4
CA_12A-30A-66A-66A	12	0.5
	30	0.5

	66	0.4
CA_19A-21A-42A	19	0
	21	0
	42	0.5
CA_19A-21A-42C	19	0
	21	0
	42	0.5
CA_21A-28A-42A	21	0
	28	0.2
	42	0.5
CA_21A-28A-42C	21	0
	28	0.2
	42	0.5
CA_28A-41A-42A[9]	28	0.2
	41	0.4[1]
	42	0.5[1]
CA_28A-41A-42C	28	0.2
	41	0.4[8]
	42	0.5[8]
CA_28A-41C-42A	28	0.2
	41	0.4[8]
	42	0.5[8]
CA_28A-41C-42C	28	0.2
	41	0.4[8]
	42	0.5[8]
CA_29A-30A-66A	30	0.5
	66	0.4
CA_29A-46A-66A	66	0

NOTE 1: The above additional tolerances are only applicable for the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

NOTE 2: The above additional tolerances also apply in intra-band and non-aggregated operation for the supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

NOTE 3: Unless otherwise specified, in case the UE supports more than one of the above 3DL inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one 3DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 3DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 3DL carrier aggregation configurations involving such band shall be applied.
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 3DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 3DL CA configurations.

NOTE 4: The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.

NOTE 5: The requirement is specified for the frequency range of 2545-2690MHz.

NOTE 6: The requirement is specified for the frequency range of 2496-2545MHz.

NOTE 7: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 1 or Band 42.

NOTE 8: Only applicable for UE supporting inter-band carrier aggregation with uplink in one E-UTRA band and without simultaneous Rx/Tx on Band 41 and Band 42.

NOTE 9: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx among TDD bands.

NOTE 10: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 1 or Band 8.

NOTE 11: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 3 or Band 8.

NOTE 12: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx among TDD bands.

NOTE 13: Applicable for UE supporting inter-band carrier aggregation without

simultaneous Rx/Tx among TDD bands.
NOTE 14: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 8 or Band 41.
NOTE 15: For UE supporting E-UTRA band 42, 43 or 48 and CA configurations including Band 42, 43 or 48, the applicable $\Delta R_{IB,c}$ in Band 42, 43, or 48 is the max(Band 42 $\Delta R_{IB,c}$, Band 43 $\Delta R_{IB,c}$, Band 48 $\Delta R_{IB,c}$).
NOTE 16: Only applicable for UE supporting inter-band carrier aggregation with the uplink active in Band 8 or Band 11.

Table 7.3.3-1C: $\Delta R_{IB,c}$ (four bands)

Inter-band CA Configuration	E-UTRA Band	$\Delta R_{IB,c}$ [dB]
CA_1A-3A-5A-7A	1	0
	3	0
	5	0
	7	0
CA_1A-3A-5A-7A-7A	1	0
	3	0
	5	0
	7	0
CA_1A-3A-5A-40A	1	0
	3	0
	5	0
	40	0
CA_1A-3A-5A-41A	1	0
	3	0
	5	0
	41	0[6]
		0.5[7]
CA_1A-3A-7A-7A-26A	1	0
	3	0
	7	0
	26	0
CA_1A-3A-7A-8A	1	0
	3	0
	7	0
	8	0.2
CA_1A-3A-7A-20A	1	0
	3	0
	7	0
	20	0
CA_1A-3A-7A-26A	1	0
	3	0
	7	0
	26	0
CA_1A-3A-7A-28A	1	0
	3	0
	7	0
	28	0.2
CA_1A-3A-7C-28A	1	0
	3	0
	7	0
	28	0.2
CA_1A-3A-7A-40A	1	0
	3	0
	7	0.3
	40	0.8
CA_1A-3A-7A-40C	1	0
	3	0
	7	0.3
	40	0.8
CA_1A-3A-7A-42A	1	0.3
	3	0.3
	7	0.3
	42	0.5
CA_1A-3A-8A-11A	1	0
	3	0.3
	8	0
	11	0.5
CA_1A-3A-8A-40A	1	0
	3	0
	8	0
	40	0

CA_1A-3A-19A-21A	1	0
	3	0.3
	19	0
	21	0.5
CA_1A-3A-19A-42A	1	0.2
	3	0.2
	19	0
	42	0.5
CA_1A-3A-19A-42C	1	0.2
	3	0.2
	19	0
	42	0.5
CA_1A-3A-20A-28A	1	0
	3	0
	20	0.2
	28	0.2
CA_1A-3A-20A-42A	1	0.2
	3	0.2
	20	0
	42	0.5
CA_1A-3A-21A-28A	1	0
	3	0.3
	21	0.5
	28	0.2
CA_1A-3A-21A-42A	1	0.2
	3	0.3
	21	0.5
	42	0.5
CA_1A-3A-21A-42C	1	0.2
	3	0.3
	21	0.5
	42	0.5
CA_1A-3A-28A-42A	1	0.2
	3	0.2
	28	0.2
	42	0.5
CA_1A-3A-28A-42C	1	0.2
	3	0.2
	28	0.2
	42	0.5
CA_1A-21A-28A-42A	1	0
	21	0
	28	0.2
	42	0.5
CA_1A-5A-7A-46A	1	0
	5	0
	7	0
CA_1A-5A-7A-46C	1	0
	5	0
	7	0
CA_1A-7A-20A-28A	1	0
	7	0
	20	0.2
	28	0.2
CA_1A-7A-20A-42A	1	0.2
	7	0.2
	20	0.2
	42	0.5
CA_1A-19A-21A-42A	1	0
	19	0
	21	0
	42	0.5
CA_1A-19A-21A-42C	1	0
	19	0
	21	0

	42	0.5
CA_1A-21A-28A-42C	1	0
	21	0
	28	0.2
	42	0.5
CA_2A-2A-5A-12A-66A	2	0.3
	5	0.5
	12	0.5
	66	0.3
CA_2A-2A-5A-30A-66A	2	0.4
	5	0
	30	0.5
	66	0.4
CA_2A-2A-12A-30A-66A	2	0.4
	12	0.5
	30	0.5
	66	0.4
CA_2A-4A-5A-12A	2	0.3
	4	0.3
	5	0.5
	12	0.5
CA_2A-4A-5A-29A	2	0.3
	4	0.3
	5	0
CA_2A-4A-5A-30A	2	0.4
	4	0.4
	5	0
	30	0.5
CA_2A-4A-5B-30A	2	0.4
	4	0.4
	5	0
	30	0.5
CA_2A-4A-7A-12A	2	0.3
	4	0.3
	7	0.5
	12	0.5
CA_2A-4A-12A-30A	2	0.4
	4	0.4
	12	0.5
	30	0.5
CA_2A-4A-29A-30A	2	0.4
	4	0.4
	30	0.5
CA_2A-5A-12A-66A	2	0.3
	5	0.5
	12	0.5
	66	0.3
CA_2A-5A-30A-66A	2	0.4
	5	0
	30	0.5
	66	0.4
CA_2A-5A-30A-66A-66A	2	0.4
	5	0
	30	0.5
	66	0.4
CA_2A-5B-30A-66A	2	0.4
	5	0
	30	0.5
	66	0.4
CA_2A-12A-30A-66A	2	0.4
	12	0.5
	30	0.5
	66	0.4
CA_3A-7A-20A-28A	3	0
	7	0

	20	0.2
	28	0.1
CA_3A-7A-20A-32A	3	0
	7	0
	20	0
	32	0
CA_3A-7A-20A-42A	3	0.2
	7	0.2
	20	0
	42	0.5
CA_3A-19A-21A-42A	3	0.3
	19	0
	21	0.5
	42	0.5
CA_3A-28A-41A-42A	3	0.5
	28	0.2
	41	0.4[5]/0.5[7]
	42	0.5
CA_3A-28A-41A-42C	3	0.5
	28	0.2
	41	0.4[6]/0.5[7]
	42	0.5
CA_3A-28A-41C-42A	3	0.5
	28	0.2
	41	0.4[6]/0.5[7]
	42	0.5

NOTE 1: The above additional tolerances are only applicable for the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.
NOTE 2: The above additional tolerances also apply in intra-band and non-aggregated operation for the supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.
NOTE 3: Tolerances for a UE supporting multiple 4DL inter-band CA configurations are FFS.
NOTE 4: The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.
NOTE 5: For UE supporting E-UTRA band 42, 43 or 48 and CA configurations including Band 42, 43 or 48, the applicable $\Delta R_{IB,c}$ in Band 42, 43, or 48 is the max(Band 42 $\Delta R_{IB,c}$, Band 43 $\Delta R_{IB,c}$, Band 48 $\Delta R_{IB,c}$).
NOTE 6: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz.
NOTE 7: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.

Table 7.3.3-1D: $\Delta R_{IB,c}$ (five bands)

Inter-band CA Configuration	E-UTRA Band	$\Delta R_{IB,c}$ [dB]
CA_1A-3A-7A-20A-28A	1	0
	3	0
	7	0
	20	0.2
	28	0.2
CA_1A-3A-7A-20A-42A	1	0.2
	3	0.2
	7	0.2
	20	0
	42	0.5
NOTE 1: The above additional tolerances are only applicable for the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations. NOTE 2: The above additional tolerances also apply in intra-band and non-aggregated operation for the supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations. NOTE 3: Tolerances for a UE supporting multiple 5DL inter-band CA configurations are FFS. NOTE 4: The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.		

NOTE: The above additional tolerances do not apply to supported UTRA operating bands with frequency range below 1 GHz that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations when such bands are belonging only to band combination(s) where one band is <1GHz and other bands are >1.7GHz and there is no harmonic relationship between the low band UL and high band DL. Otherwise the above additional tolerances also apply to supported UTRA operating bands that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

Table 7.3.3-2: Uplink configuration for reference sensitivity

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Duplex Mode
1			25	50	75	100	FDD
2	6	15	25	50	50[1]	50[1]	FDD
3	6	15	25	50	50[1]	50[1]	FDD
4	6	15	25	50	75	100	FDD
5	6	15	25	25[1]			FDD
6			25	25[1]			FDD
7			25	50	75	75[1]	FDD
8	6	15	25	25[1]			FDD
9			25	50	50[1]	50[1]	FDD
10			25	50	75	100	FDD
11			25	25[1]			FDD
12	6	15	20[1]	20[1]			FDD
13			20[1]	20[1]			FDD
14			15[1]	15[1]			FDD
...							
17			20[1]	20[1]			FDD
18			25	25[1]	25[1]		FDD
19			25	25[1]	25[1]		FDD
20			25	20[1]	20[3]	20[3]	FDD
21			25	25[1]	25[1]		FDD
22			25	50	50[1]	50[1]	FDD
23	6	15	25	50	75	100	FDD
24			25	50			FDD
25	6	15	25	50	50[1]	50[1]	FDD
26	6	15	25	25[1]	25[1]		FDD
27	6	15	25	25[1]			FDD
28		15	25	25[1]	25[1]	25[1]	FDD
30			25	25[1]			FDD
31	6	5[4]	5[4]				FDD
...							
33			25	50	75	100	TDD
34			25	50	75		TDD
35	6	15	25	50	75	100	TDD
36	6	15	25	50	75	100	TDD
37			25	50	75	100	TDD
38			25	50	75	100	TDD
39			25	50	75	100	TDD
40			25	50	75	100	TDD
41			25	50	75	100	TDD
42			25	50	75	100	TDD
43			25	50	75	100	TDD
44		15	25	50	75	100	TDD
45			25	50	75	100	TDD
…							
65	6	15	25	50	75	100	FDD
66	6	15	25	50	75	100	FDD
68			25	25[1]	25[1]		FDD
…							

70			25	50	75		FDD

Note 1: refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).

Note 2: For the UE which supports both Band 11 and Band 21 the uplink configuration for reference sensitivity is FFS.

Note 3: refers to Band 20; in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start}=11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RB_{start}=16.

Note 4: refers to Band 31; in the case of 3 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 9 and in the case of 5 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 10.

Unless given by Table 7.3.3-3, the minimum requirements specified in Tables 7.3.3-1, 7.3.3-1a and 7.3.3-2 shall be verified with the network signalling value NS_01 (Table 6.2.4.3-1) configured.

Table 7.3.3-3: Network Signalling Value for reference sensitivity

E-UTRA Band	Network Signalling value
2	NS_03
4	NS_03
10	NS_03
12	NS_06
13	NS_06
14	NS_06
17	NS_06
19	NS_08
21	NS_09
23	NS_03
30	NS_21
48	NS_27
66	NS_03
70	NS_03

The normative reference for this requirement is TS 36.101 [2] clause 7.3.1.

7.3.4 Test description

7.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in tables 7.3.4.1-1 and 7.3.4.1-2. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2. Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).

Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.

Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).

Table 7.3.4.1-2: Additional Test Configuration Table for Band 70

Initial Conditions					
Test Environment as specified in TS 36.508[7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1			Refer to F_{UL} and F_{DL} in test parameters		
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz, 10MHz		
Test Parameters for Channel Bandwidths					
		Downlink Configuration		**Uplink Configuration**	
Ch BW	**Mod'n**	**F_{DL}**	**RB allocation FDD**	**F_{UL}**	**RB allocation FDD**
5MHz	QPSK	Low	6	Mid	6
5MHz	QPSK	Mid	15	High	15
10MHz	QPSK	Low	25	High	25
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2. The UL allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1). Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used. Note 4: The additional configurations shall verify reference sensitivity requirements with the UE TX-RX frequency separation of 295MHz (table 5.3-1).					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Tables 7.3.4.1-1 and 7.3.4.1-2.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3.4.3.

7.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.3.4.1-1 and 7.3.4.1-2. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3.5-1. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

7.3.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 36.508 [7] subclause 4.6 can be used without exceptions.

7.3.4.3.2 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

7.3.4.3.3 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_06"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

7.3.4.3.4 Message contents exceptions (network signalled value "NS_09")

1. Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.4.3.4-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_09"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	9 (NS_09)		

7.3.4.3.5 Message contents exceptions (network signalled value "NS_08")

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_08"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	8 (NS_08)		

7.3.4.3.6 Message contents exceptions (network signalled value "NS_21")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.4.3.6-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_21"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	21 (NS_21)		

7.3.4.3.7 Message contents exceptions (network signalled value "NS_27")

1. Information element additionalSpectrumEmission is set to NS_27. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3.4.3.7-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_27"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	27 (NS_27)		

7.3.4.3.8 Message contents exceptions (Additional Band 70 test configurations in Table 7.3.4 for Tx-Rx frequency separation of 295 MHz)

1. Information element ul-CarrierFreq is set to UL EARFCN according to the test configuration ID. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the reference sensitivity requirement for a specific deployment scenario using a non-default Tx-Rx frequency separation of 295 MHz.

Table 7.3.4.3.8-1: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "1"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133047 (5 MHz)	Paired Mid Range	

Table 7.3.4.3.8-2: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "2"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133097 (5 MHz)	Paired High Range	

Table 7.3.4.3.8-3: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "3"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133072 (10 MHz)	Paired High Range	

7.3.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.3.5-1 and Table 7.3.5-2.

Table 7.3.5-1: Reference sensitivity QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
2	-102.0	-99.0	-97.3	-94.3	-92.5	-91.3	FDD
3	-101.0	-98.0	-96.3	-93.3	-91.5	-90.3	FDD
4	-104.0	-101	-99.3	-96.3	-94.5	-93.3	FDD
5	-102.5	-99.5	-97.3	-94.3			FDD
6	-	-	-99.3	-96.3			FDD
7	-	-	-97.3	-94.3	-92.5	-91.3	FDD
8	-101.5	-98.5	-96.3	-93.3			FDD
9	-	-	-98.3	-95.3	-93.5	-92.3	FDD
10	-	-	-99.3	-96.3	-94.5	-93.3	FDD
11	-	-	-99.3	-96.3			FDD
12	-101.0	-98.0	-96.3	-93.3			FDD
13			-96.3	-93.3			FDD
14		-	-96.3	-93.3			FDD
...							
17	-	-	-96.3	-93.3			FDD
18	-	-	-99.3[7]	-96.3[7]	-94.5[7]	-	FDD
19	-	-	-99.3	-96.3	-94.5	-	FDD
20			-96.3	-93.3	-90.5	-89.3	FDD
21			-99.3	-96.3	-94.5		FDD
22			-96.0	-93.0	-91.2	-90.0	FDD
23	-104.0	-101	-99.3	-96.3	-94.5	-93.3	FDD
24			-99.3	-96.3			FDD
25	-100.5	-97.5	-95.8	-92.8	-91.0	-89.8	FDD
26	-102	-99	-96.8[6]	-93.8[6]	-92[6]		FDD
27	-102.5	-99.5	-97.3	-94.3			FDD
28		-99.5	-97.8	-94.8	-93.0	-90.3	FDD
30	-	-	-98.3	-95.3	-	-	FDD
31	-98.3	-95.0	-92.8				FDD
...							
33	-	-	-99,3	-96.3	-94.5	-93.3	TDD
34	-	-	-99.3	-96.3	-94.5	-	TDD
35	-105.5	-101.5	-99.3	-96.3	-94.5	-93.3	TDD
36	-105.5	-101.5	-99.3	-96.3	-94.5	-93.3	TDD
37	-	-	-99.3	-96.3	-94.5	-93.3	TDD
38	-	-	-99.3	-96.3	-94.5	-93.3	TDD
39	-	-	-99.3	-96.3	-94.5	-93.3	TDD
40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
43	-	-	-98.0	-95.0	-93.2	-92.0	TDD
44		[-99.5]	[-97.3]	[-94.3]	[-92.5]	[-91.3]	TDD
45	-	-	-99.3	-96.3	-94.5	-93.3	TDD
…							
48			-98.3	-95.3	-93.5	-92.6	TDD
…							
65	-103.5	-100.5	-99.5	-96.5	-94	-92.8	FDD
66	-103.5	-100.5	-98.8	-95.8	-94	-92.8	FDD
…							

70			-99.3	-96.3	-94.5		FDD

Note 1: The transmitter shall be set to maximum output power level (Table 7.3.5-2)
Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
Note 3: The signal power is specified per port
Note 4: For the UE which supports both Band 3 and Band 9 the reference sensitivity level is FFS.
Note 5: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
Note 6: [6] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
Note 7: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

In case the UE supports more than one of the inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL (i.e. bands listed in Table 7.3A.0-0a), then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 7.3.3-1A that would apply for that operating band among the supported CA configurations

NOTE 1: The relation to the received PSD is $\left\langle \mathrm{REF}\,\hat{I}_{or} \right\rangle = P_{REFSENS}\left(N_{sc}^{RB} N_{RB} \Delta f\right)^{-1}$ with N_{RB} is the transmission bandwidth configuration according to Table 5.4.2-1.

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3.5-1 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.5-2.

NOTE 2: Table 7.3.5-2 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3.5-2: Uplink configuration for reference sensitivity, L_{CRB} @ RB_{start} format

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	1.4 MHz / 6	3 MHz / 15	5 MHz / 25	10 MHz / 50	15 MHz / 75	20 MHz / 100	Duplex Mode
1	-	-	25@0	50@0	75@0	100@0	FDD
2	6@0	15@0	25@0	50@0	50@25	50@50	FDD
3	6@0	15@0	25@0	50@0	50@25	50@50	FDD
4	6@0	15@0	25@0	50@0	75@0	100@0	FDD
5	6@0	15@0	25@0	25@25	-	-	FDD
6	-	-	25@0	25@25	-	-	FDD
7	-	-	25@0	50@0	75@0	75@25	FDD
8	6@0	15@0	25@0	25@25	-	-	FDD
9	-	-	25@0	50@0	50@25	50@50	FDD
10	-	-	25@0	50@0	75@0	100@0	FDD
11	-	-	25@0	25@25	-	-	FDD
12	6@0	15@0	20@5	20@30	-	-	FDD
13	-	-	20@0	20@0	-	-	FDD
14	-	-	15@0	15@0	-	-	FDD
...							
17	-	-	20@5	20@30	-	-	FDD
18	-	-	25@0	25@25	25@50	-	FDD
19	-	-	25@0	25@25	25@50	-	FDD
20	-	-	25@0	20@0	20@11	20@16	FDD
21	-	-	25@0	25@25	25@50	-	FDD
22	-	-	25@0	50@0	50@25	50@50	FDD
23	6@0	15@0	25@0	50@0	75@0	100@0	FDD
24	-	-	25@0	50@0	-	-	FDD
25	6@0	15@0	25@0	50@0	50@25	50@50	FDD
26	6@0	15@0	25@0	25@25	25@50	-	FDD
27	6@0	15@0	25@0	25@25	-	-	FDD
28		15@0	25@0	25@25	25@50	25@75	FDD
30	-	-	25@0	25@25	-	-	FDD
31	6@0	5@9	5@10	-	-	-	FDD
…							
33	-	-	25@0	50@0	75@0	100@0	TDD
34	-	-	25@0	50@0	75@0	-	TDD
35	6@0	15@0	25@0	50@0	75@0	100@0	TDD
36	6@0	15@0	25@0	50@0	75@0	100@0	TDD
37	-	-	25@0	50@0	75@0	100@0	TDD
38	-	-	25@0	50@0	75@0	100@0	TDD
39	-	-	25@0	50@0	75@0	100@0	TDD
40	-	-	25@0	50@0	75@0	100@0	TDD
41	-	-	25@0	50@0	75@0	100@0	TDD
42	-	-	25@0	50@0	75@0	100@0	TDD
43	-	-	25@0	50@0	75@0	100@0	TDD
44	-	15@0	25@0	50@0	75@0	100@0	TDD
45	-	-	25@0	50@0	75@0	100@0	TDD
…							
48			25@0	50@0	75@0	100@0	TDD
…							
65	6@0	15@0	25@0	50@0	75@0	100@0	FDD
66	6@0	15@0	25@0	50@0	75@0	100@0	FDD

…							
70			25@0	50@0	75@0		FDD

7.3_1 Reference sensitivity level with 4 Rx antenna ports

7.3_1.1 Test purpose

To verify the ability of UE that supports 4 Rx antenna ports to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3_1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports.

7.3_1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3.3.

7.3_1.4 Test description

7.3_1.4.1 Initial conditions

Same as in clause 7.3.4.1 with following exceptions:

- Instead of Table 7.3.4.1-1→ use Table 7.3_1.4.1-1.
- Instead of Figure A.3→ use Figure A.69.
- Instead of clause 7.3.4.3→ use clause 7.3_1.4.3.

Table 7.3_1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	N/A	QPSK	6	N/A
3MHz	QPSK	15	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	50	N/A
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
15MHz	QPSK	75	N/A	QPSK	75	N/A
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2. Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						

7.3_1.4.2 Test procedure

Same as in clause 7.3.4.2 with following exceptions:

- Instead of Table 7.3.4.1-1→ use Table 7.3_1.4.1-1.
- Instead of Table 7.3.5-1 → use Table 7.3_1.5-1.

7.3_1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

7.3_1.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 36.508 [7] subclause 4.6 can be used without exceptions.

7.3_1.4.3.2 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3_1.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

7.3_1.4.3.3 Message contents exceptions (network signalled value "NS_09")

1. Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3_1.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_09"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	9 (NS_09)		

7.3_1.5 Test requirement

Same as in clause 7.3.5 with the following exceptions:

- Instead of Table 7.3.5-1→ use Table 7.3_1.5-1.

Table 7.3_1.5-1: Reference sensitivity QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
1			-102.0	-99.0	-97.2	-96.0	FDD
2	-104.7	-101.7	-100.0	-97.0	-95.2	-94.0	FDD
3	-103.7	-100.7	-99.0	-96.0	-94.2	-93.0	FDD
…							
7			-100.0	-97.0	-95.2	-94.0	FDD
…							
20			-99.0	-96.0	-93.2	-92.0	FDD
21			-102.0	-99.0	-97.2		FDD
25	-103.2	-100.2	-98.5	-95.5	-93.7	-92.5	FDD
…							
39			-102.0	-99.0	-97.2	-96.0	TDD
40			-102.0	-99.0	-97.2	-96.0	TDD
…							
41			-100.0	-97.0	-95.2	-94.0	TDD
42			-100.2	-97.2	-95.4	-94.2	TDD
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5 NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 NOTE 3: The signal power is specified per port.							

7.3A Reference sensitivity level for CA

Editor's note: The Test Requirements for CA_2A-30A are missing.

7.3A.0 Minimum conformance requirements

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.3-1, Table 7.3.3-1a and Table 7.3.3-2. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active. The uplink resource blocks shall be located as close as possible to the primary downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1). The primary downlink operating band is the downlink band of the active uplink operating band. The UE shall meet the requirements specified in subclause 7.3.3 with the following exceptions.

For the UE that supports any of the E-UTRA CA configurations given in Table 7.3A.0-0a, exceptions to the aforementioned requirements are allowed when the uplink is active in a lower-frequency band and is within a specified frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band as noted in Table 7.3A.0-0a. For these exceptions, the UE shall meet the requirements specified in Table 7.3A.0-0a and Table 7.3A.0-0b.

Table 7.3A.0-0a: Reference sensitivity for carrier aggregation QPSK $P_{REFSENS, CA}$ (exceptions due to harmonic issue)

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A-7A-8A[4]	1			N/A	N/A	N/A	N/A	FDD
	3			N/A	N/A	N/A	N/A	
	7			N/A	N/A	N/A	N/A	
	8			N/A	N/A			
CA_1A-3A-7A-8A[4,5,6]	1			-100	-97	-95.2	-94	FDD
				-102.7[20]	-99.7[20]	-97.9[20]	-96.7[20]	
	3			-97	-94	-92.2	-91	
				-99.7[20]	-96.7[20]	-94.9[20]	-93.7[20]	
	7			-88	-87.4	-87	-86.7	
	8			-96.8	-93.8			
CA_1A-3A-7A-20A-42A[9,10]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	7				-94.8	-93	-91.8	
					-97.5[20]	-95.7[20]	-94.5[20]	
	20			-97	-94	-91.2	-90	
				-99.7[20]	-96.7[20]	-93.9[20]	-92.7[20]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-7A-20A-42A[11]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	7				-94.8	-93	-91.8	
					-97.5[20]	-95.7[20]	-94.5[20]	
	20			-97	-94	-91.2	-90	
				-99.7[20]	-96.7[20]	-93.9[20]	-92.7[20]	
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_1A-3A-7A-28A[5,6]	1			-89.8	-89.4	-89	-88.7	FDD
	3				-94	-92.2	-91	
					-96.7[20]	-94.9[20]	-93.7[20]	
	7				-95	-93.2	-92	
					-97.7[20]	-95.9[20]	-94.7[20]	
	28				-95.3	-93.5	-90.8	
CA_1A-3A-7A-42A[9,10]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	7				-94.8	-93	-91.8	
					-97.5[20]	-95.7[20]	-94.5[20]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-7A-42A[11]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	7				-94.8	-93	-91.8	
					-97.5[20]	-95.7[20]	-94.5[20]	
	42			-97.1	-94.7	-93.2	-92.5	TDD

CA_1A-3A-8A[4]	1			N/A	N/A	N/A	N/A	FDD
	3			N/A	N/A	N/A	N/A	
	8		N/A	N/A	N/A			
CA_1A-3A-8A-11A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[20]	-99.7[20]	-97.9[20]	-96.7[20]	
	3			N/A	N/A	N/A	N/A	
	8			-97	-94			
	11			-100	-97			
CA_1A-3A-8A-40A[4]	1			N/A	N/A	N/A	N/A	FDD
	3			N/A	N/A	N/A	N/A	
	8		N/A	N/A	N/A			
	40			N/A	N/A	N/A	N/A	TDD
CA_1A-3A-19A-42A[9,10]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	19			-100	-97	-95.2		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-19A-42A[11]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	19			-100	-97	-95.2		
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_1A-3A-21A-28A[4,21]	1			N/A	N/A	N/A	N/A	FDD
	3			N/A	N/A	N/A	N/A	
	21			N/A	N/A	N/A		
	28			N/A	N/A			
CA_1A-3A-21A-42A[22,23]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[20]	-96.4[20]	-94.6[20]	-93.4[20]	
	21			-99.5	-96.5	-94.7		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-21A-42A[24]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[20]	-96.4[20]	-94.6[20]	-93.4[20]	
	21			-99.5	-96.5	-94.7		
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_1A-3A-28A-42A[22,23]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	28			-98.3	-95.3			
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-28A-42A[24]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	28			-98.3	-95.3			
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_1A-3A-28A	1			-89.8	-89.4	-89	-88.7	FDD

	3			-97	-94	-92.2	-91	
				-99.7[20]	-96.7[20]	-94.9[20]	-93.7[20]	
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-3A-42A[9,10]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-42A[11]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[20]	-99.5[20]	-97.7[20]	-96.5[20]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_1A-7A-8A[5,6]	1			-100	-97	-95.2	-94	FDD
				-102.7[20]	-99.7[20]	-97.9[20]	-96.7[20]	
	7				-87.4	-87	-86.7	
	8			-96.8	-93.8			
CA_1A-7A-28A[5,6]	1			-89.8	-89.4	-89	-88.7	FDD
	7				-95	-93.2	-92	
					-97.7[20]	-95.9[20]	-94.7[20]	
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-11A-28A[5,6]	1			-89.8	-89.4	-89	-88.7	FDD
	11			-100	-97			
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-11A-28A[9,10]	1			-100	-97	-95.2	-94	FDD
				-102.7[20]	-99.7[20]	-97.9[20]	-96.7[20]	
	11			-75.2	-75.2			
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-18A-28A[14]	1			N/A	N/A	N/A	N/A	FDD
	18			N/A	N/A	N/A		
	28			N/A	N/A			
CA_1A-19A-28A[14]	1			N/A	N/A	N/A	N/A	FDD
	19			N/A	N/A	N/A		
	28			N/A	N/A			
CA_1A-21A-28A[4,21]	1			N/A	N/A	N/A	N/A	FDD
	21			N/A	N/A	N/A		
	28			N/A	N/A			
CA_1A-21A-28A-42A[4,21]	1			N/A	N/A	N/A	N/A	FDD
	21			N/A	N/A	N/A		
	28			N/A	N/A			
	42			N/A	N/A	N/A	N/A	TDD
CA_1A-28A[5,6,14]	1			-89.8	-89.4	-89	-88.7	FDD
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-28A-42A[5,6,17,18]	1			-89.8	-89.4	-89	-88.7	FDD
	28			-98.3	-95.3			
	42			-85.7	-85.4	-85.1	-84.9	TDD
CA_2A-46A[15,16]	2			-70	-67	-65.2	-64	FDD
	46						-90	TDD
CA_2A-4A-12A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[20]	-97.4[20]	-95.6[20]	-94.4[20]	
	4			-90	-89.5	-89	-88.5	
	12			-96.5	-93.5			
CA_2A-4A-5A-12A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[20]	-97.4[20]	-95.6[20]	-94.4[20]	
	4			-90	-89.5	-89	-88.5	
	5			-97.5	-94.5			

	12			-96.5	-93.5			
CA_2A-4A-7A-12A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[20]	-97.4[20]	-95.6[20]	-94.4[20]	
	4			-90	-89.5	-89	-88.5	
	7			-97.5	-94.5	-92.7	-91.5	
				-100.2[20]	-97.2[20]	-95.4[20]	-94.2[20]	
	12			-96.5	-93.5			
CA_2A-4A-12A-30A[5,6]	2			-97.6	-94.6	-92.8	-91.6	FDD
				-100.3[20]	-97.3[20]	-95.5[20]	-94.3[20]	
	4			-90	-89.5	-89	-88.5	
	12			-96.5	-93.5			
	30			-98.5	-95.5			
CA_2A-5A-12A-66A [5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[20]	-97.4[20]	-95.6[20]	-94.4[20]	
	5			-97.5	-94.5			
	12			-96.5	-93.5			
	66			-89.5	-89	-88.5	-88	
CA_2A-12A-66A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[20]	-97.4[20]	-95.6[20]	-94.4[20]	
	12			-96.5	-93.5			
	66			-89.5	-89	-88.5	-88	
CA_3A-7A-8A[4]	3			N/A	N/A	N/A	N/A	FDD
	7			N/A	N/A	N/A	N/A	
	8			N/A	N/A			
CA_3A-7A-8A[4,5,6]	3			-97	-94	-92.2	-91	FDD
				-99.7[20]	-96.7[20]	-94.9[20]	-93.7[20]	
	7			-88	-87.4	-87	-86.7	
	8			-96.8	-93.8			
CA_3A-7A-20A-42A[9,10]	3			-96.8	-93.8	-92	-90.8	FDD
				[-99.5][20]	[-96.5][20]	[-94.7][20]	[-93.5][20]	
	7			-97.8	-94.8	-93	-91.8	
				-100.5[20]	-97.5[20]	-95.7[20]	-94.5[20]	
	20			-97	-94	-91.2	-90	
				-99.7[20]	-96.7[20]	-93.9[20]	-92.7[20]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-7A-20A-42A[11]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	7			-97.8	-94.8	-93	-91.8	
				-100.5[20]	-97.5[20]	-95.7[20]	-94.5[20]	
	20			-97	-94	-91.2	-90	
				-99.7[20]	-96.7[20]	-93.9[20]	-92.7[20]	
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-7A-42A[9,10]	3			-96.8	-93.8	-92	-90.8	FDD
				[-99.5][20]	[-96.5][20]	[-94.7][20]	[-93.5][20]	
	7			-97.8	-94.8	-93	-91.8	
				-100.5[20]	-97.5[20]	-95.7[20]	-94.5[20]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-7A-42A[11]	3			-96.8	-93.8	-92	-90.8	FDD
				[-99.5][20]	[-96.5][20]	[-94.7][20]	[-93.5][20]	
	7			-97.8	-94.8	-93	-91.8	
				-100.5[20]	-97.5[20]	-95.7[20]	-94.5[20]	
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-8A[4]	3			N/A	N/A	N/A	N/A	FDD
	8		N/A	N/A	N/A			
CA_3A-8A-11A[4]	3			N/A	N/A	N/A	N/A	FDD

	8			N/A	N/A			
	11			N/A	N/A			
CA_3A-11A-28A[9,10]	3			-96.7	-93.7	-91.9	-90.7	FDD
				-99.4[20]	-96.4[20]	-94.6[20]	-93.4[20]	
	11			-75.2	-75.2			
	28			-98.3	-95.3	-93.5	-90.8	
CA_3A-19A-21A-42A[25,26]	3			-96.7	-93.7	-91.9	-90.7	FDD
				-99.4[20]	-96.4[20]	-94.6[20]	-93.4[20]	
	19			-100	-97	-95.2		
	21			-99.5	-96.5	-94.7		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-19A-21A-42A[27]	3			-96.7	-93.7	-91.9	-90.7	FDD
				-99.4[20]	-96.4[20]	-94.6[20]	-93.4[20]	
	19			-100	-97	-95.2		
	21			-99.5	-96.5	-94.7		
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-19A-42A[9,10]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	19			-100	-97	-95.2		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-19A-42A[11]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	19			-100	-97	-95.2		
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-20A-42A[9,10]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	20			-97	-94	-91.2	-90	
				-99.7[11]	-96.7[11]	-93.9[11]	-92.7[11]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-20A-42A[11]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	20			-97	-94	-91.2	-90	
				-99.7[20]	-96.7[20]	-93.9[20]	-92.7[20]	
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-21A-28A[4,21]	3			N/A	N/A	N/A	N/A	FDD
	21			N/A	N/A	N/A		
	28			N/A	N/A			
CA_3A-21A-42A[1,2]	3			-96.7	-93.7	-91.9	-90.7	FDD
				-99.4[4]	-96.4[4]	-94.6[4]	-93.4[4]	
	21			-99.5	-96.5	-94.7		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-21A-42A[3]	3			-96.7	-93.7	-91.9	-90.7	FDD
				-99.4[4]	-96.4[4]	-94.6[4]	-93.4[4]	
	21			-99.5	-96.5	-94.7		
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-28A-40A[15,16]	3			-97	-94	-92.2	-91	FDD
				-99.7[20]	-96.7[20]	-94.9[20]	-93.7[20]	
	28			-60.7	-60.7	-60.7	-60.7	
	40			-100	-97	-95.2	-94	TDD
CA_3A-28A-41A-42A[9,10,29]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[20]	-96.2[20]	-94.4[20]	-93.2[20]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD

					-97.2[20]	-95.4[20]	-94.2[20]	
	42				-71.7	-71.7	-71.7	
CA_3A-28A-41A-42A[11,29]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[20]	-96.2[20]	-94.4[20]	-93.2[20]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD
					-97.2[20]	-95.4[20]	-94.2[20]	
	42				-94.7	-93.2	-92.5	
CA_3A-28A-41A-42A[17,18, 29]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[20]	-96.2[20]	-94.4[20]	-93.2[20]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD
					-97.2[20]	-95.4[20]	-94.2[20]	
	42				-85.4	-85.1	-84.9	
CA_3A-28A-42A[9,10]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	28			-98.3	-95.3			
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-28A-42A[11]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[6]	-96.56 [6]	-94.7[6]	-93.5[6]	
	28			-98.3	-95.3			
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-28A-42A[17,18]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	28			-98.3	-95.3			
	42			-85.7	-85.4	-85.1	-84.9	TDD
CA_3A-31A[12,13]	3			-86.9	-86.4	-86	-85.6	FDD
	31		-95.5	-93.3				
CA_3A-42A[9,10]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-42A[11]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[20]	-96.5[20]	-94.7[20]	-93.5[20]	
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_4A-5A-12A[5,6]	4			-90	-89.5	-89	-88.5	FDD
	5			-97.5	-94.5			
	12			-96.5	-93.5			
CA_4A-7A-12A[5,6]	4			[-90]	[-89.5]	[-89]	[-88.5]	FDD
	7			-97.5	-94.5			
				-100.2[20]	-97.2[20]			
	12			-96.5	-93.5			
CA_4A-12A[5,6]	4	-89.2	-89.2	-90	-89.5	-89	-88.5	FDD
	12		-98.2	- 96.5	- 93.5			
CA_4A-12A-30A[5,6]	4			-90	-89.5	-89	-88.5	FDD
	12			-96.5	-93.5			
	30			-98.5	-95.5			
CA_4A-17A[5,6]	4			-90	-89.5			FDD
	17			-96.5	-93.5			
CA_4A-28A[5,6]	4			-89.8	-89.4	-89	-88.7	FDD
	28			-98.3	-95.3	-93.5	-90.8	
CA_5A-12A-66A[5,6]	5			-97.5	-94.5			FDD
	12			-96.5	-93.5			
	66			-90	-89.5	-89	-88.5	
CA_5A-38A[19]	5			N/A	N/A			FDD

	38			N/A	N/A	N/A	N/A	TDD
CA_5A-41A[8]	5			N/A	N/A			FDD
	41						N/A	TDD
CA_5A-40A-41A[8]	5			N/A	N/A			FDD
	40				N/A	N/A	N/A	TDD
	41						N/A	
CA_7A-8A[5,6]	7			-88	-87.4	-87	-86.7	FDD
	8		-99	-96.8	-93.8			
CA_7A-8A-20A[5,6]	7				-87.4	-87	-86.7	FDD
	8		-99	-96.8	-93.8			
	20			[-96.8]	[-93.8]			
				[-99.5][20]	[-96.5][20]			
CA_7A-20A-38A[19]	7				N/A	N/A	N/A	FDD
	20			N/A	N/A	N/A	N/A	
	38			N/A	N/A	N/A	N/A	TDD
CA_8A-28A-41A[28]	8			N/A	N/A			FDD
	28			N/A	N/A	N/A	N/A	
	41			N/A	N/A	N/A	N/A	TDD
CA_8A-41A[8]	8	N/A	N/A	N/A	N/A			FDD
	41			N/A	N/A	N/A	N/A	TDD
CA_8A-42A[12,13]	8	-102	-99	-96.8	-93.8			FDD
	42			-84.8	-84.7	-84.6	-84.5	TDD
CA_11A-28A[9,10]	11			-75.2	-75.2			FDD
	28			-98.3	-95.3	-93.5	-90.8	FDD
CA_12A-30A-66A[5,6]	12			-96.5	-93.5			FDD
	30			-98.5	-95.5			
	66			-89.5	-89	-88.5	-88	
CA_12A-66A[5,6]	12		-98.2	-96.5	-93.5			FDD
	66	-88.7	-88.7	-89.5	-89	-88.5	-88	
CA_20A-38A[19]	20			N/A	N/A	N/A	N/A	FDD
	38			N/A	N/A	N/A	N/A	TDD
CA_20A-40A[15,16]	20			-60.7	-60.7	-60.7	-60.7	FDD
	40			-100	-97	-95.2	-94	TDD
CA_20A-42A[12,13], CA_20A-42A-42A[12,13]	20			-97	-94	-91.2	-90	FDD
	42			-84.8	-84.7	-84.6	-84.5	TDD
CA_21A-28A[4,21]	21			N/A	N/A	N/A		FDD
	28			N/A	N/A			
CA_21A-28A-42A[4,21]	21			N/A	N/A	N/A	N/A	FDD
	28			N/A	N/A	N/A		
	42			N/A	N/A			TDD
CA_26A-41A[8]	26			N/A	N/A	N/A		FDD
	41			N/A	N/A	N/A	N/A	TDD
CA_28A-40A[15,16]	28			-60.7	-60.7	-60.7	-60.7	FDD
	40			-100	-97	-95.2	-94	TDD
CA_28A-41A-42A[17,18]	28			-98.3	-95.3			FDD
	41				-94.6	-92.8	-91.6	TDD
	42				-85.4	-85.1	-84.9	
CA_28A-42A[17,18]	28			-98.3	-95.3	-93.5	-92.3	FDD
	42			-85.7	-85.4	-85.1	-84.9	TDD

Note 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
Note 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
Note 3: The signal power is specified per port
Note 4: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity is only verified when this is not the case (the requirements specified in clause 7.3.3 apply unless otherwise specified).

Note 5: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band.

Note 6: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} the carrier frequency of a high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the low band.

NOTE 7: Void.

NOTE 8: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity is only verified when this is not the case (the requirements specified in clause 7.3.3 apply).

NOTE 9: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the E-UTRA configuration: ΔF_{HD} = 10 MHz for CA_3A-42A, CA_1A-3A-42A, CA_3A-19A-42A, CA_1A-3A-19A-42A and CA_3A-28A-41A-42A. ΔF_{HD} = 0MHz for CA_11A-28A.

NOTE 10: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.

NOTE 11: The requirements are only applicable to channel bandwidths with a carrier frequency at $\pm(20 + BW_{Channel}^{HB} / 2)$ MHz offset from $2 f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.

NOTE 12: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 4th transmitter harmonic is within the downlink transmission bandwidth of a high band.

NOTE 13: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.4 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} the carrier frequency of a high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the low band.

NOTE 14: For the UE that supports CA_1A-18A-28A or CA_1A-19A-28A, no requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity should only be verified when this is not the case (the requirements specified in clause 7.3 apply).

NOTE 15: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3rd harmonic is within the uplink transmission bandwidth or the uplink adjacent channel's transmission bandwidth of an aggressor (higher) band.

NOTE 16: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{LB} the carrier frequency in the victim (lower) band and $BW_{Channel}^{HB}$ the channel bandwidth configured in the higher band.

NOTE 17: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 5th transmitter harmonic is within the downlink transmission bandwidth of a high band.

NOTE 18: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.5 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} the carrier frequency of a high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the low band.

NOTE 19: No requirements apply for the case that there is at least one individual RE within the uplink transmission bandwidth of the relative higher band and when the frequency range of relative higher band's uplink channel bandwidth or uplink 1st adjacent channel bandwidth is fully or partially overlapped with the 3 times of the frequency range of the relative lower band's downlink channel bandwidth. The reference sensitivity is only verified when this is not the case (the requirements specified in clause 7.3.1 apply).

NOTE 20: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

NOTE 21: No requirements apply when there is at least one individual RE on band 28 uplink outside frequencies 728 – 738 MHz. The reference sensitivity is only verified when all configured RE's are confined within frequencies 728 – 738 MHz (the requirements specified in clause 7.3 apply).

NOTE 22: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the E-UTRA configuration: ΔF_{HD} = 10 MHz for CA_1A-3A-21A-42A.

NOTE 23: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} carrier frequency in

the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.

NOTE 24: The requirements are only applicable to channel bandwidths with a carrier frequency at $\pm\left(20+BW_{Channel}^{HB}/2\right)$ MHz offset from $2\,f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB}+BW_{Channel}^{LB}/2<f_{UL}^{LB}<F_{UL_high}^{LB}-BW_{Channel}^{LB}/2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.

NOTE 25: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the E-UTRA configuration: ΔF_{HD} = 10 MHz for CA_3A-19A-21A-42A.

NOTE 26: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB}=\lfloor f_{DL}^{HB}/0.2\rfloor 0.1$ in MHz and $F_{UL_low}^{LB}+BW_{Channel}^{LB}/2<f_{UL}^{LB}<F_{UL_high}^{LB}-BW_{Channel}^{LB}/2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.

NOTE 27: The requirements are only applicable to channel bandwidths with a carrier frequency at $\pm\left(20+BW_{Channel}^{HB}/2\right)$ MHz offset from $2\,f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB}+BW_{Channel}^{LB}/2<f_{UL}^{LB}<F_{UL_high}^{LB}-BW_{Channel}^{LB}/2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.

NOTE 28: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of Band 8 for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of Band 41. The reference sensitivity is only verified when this is not the case (the requirements specified in clause 7.3 apply).

NOTE 29: The B41 requirements are modified by -0.1dB when carrier frequency of the assigned E-UTRA channel bandwidth is within 2545-2690 MHz.

Table 7.3A.0-0b: Uplink configuration for the low band (exceptions due to harmonic issue)

E-UTRA Band / Channel bandwidth of the high band / NRB / Duplex mode								
EUTRA CA Configuration	**UL band**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex mode**
CA_1A-3A-7A-8A	8				16	25	25	FDD
CA_1A-3A-7A-20A-42A	3			12	25	36	50	FDD
CA_1A-3A-7A-28A	28				16	25	25	FDD
CA_1A-3A-7A-42A	3			12	25	36	50	FDD
CA_1A-3A-8A-11A	8			8	16	25	25	FDD
CA_1A-3A-19A-42A	3			12	25	36	50	FDD
CA_1A-3A-28A	28			8	16	25	25	FDD
CA_1A-3A-42A	3			12	25	36	50	FDD
CA_1A-3A-21A-42A	3			12	25	36	50	FDD
CA_1A-3A-28A-42A	3			12	25	36	50	FDD
CA_1A-7A-8A	8				16	25	25	FDD
CA_1A-7A-28A	28			8	16	25	25	FDD
CA_1A-11A-28A	28			8	16	25	25	FDD
CA_1A-11A-28A	28			12	25			FDD
CA_1A-28A	28			8	16	25	25	FDD
CA_1A-28A-42A	28			8	16	25	25	FDD
CA_2A-46A	46						100	TDD
CA_2A-4A-12A	12			8	16	20	20	FDD
CA_2A-4A-5A-12A	12			8	16			FDD
CA_2A-4A-7A-12A	12			8	16			FDD
CA_2A-4A-12A-30A	12			8	16			FDD
CA_2A-5A-12A-66A	12			8	16	20	20	FDD
CA_2A-12A-66A	12			8	16			FDD
CA_3A-7A-8A	8			8	16	25	25	FDD
CA_3A-7A-20A-42A	3			12	25	36	50	FDD
CA_3A-7A-42A	3			12	25	36	50	FDD
CA_3A-11A-28A	28			12	25			FDD
CA_3A-19A-42A	3			12	25	36	50	FDD
CA_3A-19A-21A-42A	3			12	25	36	50	FDD
CA_3A-20A-42A	3			12	25	36	50	FDD
CA_3A-21A-42A	3			12	25	36	50	FDD
CA_3A-28A-40A	40			25	50	75	100	TDD
CA_3A-28A-41A-42A	3				25	36	50	FDD
CA_3A-28A-41A-42A	28				10	15	20	FDD
CA_3A-31A	31			5	5	5	5	FDD
CA_3A-42A	3			12	25	36	50	FDD
CA_4A-5A-12A	12			8	16	20	20	FDD
CA_4A-7A-12A	12			8	16	20	20	FDD
CA_4A-12A	12	2	5	8	16	20	20	FDD
CA_4A-12A-30A	12			8	16			FDD
CA_4A-17A	17			8	16			FDD
CA_4A-28A	28			[8]	[16]	[25]	[25]	FDD
CA_5A-12A-66A	12			8	16	20	20	FDD
CA_7A-8A	8			8	16	25	25	FDD
CA_7A-8A-20A	8				16	25	25	FDD
CA_8A-42A	8			8	16	25	25	FDD
CA_11A-28A	28			12	25			FDD
CA_12A-30A-66A	12			8	16			FDD
CA_12A-66A	12	2	5	8	16	20	20	FDD

CA_20A-40A[3]	40			25	50	75	100	FDD
CA_20A-42A, CA_20A-42A-42A	20			8	16	25	25	FDD
CA_28A-40A	40			25	50	75	100	TDD
CA_28A-41A-42A	28				10	15	20	FDD
CA_28A-42A	28			5	10	15	20	FDD

Note 1: refers to the UL resource blocks, which shall be centred within the transmission bandwidth configuration for the channel bandwidth
Note 2: the UL configuration applies regardless of the channel bandwidth of the low band unless the UL resource blocks exceed that specified in Table 7.3.3-2 for the uplink bandwidth in which case the allocation according to Table 7.3.3-2 applies.
Note 3: refers to the UL resource blocks shall be located between 2373-2400MHz.

For the UE that supports any of the E-UTRA CA configurations given in Table 7.3A.0-0bA, exceptions are allowed when the uplink is active within a specified frequency range as noted in Table 7.3A.0-0bA. For these exceptions, the UE shall meet the requirements specified in Table 7.3A.0-0bA and Table 7.3A.0-0bB.

Table 7.3A.0-0bA: Reference sensitivity for carrier aggregation QPSK $P_{REFSENS, CA}$ (exceptions for two bands due to close proximity of UL to DL channel)

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[8]	-99.7[8]	-97.9[8]	-96.7[8]	
	3		[-95.7]	-94	-91.5	-90	-89	
CA_1A-3A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[8]	-99.7[8]	-97.9[8]	-96.7[8]	
	3		-98.7	-97	-94	-92.2	-91	
			-101.4	-99.7[8]	-96.7[8]	-94.9[8]	-93.7[8]	
CA_1A-3A-3A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[8]	-99.7[8]	-97.9[8]	-96.7[8]	
	3			-94	-91.5	-90	-89	
CA_1A-3A-3A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[8]	-99.7[8]	-97.9[8]	-96.7[8]	
	3			-97	-94	-92.2	-91	
				-99.7[8]	-96.7[8]	-94.9[8]	-93.7[8]	
CA_1A-3C[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[8]	-99.7[8]	-97.9[8]	-96.7[8]	
	3			-94	-91.5	-90	-89	
CA_1A-3C[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[8]	-99.7[8]	-97.9[8]	-96.7[8]	
	3			-97	-94	-92.2	-91	
				-99.7[8]	-96.7[8]	-94.9[8]	-93.7[8]	
CA_1C-3A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[8]	-99.7[8]	-97.9[8]	-96.7[8]	
	3			-94	-91.5	-90	-89	
CA_1C-3A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[8]	-99.7[8]	-97.9[8]	-96.7[8]	
	3			-97	-94	-92.2	-91	
				-99.7[8]	-96.7[8]	-94.9[8]	-93.7[8]	
CA_18A-28A[6]	18			-100	-97	-95.2		FDD
	28			-94	-92.5			
CA_19A-28A[7]	19			-100	-97	-95.2		FDD
	28			-94	-92			

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: The signal power is specified per port
NOTE 4: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in Band 3, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 5: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in Band 3, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 6: These requirements apply when the uplink is active in Band 18 and the downlink channels in Band 28 are confined within the restricted frequency range specified for this CA configuration (Table 5.2A-2). For each channel bandwidth in Band 28, the requirement applies regardless of channel bandwidth in Band 18.
NOTE 7: These requirements apply when the uplink is active in Band 19 and the downlink channels in Band 28 are allocated at the middle of the restricted frequency range specified for this CA configuration (Table 5.2A-2). For each channel bandwidth in Band 28, the requirement applies regardless of channel bandwidth in Band 19.
NOTE 8: Applicable only if operation with 4 antenna ports is supported in the band with carrier

aggregation configured.

Table 7.3A.0-0bB: Uplink configuration for the uplink band (exceptions for two bands due to close proximity of UL to DL channel)

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode								
EUTRA CA Configuration	**UL band**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex mode**
CA_1A-3A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A[1, 3]	1			25	45	45	45	FDD
CA_1A-3C[1, 2]	1			25	25	25	25	FDD
CA_1A-3C[1, 3]	1			25	45	45	45	FDD
CA_1C-3A[1, 2]	1			25	25	25	25	FDD
CA_1C-3A[1, 3]	1			25	45	45	45	FDD
CA_18A-28A[4]	18			18	18			FDD
CA_19A-28A[4]	19			18	18			FDD

NOTE 1: refers to the UL resource blocks shall be located as close as possible to the downlink channel in Band 3 but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1) in the uplink channel in Band 1.
NOTE 2: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz
NOTE 3: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz.
NOTE 4: refers to the UL resource blocks shall be located as close as possible to the downlink channel in Band 28 but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).

For the UE that supports any of the E-UTRA CA configurations given in Table 7.3A.0-0bC, exceptions are allowed when the uplink is active within a specified frequency range as noted in Table 7.3A.0-0bC. For these exceptions, the UE shall meet the requirements specified in Table 7.3A.0-0bC and Table 7.3A.0-0bD.

Table 7.3A.0-0bC: Reference sensitivity for carrier aggregation QPSK $P_{REFSENS, CA}$ (exceptions for three bands due to close proximity of UL to DL channel)

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A-5A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	5			-98	-95			
CA_1A-3A-5A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	5			-98	-95			
CA_1A-3C-5A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	5			-98	-95			
CA_1A-3C-5A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	5			-98	-95			
CA_1A-3A-7A[9]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	7				-95	-93.2	-92	
					-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-3A-7A[10]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	7				-95	-93.2	-92	
					-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-3A-7A-7A	1			-100	-97	-95.2	-94	FDD
	3[9]			-94	-91.5	-90	-89	
	3[10]			-97	-94	-92.2	-91	
	7				-95	-93.2	-92	
					-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-3A-7C[9]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3				-91.5	-90	-89	
	7				-95	-93.2	-92	
					-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-3A-7C[10]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3				-94	-92.2	-91	
					-96.7[11]	-94.9[11]	-93.7[11]	
	7				-95	-93.2	-92	
					-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-3C-7C	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3[9]			-94	-91.5	-90	-89	

	3[10]			-97	-94	-92.2	-91	
	7				-95	-93.2	-92	
					-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-3A-8A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	8		-99.2	-97	-94			
CA_1A-3A-8A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	8		-99.2	-97	-94			
CA_1A-3A-3A-8A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	8		-99.2	-97	-94			
CA_1A-3A-3A-8A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	8		-99.2	-97	-94			
CA_1A-3C-8A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	8		-99.2	-97	-94			
CA_1A-3C-8A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	8		-99.2	-97	-94			
CA_1A-3A-11A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	11			-100	-97			
CA_1A-3A-11A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	11			-100	-97			
CA_1A-3A-19A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	19			-100	-97	-95.2		
CA_1A-3A-19A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	19			-100	-97	-95.2		
CA_1A-3A-20A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	20			-97	-94	-91.2	-90	
				-99.7[11]	-96.7[11]	-93.9[11]	-92.7[11]	

CA_1A-3A-20A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	20			-97	-94	-91.2	-90	
				-99.7[11]	-96.7[11]	-93.9[11]	-92.7[11]	
CA_1A-3A-21A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	21			-100	-97	-95.2		
CA_1A-3A-21A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	21			-100	-97	-95.2		
CA_1A-3A-26A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	26			-97.5[7]	-94.5[7]			
CA_1A-3A-26A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	26			-97.5[7]	-94.5[7]			
CA_1A-3A-28A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-3A-28A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-3C-28A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-94	-91.5	-90	-89	
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-3C-28A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	28			-98.3	-95.3	-93.5	-90.8	
CA_1A-3A-42A[4]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[11]	-99.5[11]	-97.7[11]	-96.5[11]	
	3			-93.8	-91.3	-89.8	-88.8	
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-3A-42A[5]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[11]	-99.5[11]	-97.7[11]	-96.5[11]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]	

CA_1A-3A-42C[4]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[11]	-99.5[11]	-97.7[11]	-96.5[11]	
	3			-93.8	-91.3	-89.8	-88.8	
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-3A-42C[5]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[11]	-99.5[11]	-97.7[11]	-96.5[11]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]	
CA_1A-18A-28A[6]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	18			-100	-97	-95.2		
	28			-94	-92.5			
CA_1A-19A-28A[8]	1			-100	-97	-95.2	-94	FDD
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]	
	19			-100	-97	-95.2		
	28			-94	-92			

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5.3.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: The signal power is specified per port
NOTE 4: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in the Bands other than Band 1, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 5: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in the Bands other than Band 1, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 6: These requirements apply when the uplink is active in Band 18 and the downlink channels in Band 28 are confined within the restricted frequency range specified for this CA configuration (Table 5.2A-2). For each channel bandwidth in Band 28, the requirement applies regardless of channel bandwidth in Band 18.
NOTE 7: [7] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 8: These requirements apply when the uplink is active in Band 19 and the downlink channels in Band 28 are allocated at the middle of the restricted frequency range specified for this CA configuration (Table 5.2A-2). For each channel bandwidth in Band 28, the requirement applies regardless of channel bandwidth in Band 19.
NOTE 9: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in Band 3 and Band 7, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 10: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in Band 3 and Band 7, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 11: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

Table 7.3A.0-0bD: Uplink configuration for the uplink band (exceptions for three bands due to close proximity of UL to DL channel)

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode								
EUTRA CA Configuration	**UL band**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex mode**
CA_1A-3A-5A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-5A[1, 3]	1			25	45	45	45	FDD
CA_1A-3C-5A[1, 2]	1			25	25	25	25	FDD
CA_1A-3C-5A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-7A[**1, 2**]	1			25	25	25	25	FDD
CA_1A-3A-7A[**1, 3**]	1			25	45	45	45	FDD
CA_1A-3A-7A-7A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-7A-7A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-7C[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-7C[1, 3]	1			25	45	45	45	FDD
CA_1A-3C-7C[1, 2]	1			25	25	25	25	FDD
CA_1A-3C-7C[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-8A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-8A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-3A-8A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-3A-8A[1, 3]	1			25	45	45	45	FDD
CA_1A-3C-8A[1, 2]	1			25	25	25	25	FDD
CA_1A-3C-8A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-19A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-19A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-20A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-20A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-21A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-21A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-26A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-26A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-28A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-28A[1, 3]	1			25	45	45	45	FDD
CA_1A-3C-28A[1, 2]	1			25	25	25	25	FDD
CA_1A-3C-28A[1, 3]	1			25	45	45	45	FDD

CA_1A-3A-42A[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-42A[1, 3]	1			25	45	45	45	FDD
CA_1A-3A-42C[1, 2]	1			25	25	25	25	FDD
CA_1A-3A-42C[1, 3]	1			25	45	45	45	FDD
CA_1A-18A-28A[4]	18			18	18			FDD
CA_1A-19A-28A[4]	19			18	18			FDD

NOTE 1: refers to the UL resource blocks shall be located as close as possible to the downlink channel in Band 3 but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1) in the uplink channel in Band 1.
NOTE 2: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz.
NOTE 3: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz.
NOTE 4: refers to the UL resource blocks shall be located as close as possible to the downlink channel in Band28 but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1).

For the UE that supports any of the E-UTRA CA configurations given in Table 7.3A.0-0bD1, exceptions are allowed when the uplink is active within a specified frequency range as noted in Table 7.3A.0-0bD1. For these exceptions, the UE shall meet the requirements specified in Table 7.3A.0-0bD1 and Table 0bD1.

Table 7.3A.0-0bD1: Reference sensitivity for carrier aggregation QPSK $P_{REFSENS, CA}$ (exceptions for four bands due to close proximity of UL to DL channel)

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A-5A-7A	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3[4]				-91.5	-90	-89	
	3[5]				-94	-92.2	-91	
					-96.7[6]	-94.9[6]	-93.7[6]	
	5			-98	-95			
	7				-95	-93.2	-92	
					-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-5A-7A-7A	1			-100	-97	-95.2	-94	FDD
	3[4]				-91.5	-90	-89	
	3[5]				-94	-92.2	-91	
					-96.7[6]	-94.9[6]	-93.7[6]	
	5			-98	-95			
	7				-95	-93.2	-92	
					-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-5A-40A	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3[4]			-94	-91.5	-90	-89	
	3[5]			-97	-94	-92.2	-91	
				-99.7[6]	-96.7[6]	-94.9[6]	-93.7[6]	
	5			-98	-95			
	40				-91.9	-90.4	-89.4	TDD
CA_1A-3A-7A-8A	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3[4]			-94	-91.5	-90	-89	
	3[5]			-97	-94	-92.2	-91	
				-99.7[6]	-96.7[6]	-94.9[6]	-93.7[6]	
	7				-95	-93.2	-92	
					-97.7[6]	-95.9[6]	-94.7[6]	
	8			-96.8	-93.8			
CA_1A-3A-7A-20A	1			-100	-97	-95.2	-94	FDD
	3[4]			-94	-91.5	-90	-89	
	3[5]			-97	-94	-92.2	-91	
				-99.7[6]	-96.7[6]	-94.9[6]	-93.7[6]	
	7				-95	-93.2	-92	
					-97.7[6]	-95.9[6]	-94.7[6]	
	20			-97	-94	-91.2	-90	
				-99.7[20]	-96.7[20]	-93.9[20]	-92.7[20]	
CA_1A-3A-7A-28A	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3[4]				[-91.5]	[-90]	[-89]	
	3[5]				-94	-92.2	-91	
	7				-95	-93.2	-92	
					-97.7[6]	-95.9[6]	-94.7[6]	
	28				-95.3	-93.5	-90.8	
CA_1A-3A-7C-28A	1			-100	-97	-95.2	-94	FDD

				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3[4]				[-91.5]	[-90]	[-89]	
	3[5]				-94	-92.2	-91	
					-96.7[6]	-94.9[6]	-93.7[6]	
	7				-95	-93.2	-92	
					-97.7[6]	-95.9[6]	-94.7[6]	
	28				-95.3	-93.5	-90.8	
CA_1A-3A-7A-42A	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3[4]			-93.8	-91.3	-89.8	-88.8	
	3[5]			-96.8	-93.8	-92	-90.8	
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	7				-94.8	-93	-91.8	
					-97.5[6]	-95.7[6]	-94.5[6]	
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-8A-11A	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3[4]			-94	-91.5	-90	-89	
	3[5]			-97	-94	-92.2	-91	
				-99.7[6]	-96.7[6]	-94.9[6]	-93.7[6]	
	8			-97	-94			
	11			-100	-97			
CA_1A-3A-8A-40A	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3[4]			-94	-91.5	-90	-89	
	3[5]			-97	-94	-92.2	-91	
				-99.7[6]	-96.7[6]	-94.9[6]	-93.7[6]	
	8		-99.2	-97	-94			
	40			[-93.4]	-91.9	-90.4	-89.4	TDD
CA_1A-3A-19A-21A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3			-93.7	-91.2	-89.7	-88.7	
	19			-100	-97	-95.2		
	21			-99.5	-96.5	-94.7		
CA_1A-3A-19A-21A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[6]	-96.4[6]	-94.6[6]	-93.4[6]	
	19			-100	-97	-95.2		
	21			-99.5	-96.5	-94.7		
CA_1A-3A-19A-42A	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3[4]			-93.8	-91.3	-89.8	-88.8	
	3[5]			-96.8	-93.8	-92	-90.8	
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	19			-100	-97	-95.2		
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-	-97.7[6]	-95.9[6]	-94.7[6]	

				100.7[6]				
CA_1A-3A-19A-42C	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3[4]			-93.8	-91.3	-89.8	-88.8	
	3[5]			-96.8	-93.8	-92	-90.8	
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	19			-100	-97	-95.2		
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-20A-42A	1			-99.8	-96.8	-95	-93.8	FDD
	3[4]			-93.8	-91.3	-89.8	-88.8	
	3[5]			-96.8	-93.8	-92	-90.8	
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	20			-97	-94	-91.2	-90	
				-99.7[6]	-96.7[6]	-93.9[6]	-92.7[6]	
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-21A-28A[4]	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3			-93.7	-91.2	-89.7	-88.7	
	21			-99.5	-96.5	-94.7		
	28			-98.3	-95.3			
CA_1A-3A-21A-28A[5]	1			-100	-97	-95.2	-94	FDD
				-102.7[6]	-99.7[6]	-97.9[6]	-96.7[6]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[6]	-96.4[6]	-94.6[6]	-93.4[6]	
	21			-99.5	-96.5	-94.7		
	28			-98.3	-95.3			
CA_1A-3A-21A-42A[4]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3			-93.7	-91.2	-89.7	-88.7	
	21			-99.5	-96.5	-94.7		
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-21A-42A[5]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[6]	-96.4[6]	-94.6[6]	-93.4[6]	
	21			-99.5	-96.5	-94.7		
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-21A-42C	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3[4]			-93.7	-91.2	-89.7	-88.7	
	3[5]			-96.7	-93.7	-91.9	-90.7	
				-99.4[6]	-96.4[6]	-94.6[6]	-93.4[6]	
	21			-99.5	-96.5	-94.7		

	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-28A-42A[4]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3			-93.8	-91.3	-89.8	-88.8	
	28			-98.3	-95.3			
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-28A-42A[5]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	28			-98.3	-95.3			
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
CA_1A-3A-28A-42C	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3[4]			-93.8	-91.3	-89.8	-88.8	
	3[5]			-96.8	-93.8	-92	-90.8	
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	28			-98.3	-95.3			
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: The signal power is specified per port
NOTE 4: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in the bands other than Band 1, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 5: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in the bands other than Band 1, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 6: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

Table 7.3A.0-0bD2: Uplink configuration for the low band (exceptions for four bands due to close proximity of UL to DL channel)

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode								
EUTRA CA Configuration	**UL band**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex mode**
CA_1A-3A-5A-7A	1[1,2]			25	25	25	25	FDD
CA_1A-3A-5A-7A-7A CA_1A-3A-5A-40A CA_1A-3A-7A-8A CA_1A-3A-7A-20A CA_1A-3A-7A-28A CA_1A-3A-7C-28A CA_1A-3A-7A-42A CA_1A-3A-8A-11A CA_1A-3A-8A-40A CA_1A-3A-19A-21A CA_1A-3A-19A-42A	1[1,3]			25	45	45	45	

CA_1A-3A-19A-42C CA_1A-3A-20A-42A CA_1A-3A-21A-28A CA_1A-3A-21A-42A CA_1A-3A-21A-42C CA_1A-3A-28A-42A								
NOTE 1: refers to the UL resource blocks shall be located as close as possible to the downlink channel in Band 3 but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1) in the uplink channel in Band 1. NOTE 2: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz NOTE 3: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz.								

For the UE that supports any of the E-UTRA CA configurations given in Table 7.3A.0-0bD3, exceptions are allowed when the uplink is active within a specified frequency range as noted in Table 7.3A.0-0bD3. For these exceptions, the UE shall meet the requirements specified in Table 7.3A.0-0bD3 and Table 7.3A.0-0bD4.

Table 7.3.0-0bD3: Reference sensitivity for carrier aggregation QPSK $P_{REFSENS, CA}$ (exceptions for five bands due to close proximity of UL to DL channel)

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A-7A-20A-42A	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[6]	-99.5[6]	-97.7[6]	-96.5[6]	
	3[4]			-93.8	-91.3	-89.8	-88.8	
	3[5]			-96.8	-93.8	-92	-90.8	
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	7				-94.8	-93	-91.8	
					-97.5[6]	-95.7[6]	-94.5[6]	
	20			-97	-94	-91.2	-90	
				-99.7[6]	-96.7[6]	-93.9[6]	-92.7[6]	
	42			-98.5	-95.5	-93.7	-92.5	TDD
				-100.7[6]	-97.7[6]	-95.9[6]	-94.7[6]	
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A. NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 NOTE 3: The signal power is specified per port NOTE 4: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in the bands other than Band 1, the requirement applies regardless of channel bandwidth in Band 1. NOTE 5: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in the bands other than Band 1, the requirement applies regardless of channel bandwidth in Band 1. NOTE 6: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.								

Table 7.3.0-0bD4: Uplink configuration for the low band (exceptions for five bands due to close proximity of UL to DL channel)

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode								
EUTRA CA Configuration	**UL band**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex mode**
CA_1A-3A-7A-20A-42A	1[1,2]			25	25	25	25	FDD
	1[1,3]			25	45	45	45	
NOTE 1: refers to the UL resource blocks shall be located as close as possible to the downlink channel in Band 3 but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1) in the uplink channel in Band 1. NOTE 2: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. NOTE 3: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz.								

For the UE that supports any of the E-UTRA CA configurations given in Table 7.3A.0-0bE, exceptions are allowed when the uplink is active in the applicable active UL bands in Table 7.3A.0-0bE. For these exceptions, the UE shall meet the reference sensitivities specified in Table 7.3A.0-0bE and Table 7.3A.0-0bF.

Table 7.3A.0-0bE: Reference sensitivity for carrier aggregation QPSK $P_{REFSENS, CA}$ (exceptions due to cross band isolation issues of TDD and FDD bands)

EUTRA CA Configuration	EUTRA band	Channel bandwidth						Duplex mode	Applicable active UL band
		1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)		
CA_1A-3A-5A-40A	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	5			-98	-95				
	40				-92.9	-91.3	-90.2	TDD	
CA_1A-3A-5A-40A	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	3			-94.2	-91.2	-89.5	-88.3		
	5			-98	-95				
	40				-97	-95.2	-94	TDD	
CA_1A-3A-7A-20A-42A	1			-99.8	-96.8	-95	-93.8	FDD	7
				-102.5[11]	-99.5[11]	-97.7[11]	-96.5[11]		
	3			-96.8	-93.8	-92	-90.8		
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]		
	7				-94.8	-93	-91.8		
					-97.7[11]	-95.9[11]	-94.7[11]		
	20			-97	-94	-91.2	-90		
				-99.7[11]	-96.7[11]	-93.9[11]	-92.7[11]		
	42			-95.6	-93	-91.5	-90.4	TDD	
CA_1A-3A-7A-20A-42A	1			-99.8	-96.8	-95	-93.8	FDD	42
				-102.5[11]	-99.5[11]	-97.7[11]	-96.5[11]		
	3			-96.8	-93.8	-92	-90.8		
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]		
	7				-93	-91.3	-90.1		
	20			-97	-94	-91.2	-90		
				-99.7[11]	-96.7[11]	-93.9[11]	-92.7[11]		
	42			-98.5	-95.5	-93.7	-92.5		
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]	TDD	
CA_1A-3A-7A-40A[15]	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-94	-91.5	-90	-89		
	7				-94.7	-92.9	-91.7		
					-97.4[11]	-95.6[11]	-94.4[11]		
	40			-92.6	-90.5	-89.2	-88.1	TDD	
CA_1A-3A-7A-40A[16]	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	7				-94.7	-92.9	-91.7		

					-97.4[11]	-95.6[11]	-94.4[11]		
	40			-92.6	-90.5	-89.2	-88.1	TDD	
CA_1A-3A-7A-40A	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11][1]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	7				-94.7	-92.9	-91.7		
					-97.4[11]	-95.6[11]	-94.4[11]		
	40			-94.6	-92.1	-90.5	-89.4	TDD	
CA_1A-3A-7A-40A	1			-100	-97	-95.2	-94	FDD	7
				-102.7[11][1]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	7				-94.7	-92.9	-91.7		
					-97.4[11]	-95.6[11]	-94.4[11]		
	40			-96	-93.3	-91.7	-90.6	TDD	
CA_1A-3A-7A-40A	1			-91.7	-89.5	-87.9	-86.9	FDD	40
	3			-94.2	-91.2	-89.5	-88.3		
	7				-94	-92.4	-91.2		
	40			-99.2	-96.2	-94.4	-93.2	TDD	
CA_1A-3A-7A-42A	1			-99.8	-96.8	-95	-93.8	FDD	7
				-102.5[11][1]	-99.5[11]	-97.7[11]	-96.5[11]		
	3			-96.8	-93.8	-92	-90.8		
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]		
	7				-94.8	-93	-91.8		
					-97.5[11]	-95.7[11]	-94.5[11]		
	42			-95.6	-93	-91.5	-90.4	TDD	
	1			-99.8	-96.8	-95	-93.8	FDD	42
				-102.5[11][1]	-99.5[11]	-97.7[11]	-96.5[11]		
	3			-96.8	-93.8	-92	-90.8		
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]		
	7				-93	-91.3	-90.1		
	42			-98.5	-95.5	-93.7	-92.5	TDD	
				-100.7[11][1]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_1A-3A-8A-40A	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11][1]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	8		-99.2	-97	-94				
	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_1A-3A-8A-40A	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	3			-94.2	-91.2	-89.5	-88.3		
	8		-99.2	-97	-94				
	40			-100	-97	-95.2	-94	TDD	
CA_1A-3A-38A[12]	1			-100	-97	-95.2	-94	FDD	1

	3			-94	-91.5	-90	-89		
	38			-97.1	-94.4	-92.8	-91.7	TDD	
	1			-100	-97	-95.2	-94	FDD	3
	3			-97	-94	-92.2	-91		
	38			-97.1	-94.4	-92.8	-91.7	TDD	
	1			-98.1	-95.1	-93.3	-92.1	FDD	38
	3			-95.1	-92.1	-90.3	-89.1		
	38			-100	-97	-95.2	-94	TDD	
CA_1A-3A-38A[13]	1			-100	-97	-95.2	-94	FDD	1
	3			-97	-94	-92.2	-91		
	38			-97.1	-94.4	-92.8	-91.7	TDD	
	1			-100	-97	-95.2	-94	FDD	3
	3			-97	-94	-92.2	-91		
	38			-97.1	-94.4	-92.8	-91.7	TDD	
	1			-98.1	-95.1	-93.3	-92.1	FDD	38
	3			-95.1	-92.1	-90.3	-89.1		
	38			-100	-97	-95.2	-94	TDD	
CA_1A-3A-40A	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			-100	-92.9	-91.3	-90.2	TDD	
CA_1A-3A-40A	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	3			-94.2	-91.2	-89.5	-88.3		
	40			-100	-97	-95.2	-94	TDD	
CA_1A-3A-40A	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			[-93.4]	-91.3	-90	-88.9	TDD	
CA_1A-3A-40C	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			-100	-92.9	-91.3	-90.2	TDD	
CA_1A-3A-40C	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	3			-94.2	-91.2	-89.5	-88.3		
	40			-100	-97	-95.2	-94	TDD	
CA_1A-3A-40C	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			[-93.4]	-91.3	-90	-88.9	TDD	
CA_1A-3C-40A	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		

				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			-100	-92.9	-91.3	-90.2	TDD	
CA_1A-3C-40A	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	3			-94.2	-91.2	-89.5	-88.3		
	40			-100	-97	-95.2	-94	TDD	
CA_1A-3C-40A	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			[-93.4]	-91.3	-90	-88.9	TDD	
CA_1A-3A-41A[12,14]	3			-94	-91.5	-90	-89	FDD	1
	41			-93.3	-90.7	-89.2	-88.1	TDD	
	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	41			-93.3	-90.7	-89.2	-88.1	TDD	
CA_1A-3A-41A[13,14]	3			-97	-94	-92.2	-91	FDD	1
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	41			-93.3	-90.7	-89.2	-88.1	TDD	
	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	41			-93.3	-90.7	-89.2	-88.1	TDD	
CA_1A-3C-40C	1			-100	-97	-95.2	-94	FDD	3
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			-100	-92.9	-91.3	-90.2	TDD	
CA_1A-3C-40C	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	3			-94.2	-91.2	-89.5	-88.3		
	40			-100	-97	-95.2	-94	TDD	
CA_1A-3C-40C	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	3			-97	-94	-92.2	-91		
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			[-93.4]	-91.3	-90	-88.9	TDD	
CA_1A-5A-40A	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	5			-98	-95				
	40				-91.9	-90.4	-89.4	TDD	
CA_1A-5A-40A	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	5			-98	-95				
	40				-97	-95.2	-94	TDD	
CA_1A-7A-20A-42A	1			-99.8	-96.8	-95	-93.8	FDD	7
	7			-98	-95	-93.2	-92		
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]		

	20			-96.8	-93.8	-91	-89.8		
				-99.5[11]	-96.5[11]	-93.7[11]	-92.5[11]		
	42			-95.6	-93	-91.5	-90.4	TDD	
CA_1A-7A-20A-42A	1			-99.8	-96.8	-95	-93.8	FDD	42
	7			-96.2	-93.2	-91.5	-90.3		
	20			-96.8	-93.8	-91	-89.8		
				-99.5[11]	-96.5[11]	-93.7[11]	-92.5[11]		
	42			-98.5	-95.5	-93.7	-92.5	TDD	
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_1A-7A-40A	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	7				-94.7	-92.9	-91.7		
					-97.4[11]	-95.6[11]	-94.4[11]		
	40			-92.6	-90.5	-89.2	-88.1	TDD	
CA_1A-7A-40A	1			-100	-97	-95.2	-94	FDD	7
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	7				-94.7	-92.9	-91.7		
					-97.4[11]	-95.6[11]	-94.4[11]		
	40			-96	-93.3	-91.7	-90.6	TDD	
CA_1A-7A-40A	1			-91.7	-89.5	-87.9	-86.9	FDD	40
	7				-94	-92.4	-91.2		
	40			-99.2	-96.2	-94.4	-93.2	TDD	
CA_1A-7A-42A	1			-99.8	-96.8	-95	-93.8	FDD	7
	7			-98	-95	-93.2	-92		
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]		
	42			-95.6	-93	-91.5	-90.4	TDD	
	1			-99.8	-96.8	-95	-93.8	FDD	42
	7			-96.2	-93.2	-91.5	-90.3		
	42			-98.5	-95.5	-93.7	-92.5	TDD	
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_1A-8A-40A	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	8		-99.2	-97	-94				
	40			[-93.4]	-91.9	-90.4	-89.4	TDD	
CA_1A-8A-40A	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	8		-99.2	-97	-94				
	40			-100	-97	-95.2	-94	TDD	
CA_1A-40A	1			-100	-97	-95.2	-94	FDD	1
				-102.7[11]	-99.7[11]	-97.9[11]	-96.7[11]		
	40			[-93.4]	-91.9	-90.4	-89.4	TDD	
CA_1A-40A	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_1A-40C	1			-100	-97	-95.2	-94	FDD	1
				-	-99.7[11]	-97.9[11]	-96.7[11]		

				102.7[1][1]					
	40			[-93.4]	-91.9	-90.4	-89.4	TDD	
CA_1A-40C	1			-91.7	[-89.5]	[-87.9]	[-86.9]	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_3A-5A-40A	3		-98.7	-97	-94	-92.2	-91	FDD	3
			-101.4[1][1]	-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	5		-100.2	-98	-95				
	40				-92.9	-91.3	-90.2	TDD	
CA_3A-5A-40A	3		[-95.3]	-94.2	-91.2	-89.5	-88.3	FDD	40
	5		-100.2	-98	-95				
	40				-97	-95.2	-94	TDD	
CA_3A-7A-38A	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	7			[-93.8]	[-91.2]	[-89.7]	[-88.6]		
	38			[-93.8]	[-91.2]	[-89.7]	[-88.6]	TDD	
CA_3A-7A-40A	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	7			-97.7	-94.7	-92.9	-91.7		
				-100.4[1][1]	-97.4[11]	-95.6[11]	-94.4[11]		
	40			-94.6	-92.1	-90.5	-89.4	TDD	
CA_3A-7A-40A	3			-97	-94	-92.2	-91	FDD	7
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	7			-97.7	-94.7	-92.9	-91.7		
				-100.4[1][1]	-97.4[11]	-95.6[11]	-94.4[11]		
	40			-96	-93.3	-91.7	-90.6	TDD	
CA_3A-7A-40A	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	7			-96.8	-94	-92.4	-91.2		
	40			-99.2	-96.2	-94.4	-93.2	TDD	
CA_3A-7A-40C	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	7			-97.7	-94.7	-92.9	-91.7		
				-100.4[1][1]	-97.4[11]	-95.6[11]	-94.4[11]		
	40			-94.6	-92.1	-90.5	-89.4	TDD	
CA_3A-7A-40C	3			-97	-94	-92.2	-91	FDD	7
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	7			-97.7	-94.7	-92.9	-91.7		
				-100.4[1][1]	-97.4[11]	-95.6[11]	-94.4[11]		
	40			-96	-93.3	-91.7	-90.6	TDD	
CA_3A-7A-40C	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	7			-96.8	-94	-92.4	-91.2		
	40			-99.2	-96.2	-94.4	-93.2	TDD	
CA_3A-7A-42A	3			-96.8	-93.8	-92	-90.8	FDD	7
	7			-98	-95	-93.2	-92		
				-100.7[1][1]	-97.7[11]	-95.9[11]	-94.7[11]		

	42			-95.6	-93	-91.5	-90.4	TDD	
	3			[-96.6]	[-93.6]	[-91.8]	[-90.6]	FDD	42
	7			-96.2	-93.2	-91.5	-90.3		
	42			-98.5	-95.5	-93.7	-92.5	TDD	
				-100.7[1][11]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_3A-8A-40A	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	8		-99.2	-97	-94				
	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_3A-8A-40A	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	8		-99.2	-97	-94				
	40			-100	-97	-95.2	-94	TDD	
CA_3A-20A-32A	3			-97	-94	-92.2	-91	FDD	3
	20			-97	-94	-91.2	-90		
				-99.7[11]	-96.7[11]	-93.9[11]	-92.7[11]		
	32			-99.5	-96.5	-94.7	-93.5		
CA_3A-28A-40A	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	28			-98.5	-95.5	-93.7	-91		
	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_3A-28A-40A	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	28			-96.8	-94.1	-92.5	-89.8		
	40			-100	-97	-95.2	-94	TDD	
CA_3A-28A-40A	3			-97	-94	-92.2	-91	FDD	28
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	28			-98.5	-95.5	-93.7	-91		
	40			-95.1	-92.9	-91.4	-90.5	TDD	
CA_3A-28A-40C	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	28			-98.5	-95.5	-93.7	-91		
	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_3A-28A-40C	3			-97	-94	-92.2	-91	FDD	28
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	28			-98.5	-95.5	-93.7	-91		
	40			-95.1	-92.9	-91.4	-90.5	TDD	
CA_3A-28A-40C	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	28			-96.8	-94.1	-92.5	-89.8		
	40			-100	-97	-95.2	-94	TDD	
CA_3A-28A-40D	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	28			-98.5	-95.5	-93.7	-91		
	40				-92.9	-91.3	-90.2	TDD	
CA_3A-28A-40D	3			-97	-94	-92.2	-91	FDD	28
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	28			-98.5	-95.5	-93.7	-91		
	40				-92.9	-91.4	-90.5	TDD	
CA_3A-28A-40D	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	28			-96.8	-94.1	-92.5	-89.8		
	40				-97	-95.2	-94	TDD	
CA_3A-28A-41A[5]	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	28			-98.5	-95.5	-93.7	-91		

	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	28			-98.5	-95.5	-93.7	-91		
	41			-97.5	-94.5	-92.7	-91.5	TDD	
				-100.2[1][11]	-97.2[11]	-95.4[11]	-94.2[11]		
CA_3A-28A-41C[5]	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	28			-98.5	-95.5	-93.7	-91		
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	28			-98.5	-95.5	-93.7	-91		
	41			-97.5	-94.5	-92.7	-91.5	TDD	
				-100.2[1][11]	-97.2[11]	-95.4[11]	-94.2[11]		
CA_3A-28A-41A-42A	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	28			-98.3	-95.3				
	41				-94.5[17]	-92.7[17]	-91.5[17]	TDD	
					-97.2[11, 17]	-95.4[11, 17]	-94.2[11, 17]		
	42				-95.5	-93.7	-92.5		
	3			-96.5	-93.5	-91.7	-90.5	FDD	3
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]		
	28			-98.3	-95.3				
	41				[-90.7]	[-89.2]	[-88.1]	TDD	
	42				-95.5	-93.7	-92.5		

CA_3A-28A-41A-42C	3			-96.5	-93.5	-91.7	-90.5	FDD	3
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]		
	28			-98.3	-95.3				
	41				[-90.7]	[-89.2]	[-88.1]	TDD	
	42				-95.5	-93.7	-92.5		
	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	28			-98.3	-95.3				
	41				-94.5[17]	-92.7[17]	-91.5[17]	TDD	
					-97.2[11, 17]	-95.4[11, 17]	-94.2[11, 17]		
	42				-95.5	-93.7	-92.5		
CA_3A-28A-41C-42A	3			-96.5	-93.5	-91.7	-90.5	FDD	3
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]		
	28			-98.3	-95.3				
	41				[-90.7]	[-89.2]	[-88.1]	TDD	
	42				-95.5	-93.7	-92.5		
	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	28			-98.3	-95.3				
	41				-94.5[17]	-92.7[17]	-91.5[17]	TDD	
					-97.2[11, 17]	-95.4[11, 17]	-94.2[11, 17]		
	42				-95.5	-93.7	-92.5		
CA_3A-40A	3	-101.7	-98.7	-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_3A-40A	3	[-97.4]	[-95.3]	-94.2	-91.2	-89.5	-88.3	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_3A-40A-40A	3			-97	-94			FDD	3
				-99.7[11]	-96.7[11]				
	40				-92.9		-90.2	TDD	
CA_3A-40A-40A	3			-94.2	-91.2			FDD	40
	40				-97		-94	TDD	
CA_3A-40C	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_3A-40C	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_3A-40D	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_3A-40D	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_3A-40E	3			-97	-94	-92.2	-91	FDD	3
	40					-91.3	-90.2	TDD	
CA_3A-40E	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	40					-95.2	-94	TDD	
CA_3C-40A	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_3C-40A	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_3C-40C	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		

	40			-95.4	-92.9	-91.3	-90.2	TDD	
CA_3C-40C	3			-94.2	-91.2	-89.5	-88.3	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_3A-41A[5]	3		[-95.3]	[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	41			-97.5	-94.5	-92.7	-91.5	TDD	
				-100.2[11]	-97.2[11]	-95.4[11]	-94.2[11]		
	3			-97	-94	-92.2	-91	FDD	3
			-98.7	-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
CA_3A-41C[5]	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	41			-97.5	-94.5	-92.7	-91.5	TDD	
				-100.2[11]	-97.2[11]	-95.4[11]	-94.2[11]		
	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
CA_3A-41D[5]	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	41			-97.5	-94.5	-92.7	-91.5	TDD	
	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
CA_3C-41A[5]	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	41			-97.5	-94.5	-92.7	-91.5	TDD	
	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
CA_3C-41C[5]	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	41			-97.5	-94.5	-92.7	-91.5	TDD	
	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
CA_3C-41D[5]	3			[-94]	[-91]	[-89.2]	[-87.9]	FDD	41
	41			-97.5	-94.5	-92.7	-91.5	TDD	
	3			-97	-94	-92.2	-91	FDD	3
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]		
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
CA_3A-41A-42A[5,6,7,8]	3			-96.5	-93.5	-91.7	-90.5	FDD	3
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
	42			-71.7	-71.7	-71.7	-71.7		
CA_3A-41A-42A[5,6,9]	3			-96.5	-93.5	-91.7	-90.5	FDD	3
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
	42			-97.1	-94.7	-93.2	-92.5		
CA_3A-41A-42A[5,6,10]	3			[-93.5]	[-90.5]	[-88.7]	[-87.4]	FDD	41
	41			-97.5	-94.5	-92.7	-91.5	TDD	
				-100.2[11]	-97.2[11]	-95.4[11]	-94.2[11]		
	42			-98.5	-95.5	-93.7	-92.5		
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_3A-41A-42C[5,6,7,8]	3			-96.5	-93.5	-91.7	-90.5	FDD	3
	41				[-90.7]	[-89.2]	[-88.1]	TDD	

	42				-71.7	-71.7	-71.7		
CA_3A-41A-42C[5,6,9]	3			-96.5	-93.5	-91.7	-90.5	FDD	3
	41				[-90.7]	[-89.2]	[-88.1]	TDD	
	42				-94.7	-93.2	-92.5		
CA_3A-41A-42C[5,6,10]	3			-96.5	-93.5	-91.7	-90.5	FDD	42
	41				-94.5	-92.7	-91.5	TDD	
	42				-95.5	-93.7	-92.5		
CA_3A-41A-42C[5,6,10]	3			[-93.5]	[-90.5]	[-88.7]	[-87.4]	FDD	41
	41				-94.5	-92.7	-91.5	TDD	
	42				-95.5	-93.7	-92.5		
CA_3A-41C-42A[5,6,7,8]	3			-96.5	-93.5	-91.7	-90.5	FDD	3
	41				[-90.7]	[-89.2]	[-88.1]	TDD	
	42				-71.7	-71.7	-71.7		
CA_3A-41C-42A[5,6,9]	3			-96.5	-93.5	-91.7	-90.5	FDD	3
	41				[-90.7]	[-89.2]	[-88.1]	TDD	
	42				-94.7	-93.2	-92.5		
CA_3A-41C-42A[5,6,10]	3			-96.5	-93.5	-91.7	-90.5	FDD	42
	41				-94.5	-92.7	-91.5	TDD	
	42				-95.5	-93.7	-92.5		
CA_3A-41C-42A[5,6,10]	3			[-93.5]	[-90.5]	[-88.7]	[-87.4]	FDD	41
	41				-94.5	-92.7	-91.5	TDD	
	42				-95.5	-93.7	-92.5		
CA_3A-41C-42C[5,6,7,8]	3			-96.5	-93.5	-91.7	-90.5	FDD	3
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
	42			-71.7	-71.7	-71.7	-71.7		
CA_3A-41C-42C[5,6,9]	3			-96.5	-93.5	-91.7	-90.5	FDD	3
	41			[-93.3]	[-90.7]	[-89.2]	[-88.1]	TDD	
	42			-97.1	-94.7	-93.2	-92.5		
CA_3A-41C-42C[5,6,10]	3			-96.5	-93.5	-91.7	-90.5	FDD	42
	41			-97.5	-94.5	-92.7	-91.5	TDD	
	42			-98.5	-95.5	-93.7	-92.5		
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_3A-41C-42C[5,6,10]	3			[-93.5]	[-90.5]	[-88.7]	[-87.4]	FDD	41
	41			-97.5	-94.5	-92.7	-91.5	TDD	
	42			-98.5	-95.5	-93.7	-92.5		
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]		

CA_7A-20A-42A	7			-98	-95	-93.2	-92	FDD	7
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]		
	20			-97	-94	-91.2	-90		
				-99.7[11]	-96.7[11]	-93.9[11]	-92.7[11]		
	42			-95.6	-93	-91.5	-90.4	TDD	
	7			-96.2	-93.2	-91.5	-90.3	FDD	42
	20			-97	-94	-91.2	-90		
				-99.7[11]	-96.7[11]	-93.9[11]	-92.7[11]		
	42			-98.5	-95.5	-93.7	-92.5	TDD	
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_7A-40A	7			-98	-95	-93.2	-92	FDD	7
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]		
	40			-96.3	-93.6	-92	-90.9	TDD	
	7			-97.1	-94.3	-92.7	-91.5	FDD	40
	40			-99.5	-96.5	-94.7	-93.5	TDD	
CA_7A-40C	7			-98	-95	-93.2	-92	FDD	7
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]		
	40			-96.3	-93.6	-92	-90.9	TDD	
	7			-97.1	-94.3	-92.7	-91.5	FDD	40
	40			-99.5	-96.5	-94.7	-93.5	TDD	
CA_7A-42A	7			-98	-95	-93.2	-92	FDD	7
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]		
	42			-95.6	-93	-91.5	-90.4	TDD	
	7			-96.2	-93.2	-91.5	-90.3	FDD	42
	42			-98.5	-95.5	-93.7	-92.5	TDD	
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_7A-42A-42A	7			-98	-95	-93.2	-92	FDD	7
				-100.7[11]	-97.7[11]	-95.9[11]	-94.7[11]		
	42			-95.6	-93	-91.5	-90.4	TDD	
	7			-96.2	-93.2	-91.5	-90.3	FDD	42
	42			-98.5	-95.5	-93.7	-92.5	TDD	
				-100.7[11]	-97.7[11]	-96.9[11]	-94.7[11]		
CA_28A-40A	28			-98.5	-95.5	-93.7	-91	FDD	28
	40			-95.1	-92.9	-91.4	-90.5	TDD	
CA_28A-40A	28			-96.8	-94.1	-92.5	-89.8	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_28A-40C	28			-98.5	-95.5	-93.7	-91	FDD	28
	40			-95.1	-92.9	-91.4	-90.5	TDD	
CA_28A-40C	28			-96.8	-94.1	-92.5	-89.8	FDD	40
	40			-100	-97	-95.2	-94	TDD	
CA_28A-40D	28			-98.5	-95.5	-93.7	-91	FDD	28

	40			-95.1	-92.9	-91.4	-90.5		
CA_28A-40D	28			-96.8	-94.1	-92.5	-89.8	FDD	40
	40			-100	-97	-95.2	-94		

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: The signal power is specified per port.
NOTE 4: These requirements apply regardless of the channel bandwidth and the location of UL band.
NOTE 5: The B41 requirements are modified by -0.5dB when carrier frequency of the assigned E-UTRA channel bandwidth is within 2545-2690 MHz.
NOTE 6: The antenna isolation for MSD calculation is assumed as 10 dB. For conducted mode REFSENS test such antenna isolation is not observed as the antennas are disconnected. Additionally antenna isolation assumption is under discussion depending on the frequency range.
NOTE 7: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the E-UTRA configuration: ΔF_{HD} = 10 MHz for CA_3A-42A, CA_3A-42C, CA_1A-3A-42A, CA_1A-3A-42C, CA_3A-19A-42A, CA_3A-19A-42C and CA_1A-3A-19A-42A, CA 3A-41A-42A.
NOTE 8: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.
NOTE 9: The requirements are only applicable to channel bandwidths with a carrier frequency at $\pm(20 + BW_{Channel}^{HB} / 2)$ MHz offset from $2 f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.
NOTE 10: Only applicable for UE supporting inter-band carrier aggregation with uplink in one E-UTRA band and without simultaneous Rx/Tx.
NOTE 11: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 12: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in Band 3 and Band 41, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 13: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in Band 3 and Band 41, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 14: The B41 requirements also apply to the supported CA_1A-41A.
NOTE 15: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth other than Band 1, the requirement applies regardless of channel bandwidth in Band 1
NOTE 16: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth other than Band 1, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 17: The B41 requirements are modified by -0.1dB when carrier frequency of the assigned E-UTRA channel bandwidth is within 2545-2690 MHz.

Table 7.3A.0-0bF: Uplink configuration for reference sensitivity (exceptions due to cross band isolation issues of TDD and FDD bands)

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode								
EUTRA CA Configuration	**E-UTRA Band**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex Mode**
CA_1A-3A-7A-20A-42A	7			25	50	75	75[1]	FDD
	42			25	50	75	100	FDD
CA_1A-3A-7A-40A	1[1,3]			25	25	25	25	FDD
	1[1,4]			25	45	45	45	FDD
	3			25	50	50[1]	50[1]	FDD
	7			25	50	75	75[1]	FDD
	40			25	50	75	100	TDD
CA_1A-3A-7A-42A	7			25	50	75	75[1]	FDD
	42			25	50	75	100	TDD
CA_1A-3A-38A	1[1,3]			25	25	25	25	FDD
	1[1,4]			25	45	45	45	FDD
	3			25	50	50[1]	50[1]	FDD
	38			25	50	75	100	TDD
CA_1A-3A-40A	1			25	50	75	100	FDD
	3			25	50	50[1]	50[1]	FDD
	40			25	50	75	100	TDD
CA_1A-3A-40C	1			25	50	75	100	FDD
	3			25	50	50[1]	50[1]	FDD
	40			25	50	75	100	TDD
CA_1A-3C-40A	1			25	50	75	100	FDD
	3			25	50	50[1]	50[1]	FDD
	40			25	50	75	100	TDD
CA_1A-3A-41A	1			25[3]	25[1,3]	25[1,3]	25[1,3]	FDD
				25[4]	45[1,4]	45[1,4]	45[1,4]	FDD
	3			25	50	50[1]	50[1]	FDD
CA_1A-5A-40A	1			25	50	75	100	FDD
	40			25	50	75	100	TDD
CA_1A-8A-40A	1			25	50	75	100	FDD
	40			25	50	75	100	TDD
CA_1A-7A-20A-42A	1			25	50	75	100	FDD
	7			25	50	75	75[1]	FDD
	20			25	20[1]	20[5]	20[5]	FDD
	42			25	50	75	100	TDD
CA_1A-7A-40A	1			25	50	75	100	FDD
	7			25	50	75	75[1]	FDD
	40			25	50	75	100	TDD
CA_1A-7A-42A	1			25	50	75	100	FDD
	7			25	50	75	75[1]	FDD
	42			25	50	75	100	TDD
CA_1A-40A	1			25	50	75	100	FDD
	40			25	50	75	100	TDD
CA_3A-7A-38A	3			25	50	50[1]	50[1]	FDD
CA_3A-7A-40A	3			25	50	50[1]	50[1]	FDD
	7			25	50	75	75[1]	FDD
	40			25	50	75	100	TDD
CA_3A-7A-40C	3			25	50	50[1]	50[1]	FDD
	7			25	50	75	75[1]	FDD
	40			25	50	75	100	TDD

CA_3A-7A-42A	7			25	50	75	75[1]	FDD
	42			25	50	75	100	TDD
CA_3A-8A-40A	3	6	15	25	50	50[1]	50[1]	FDD
	40			25	50	75	100	TDD
CA_3A-28A-41A	3			25	50	50[1]	50[1]	FDD
	28			25	25[1]	25[1]	25[1]	FDD
	41			25	50	75	100	TDD
CA_3A-28A-41C	3			25	50	50[1]	50[1]	FDD
	28			25	25[1]	25[1]	25[1]	FDD
	41			25	50	75	100	TDD
CA_3A-28A-41A-42A	3			25	50	50[1]	50[1]	FDD
	28			25	25[1]			FDD
	41				50	75	100	TDD
	42				50	75	100	TDD

CA_3A-28A-41A-42C	3			25	50	50[1]	50[1]	FDD
	41				50	75	100	TDD
CA_3A-28A-41C-42A	3			25	50	50[1]	50[1]	FDD
	41				50	75	100	TDD
CA_3A-40A CA_3A-40C CA_3A-40D CA_3A-40E CA_3A-5A-40A CA_3A-28A-40A CA_3A-28A-40C CA_1A-3A-5A-40A CA_1A-3A-8A-40A	3	6	15	25	50	50[1]	50[1]	FDD
	40			25	50	75	100	TDD
CA_3A-40A-40A	3			25	50			FDD
	40				50		100	TDD
CA_3A-41A	3		15	25	50	50[1]	50[1]	FDD
	41			25	50	75	100	TDD
CA_3A-41C CA_3C-41A CA_3C-41D	3			25	50	50[1]	50[1]	FDD
	41			25	50	75	100	TDD
CA_3A-41D	3			25	50	50[1]	50[1]	FDD
	41			25	50	75	100	TDD
CA_3C-41C	3			25	50	50[1]	50[1]	FDD
	41			25	50	75	100	TDD
CA_3A-41A-42A	3			25	50	50[1]	50[1]	FDD
	41			25	50	75	100	TDD
CA_7A-20A-42A	7			25	50	75	75[1]	FDD
	20			25	50	75	100	
	42			25	50	75	100	TDD
CA_7A-40A, CA_7A-40C	7			25	50	75	75[1]	FDD
	40			25	50	75	100	TDD
CA_7A-42A, CA_7A-42A-42A	7			25	50	75	75[1]	FDD
	42			25	50	75	100	TDD
CA_28A-40A, CA_28A-40C	28			25	25[1]	25[1]	25[1]	FDD
	40			25	50	75	100	TDD

NOTE 1: refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
NOTE 2: the UL configuration applies regardless of the channel bandwidth of the low band unless the UL resource blocks exceed that specified in Table 7.3.1-2 for the uplink bandwidth in which case the allocation according to Table 7.3.1-2 applies.
NOTE 3: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz.
NOTE 4: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz.
NOTE 5: refers to Band 20; in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 16

For band combinations including operating bands without uplink band (as noted in Table 5.2-1), the requirements are specified in Table 7.3A.0-0d and for any uplink band with uplink configuration specified in Table 7.3.3-2.

Table 7.3A.0-0d: Reference sensitivity QPSK $P_{REFSENS}$ (CA with a SDL band)

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_2A-4A-5A-29A	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[4]	-97.4[4]	-95.6[4]	-94.4[4]	
	4			-99.7	-96.7	-94.9	-93.7	
	5			-98	-95			
	29			-97	-94			
CA_2A-4A-29A	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[4]	-97.4[4]	-95.6[4]	-94.4[4]	
	4			-99.7	-96.7	-94.9	-93.7	
	29			-97	-94			
CA_2A-4A-29A-30A	2			-97.6	-94.6	-92.8	-91.6	FDD
				-100.3[4]	-97.3[4]	-95.5[4]	-94.3[4]	
	4			-99.6	-96.6	-94.8	-93.6	
	29			-97	-94			
	30			-98.5	-95.5			
CA_2A-5A-29A	2			-98	-95	-93.2	-92	FDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	5			-98	-95			
	29			-97	-94			
CA_2A-29A	2			-98	-95	-93.2	-92	FDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	29		-98.7	-97	-94			
CA_2C-29A	2			-98	-95	-93.2	-92	FDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	29			-97	-94			
CA_2A-29A-30A	2			-97.6	-94.6	-92.8	-91.6	FDD
				-100.3[4]	-97.3[4]	-95.5[4]	-94.3[4]	
	29			-97	-94			
	30			-98.5	-95.5			
CA_2C-29A-30A	2			-97.6	-94.6	-92.8	-91.6	FDD
				-100.3[4]	-97.3[4]	-95.5[4]	-94.3[4]	
	29			-97	-94			
	30			-98.5	-95.5			
CA_3A-7A-32A	3			-97	-94	-92.2	-91	FDD
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	
	7			-98	-95	-93.2	-92	
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	32			-100	-97	-95.2	-94	
CA_3A-32A	3			-97	-94	-92.2	-91	FDD
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	
	32			-99.5	-96.5	-94.7	-93.5	
CA_3A-69A	3			-97	-94	-92.2	-91	FDD
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	
	69			-100	-97	-95.2	-94	
CA_4A-4A-29A	4			-100	-97	-95.2	-94	FDD

	29			-97	-94			
CA_4A-4A-29A-30A	4			-99.6	-96.6	-94.8	-93.6	FDD
	29			-97	-94			
	30			-98.5	-95.5			
CA_4A-5A-29A	4			-100	-97	-95.2	-94	FDD
	5			-98	-95			
	29			-97	-94			
CA_4A-29A	4			-100	-97	-95.2	-94	FDD
	29		-98.7	-97	-94			
CA_4A-29A-30A	4			-99.6	-96.6	-94.8	-93.6	FDD
	29			-97	-94			
	30			-98.5	-95.5			
CA_5A-29A	5			-98	-95			FDD
	29			-97	-94			
CA_7A-32A	7				-95	-93.2	-92	FDD
	32			-100	-97	-95.2	-94	
CA_20A-32A	20			-97	-94	-91.2	-90	FDD
				-99.7[4]	-96.7[4]	-93.9[4]	-92.7[4]	
	32			-100	-97	-95.2	-94	
CA_20A-67A	20			-97	-94	-91.2	-90	FDD
				-99.7[4]	-96.7[4]	-93.9[4]	-92.7[4]	
	67			-100	-97	-95.2	-94	
CA_23A-29A	23			-100	-97	-95.2	-94	FDD
	29		-98.7	-97	-94			
CA_29A-30A	29			-97	-94			FDD
	30			-99	-96			
CA_29A-66A	29			-97	-94			FDD
	66			-99.5	-96.5	-94.7	-93.5	
CA_29A-70A	29			-97	-94			FDD
	70			-100	-97	-95.2	-94	

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: The signal power is specified per port.
NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

Table 7.3A.0-0e: Void

For band combinations including operating band 46 (Table 5.2-1), the requirements are specified in Table 7.3A.0-0eA for the uplink in any band other than band 46 with the uplink configuration specified in Table 7.3.3-2 and Table 7.3A.0-0eC.

Table 7.3A.0-0eA: Reference sensitivity QPSK $P_{REFSENS}$ (CA with band 46)

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-5A-7A-46A CA_1A-5A-7A-46C	1			-100	-97	-95.2	-94	FDD
				-102.7[4][1]	-99.7[4]	-97.9[4]	-96.7[4]	
	5			-98	-95			
	7				-95	-93.2	-92	
					-97.7[4]	-95.9[4]	-94.7[4]	
	46						-90	TDD
CA_1A-5A-46A CA_1A-5A-46C CA_1A-5A-46D	1			-100	-97	-95.2	-94	FDD
				-102.7[4][1]	-99.7[4]	-97.9[4]	-96.7[4]	
	5			-98	-95			
	46						-90	TDD
CA_1A-7A-46A CA_1A-7A-46C CA_1A-7A-46D	1			-100	-97	-95.2	-94	FDD
				-102.7[4][1]	-99.7[4]	-97.9[4]	-96.7[4]	
	7				-95	-93.2	-92	
					-97.7[4]	-95.9[4]	-94.7[4]	
	46						-90	TDD
CA_1A-46A CA_1A-46C CA_1A-46D CA_1A-46E	1			-100	-97	-95.2	-94	FDD
				-102.7[4]	-99.7[4]	-97.9[4]	-96.7[4]	
	46				-93		-90	TDD
CA_2A-46A CA_2A-46C CA_2A-46A-46A CA_2A-46A-46C CA_2A-46D CA_2A-46A-46D	2			-98	-95	-93.2	-92	FDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	46						-90	TDD
CA_2A-46A-66A	2			-98	-95	-93.2	-92	FDD
				100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	46						-90	TDD
	66			-99.5	-96.5	-94.7	-93.5	FDD
CA_2A-46A-46A-66A CA_2A-46C-66A	2			-98	-95	-93.2	-92	FDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	46						-90	TDD
	66			-99.5	-96.5	-94.7	-93.5	FDD

CA_2A-46A-46C-66A CA_2A-46D-66A	2			-98	-95	-93.2	-92	FDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	46						-90	TDD
	66			-99.5	-96.5	-94.7	-93.5	FDD
CA_3A-46A CA_3A-46C CA_3A-46D CA_3A-46E	3		-98.7	-97	-94	-92.2	-91	FDD
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	
	46				-93		-90	TDD
CA_4A-46A CA_4A-46C CA_4A-46A-46A CA_4A-46A-46C CA_4A-46D CA_4A-46A-46D	4			-100	-97	-95.2	-94	FDD
	46						-90	TDD
CA_5A-7A-46A CA_5A-7A-46C CA_5A-7A-46D	5			-98	-95			FDD
	7				-95	-93.2	-92	FDD
					-97.7[4]	-95.9[4]	-94.7[4]	
	46						-90	TDD
CA_5A-46A CA_5A-46C CA_5A-46D CA_5A-46E	5			-98	-95			FDD
	46				-93		-90	TDD
CA_7A-46A CA_7A-46C CA_7A-46D CA_7A-46E	7			-98	-95	-93.2	-92	FDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	46				-93		-90	TDD
CA_8A-46A CA_8A-46D CA_8A-46E CA_8B-46C CA_8B-46D	8	-102.2	-99.2	-97	-94			FDD
	46						-90	TDD
CA_8A-46C	8	-102.2	-99.2	-97	-94			FDD
	46						-90	TDD
CA_8B-46A	8	-102.2	-99.2	-97	-94			FDD
	46						-90	TDD
CA_11A-46A	11			-100	-97			FDD
	46						-90	TDD
CA_11A-46C	11			-100	-97			FDD
	46						-90	TDD
CA_11A-46D	11			-100	-97	-95.2		FDD
	46						-90	TDD
CA_11A-46E	11			-100	-97			FDD
	46						-90	TDD
CA_13A-46A CA_13A-46D CA_13A-46E	13			-97	-94			FDD
	46						-90	TDD
CA_13A-46C	13			-97	-94			FDD
	46						-90	TDD
CA_19A-46A CA_19A-46C CA_19A-46D CA_19A-46E	19			-100	-97	-95.2		FDD
	46						-90	TDD
CA_21A-46A CA_21A-46C CA_21A-46D CA_21A-46E	21			-100	-97	-95.2		FDD
	46						-90	TDD

CA_26A-46A	26		-99.7	-97.5[7]	-94.5[7]			FDD
	46						-90	TDD
CA_28A-46A CA_28A-46C CA_28A-46D CA_28A-46E	28			-98.5	-95.5	-93.7	-91	FDD
	46				-93		-90	TDD
CA_29A-46A-66A	29			-97	-94			FDD
	46						-90	TDD
	66			-99.5	-96.5	-94.7	-93.5	FDD
CA_39A-46A	39			-100	-97	-95.2	-94	TDD
	46						-90	TDD
CA_39A-46C	39			-100	-97	-95.2	-94	TDD
	46						-90	TDD
CA_39C-46A	39			-100	-97	-95.2	-94	TDD
	46						-90	TDD
CA_39A-46E CA_39C-46C CA_39C-46D	39			-100	-97	-95.2	-94	TDD
	46						-90	

CA_40A-46A CA_40A-46D CA_40A-46E CA_40C-46C CA_40C-46D CA_40D-46A CA_40D-46C	40			-100	-97	-95.2	-94	TDD
	46				-93		-90	TDD
CA_40A-46C	40			-100	-97	-95.2	-94	TDD
	46						-90	TDD
CA_40C-46A	40			-100	-97	-95.2	-94	TDD
	46						-90	TDD
CA_41A-46A CA_41A-46C CA_41C-46A	41			-98	-95	-93.2	-92	TDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	46						-90	TDD
CA_42A-46A	42			-99	-96	-94.2	-93	TDD
				-100.7[4]	-97.7[4]	-95.9[4]	-94.7[4]	
	46						-83	TDD
CA_46A-66A CA_46A-46A-66A CA_46A-66A-66A CA_46A-66C CA_46A-46C-66A CA_46A-46D-66A CA_46C-66A CA_46D-66A CA_46E-66A	46						-90	TDD
	66			-99.5	-96.5	-94.7	-93.5	FDD
CA_46A-70A	46						-90	TDD
	70			-100	-97	-95.2		FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: The signal power is specified per port.
NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 5: The requirement for B46 does not apply when there is at least one individual RE within the B46 downlink transmission bandwidth which falls into the reference sensitivity exclusion region as specified in Table 7.3A.0-0eC.
NOTE 6: Void
NOTE 7: indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 8: When Band 46 have self interference problems by dual uplink CA, then the requirements not apply in exclusion zone which is frequency range within (harmonics frequency region + ΔF_{HD}) and IMD frequency region as follow.

IMD frequency range

DL_CA configuration	UL_CA configuration	Exclusion zone centre frequency	Exclusion zone BW
CA_1A-5A-46A	CA_1A-5A	2*fc_1A + 2*fc_5A	2*BW_1A + 2*BW_5A
CA_1A-7A-46A	CA_1A-7A	3*fc_7A - fc_1A	3*BW_7A – BW_1A
CA_5A-7A-46A	CA_5A-7A	2*fc_7A + fc_5A	2*BW_7A + BW_5A

Table 7.3A.0-0eB: Void

Table 7.3A.0-0eC specifies the Band 46 reference measurement exclusion region for different licensed component carriers and channel bandwidth. The exclusion region is defined according to the licensed component carrier channel bandwidth. The UL configurations to be adopted for the test are specified in Table 7.3.3-2. The exclusion region in Table 7.3A.0-0eC is specified for the case of 20MHz channel bandwidth in Band 46. The exclusion region for 10MHz channel bandwidth in Band 46 is FFS.

Table 7.3A.0-0eC: Band 46 Reference sensitivity measurement exclusion region in MHz

Licensed Component Carriers / E-UTRA Band / Harmonic order / Channel BW in UL					
Licensed Component Carriers	**Harmonic order**	**5MHz**	**10MHz**	**15MHz**	**20MHz**
1	3	+/- 11.25	+/- 22.5	+/- 33.75	+/- 45
2	3	+/- 11.25	+/- 22.5	+/- 33.75	+/- 45
3	3	+/- 11.25	+/- 22.5	+/- 33.75	+/- 45
4	3	+/- 11.25	+/- 22.5	+/- 33.75	+/- 45
5	7	+/- 10	+/- 20		
7[1]	2	+/- 12.5	+/- 25	+/- 37.5	+/- 50
8	6	+/- 10	+/- 20		
11	4	+/- 12.5	+/- 25		
13	7	+/- 10	+/- 20		
19	7	+/- 10	+/- 20	+/- 30	
21	4	+/- 12.5	+/- 25	+/- 37.5	
26	7	+/- 10	+/- 20	+/- 30	
28	7	+/- 10	+/- 20	+/- 30	+/- 40
28	8	+/- 10	+/- 20	+/- 30	+/- 40
39	3	+/- 11.25	+/- 22.5	+/- 33.75	+/- 45
41	2	+/- 12.5	+/- 25	+/- 37.5	+/- 50
66	3	+/- 11.25	+/- 22.5	+/- 33.75	+/- 45
NOTE 1: Even though UL harmonic does not fall directly into Band 46 the exclusion region still applies. NOTE 2: The centre of the exclusion region is obtained by multiplying the UL channel centre frequency by the harmonic order.					

In all cases for single uplink inter-band CA, unless given by Table 7.3.3-3 for the band with the active uplink carrier, the applicable reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.4.3-1) configured.

For inter-band carrier aggregation with one component carrier per operating band (up to four downlinks) and the uplink assigned to two E-UTRA bands the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.3-1, Table 7.3.3-1a and Table 7.3.3-2. The reference sensitivity is defined to be met with all downlink component carriers active and both of the uplink carriers active.

For E-UTRA CA configurations with uplink and downlink assigned to two E-UTRA bands given in Table 7.3A.0-0f the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3A.0-0f. For E-UTRA CA configurations with uplink assigned to two E-UTRA bands and downlink assigned to three E-UTRA bands given in Table 7.3.1A-0g the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3.1A-0g. For these test points the reference sensitivity requirement specified in Table 7.3.3-1 and Table 7.3.3-1a are relaxed by the amount of the corresponding parameter MSD given in Table 7.3A.0-0f and Table 7.3A.0-0g.

The allowed exceptions defined in Table 7.3A.0-0a and Table 7.3A.0-0b for inter-band carrier aggregation with a single active uplink are also applicable for dual uplink operation.

Table 7.3A.0-0f: 2DL/2UL interband Reference sensitivity QPSK $P_{REFSENS}$ and uplink/downlink configurations

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode								Source of IMD
EUTRA CA Configuration	EUTRA band	UL F_c (MHz)	UL/DL BW (MHz)	UL C_{LRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	
CA_1A-3A	1	1950	5	25	2140	23	FDD	IMD3
						25.7[5]		
	3	1760	5	25	1855	N/A		N/A
CA_1A-8A	1	1965	5	25	2155	6	FDD	IMD4
						8.7[5]		
	8	887.5	5	25	932.5	N/A		N/A
CA_2A-4A	2	1860	20	50[2]	1940	5	FDD	IMD3
						7.7[5]		
	4	1752.5	5	25	2152.5	N/A		N/A
CA_2A-4A	2	1868.3	5	25	1948.3	N/A	FDD	N/A
	4	1735	5	25	2135	5		IMD5
CA_2A-46A	2	1880	5	25	1960	12.0	FDD	IMD3
	46	5720	20	100	5720	N/A		N/A
CA_2A-46A	2	1880	5	25	1960	4.0	FDD	IMD5
	46	5560	20	100	5560	N/A		N/A
CA_2A-66A	2	1855	5	25	1935	20	FDD	IMD2[4]
	66	1775	5	25	2175	N/A		N/A
CA_2A-66A	2	1883.3	5	25	1963.3	N/A	FDD	N/A
	66	1750	5	25	2150	4		IMD5
CA_3A-5A	3	1771	10	50	1866	4	FDD	IMD4
						6.7[5]		
	5	838	5	25	883	N/A		N/A
CA_3A-5A	3	1721	10	50	1816	N/A	FDD	N/A
	5	838	5	25	883	24		IMD2[4]
CA_3A-7A	3	1730	5	25	1825	N/A	FDD	N/A
	7	2535	10	50	2655	13		IMD4
						15.7[5]		
CA_3A-8A	3	1755	10	50	1850	N/A	FDD	N/A
	8	900	5	25	945	8		IMD4[4]
CA_3A-8A	3	1747.5	10	50	1842.5	6.4	FDD	IMD5
	8	897.5	5	25	942.5	N/A		N/A
CA_3A-19A	3	1771	5	25	1866	4	FDD	IMD4
						6.7[5]		
	19	838	5	25	883	N/A		N/A
CA_3A-19A	3	1721	5	25	1816	N/A	FDD	N/A
	19	838	5	25	883	27		IMD2[4]
CA_3A-20A	3	1775	5	25	1870	4	FDD	IMD4
						6.7[5]		
	20	840	5	25	799	N/A		N/A
CA_3A-20A	3	1735	5	25	1830	N/A	FDD	N/A
	20	847	5	25	806	9		IMD4
						11.7[5]		
CA_3A-26A	3	1771	5	25	1866	4	FDD	IMD4
						6.7[5]		
	26	838	5	25	883	N/A		N/A
CA_3A-26A	3	1721	5	25	1816	N/A	FDD	N/A
	26	838	5	25	883	26		IMD2[4]
CA_3A-41A	3	1740	5	25	1835	8.2	FDD	IMD4
						10.9[5]		
	41	2657.5	5	25	2657.5	N/A	TDD	N/A
CA_3A-42A	3	1740	5	25	1835	29.8	FDD	IMD2[4]
						32.5[5]		
	42	3575	5	25	3575	N/A	TDD	N/A
CA_3A-42A	3	1765	5	25	1860	8.0	FDD	IMD4[4]
						10.7[5]		
	42	3435	5	25	3435	N/A	TDD	N/A
CA_4A-5A	4	1721	5	25	2121	N/A	FDD	N/A
	5	838	5	25	883	26		IMD2[4]

CA_4A-7A	4	1730	5	25	1825	N/A	FDD	N/A
	7	2535	5	25	2655	15		IMD4
						17.7[5]		
CA_5A-7A	5	834	5	25	879	12	FDD	IMD3[4]
	7	2547	10	50	2667	N/A		N/A
CA_5A-66A	5	838	5	25	883	30	FDD	IMD2
	66	1721	5	25	2121	N/A		N/A
CA_5A-66A	5	846.5	5	25	891.5	5	FDD	IMD5
	66	1715.5	5	25	2115.5	N/A		N/A
CA_7A-20A	7	2512	10	50	2632	N/A	FDD	N/A
	20	851	5	25	810	12		IMD3[4]
						14.7[5]		
CA_8A-41A	8	882.5	5	25	927.5	12.1	FDD	IMD3
	41	2685	10	50	2685	N/A	TDD	N/A
CA_8A-41A	8	900	5	25	945	5.7	FDD	IMD5
	41	2655	10	50	2655	N/A	TDD	N/A
CA_19A-42A[3]	19	N/A	N/A	N/A	N/A	N/A	FDD	N/A
	42	N/A	N/A	N/A	N/A	N/A	TDD	N/A
CA_21A-28A	21	1450.4	5	25	1498.4	[2.5]	FDD	IMD5
	28	735.5	5	25	790.5	N/A	TDD	N/A
CA_21A-42A[3]	21	N/A	N/A	N/A	N/A	N/A	FDD	N/A
	42	N/A	N/A	N/A	N/A	N/A	TDD	N/A
CA_28A-42A	28	705.5	5	25	760.5	[5.5]	FDD	IMD5
	42	3582.5	5	25	3582.5	N/A	TDD	N/A

NOTE 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX_L,c}$) as defined in subclause 6.2.5A
NOTE 2: RB_{START} = 0
NOTE 3: No requirements apply when there is at least one individual RE within the intermodulation generated by the dual uplink is within the downlink transmission bandwidth of the FDD band. The reference sensitivity should only be verified when this is not the case (the requirements specified in clause 7.3.1 apply).
NOTE 4: This band is subject to IMD5 also which MSD is not specified
NOTE 5: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

Table 7.3A.0-0g: 3DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations

E-UTRA Band / Channel bandwidth / NRB / Duplex mode										Source of IMD
EUTRA CA	EUTRA CA	EUTRA band	UL F_c	UL BW	UL	DL F_c (MHz)	DL BW	MSD	Duplex mode	
DL Configuration	UL Configuration		(MHz)	(MHz)	C_{LRB}	(MHz)	(MHz)	(dB)		
CA_1A-3A-28A	CA_1A-28A	1	1975	5	25	2165	5	N/A	FDD	N/A
		28	710.5	5	25	765.5	5	N/A		N/A
		3	1723.5	5	25	1818.5	5	4.0		IMD5
	CA_3A-28A	3	1780	5	25	1875	5	N/A	FDD	N/A
		28	710.5	5	25	765.5	5	N/A		N/A
		1	1949	5	25	2139	5	11.0		IMD4
CA_1A-3A-40A	CA_1A-3A	1	1950	5	25	2140	5	N/A	FDD	N/A
		3	1735	5	25	1830	5	N/A	FDD	N/A
		40	2380	5	25	2380	5	8.0	TDD	IMD5
CA_1A-3A-42A	CA_1A-3A	1	1922.5	5	25	2112.5	5	N/A	FDD	N/A
		3	1782.5	5	25	1877.5	5	N/A	FDD	N/A
		42				3425	5	11.0	TDD	IMD4
CA_1A-5A-7A	CA_1A-7A	1	1968	5	25	2158	5	N/A	FDD	N/A
		7	2512	10	50	2632	10	N/A		N/A
		5	835	5	25	880	5	1.0		IMD5
CA_1A-5A-40A	CA_1A-5A	1	1977.5	5	25	2167.5	5	N/A	FDD	N/A
		5	826.5	5	25	871.5	5	N/A	FDD	N/A
		40	2305	10	50	2305	10	9.0	TDD	IMD4
CA_1A-28A-42A	CA_1A-28A	1	1955	5	25	2145	5	N/A	FDD	N/A
		28	735	5	25	790	5	N/A	FDD	N/A
		42	3425	5	25	3425	5	15.0	TDD	IMD3
	CA_28A-42A	28	710.5	5	25	765.5	5	N/A	FDD	N/A
		42	3560	5	25	3560	5	N/A	TDD	N/A
		1	1949	5	25	2139	5	11.0	FDD	IMD3
CA_2A-12A-30A	CA_2A-12A	2	1885	5	25	1965	5	N/A	FDD	N/A
		12	708.5	5	25	738.5	5	N/A	FDD	N/A
		30	2308	5	25	2353	5	12.0	FDD	IMD4
CA_3A-5A-7A	CA_3A-5A	3	1780	10	50	1875	10	N/A	FDD	N/A
		5	845	5	25	890	5	N/A		N/A
		7	2505	10	50	2625	10	30.0		IMD2
		3	1745	10	50	1840	10	N/A	FDD	N/A
		5	835	5	25	880	5	N/A		N/A
		7	2545	10	50	2665	5	20.0		IMD3
	CA_3A-7A	3	1725	10	50	1820	10	N/A	FDD	N/A
		7	2565	10	50	2685	10	N/A		N/A
		5	840	5	25	885	5	19.0		IMD3
CA_3A-7A-20A	CA_3A-7A	3	1737	5	25	1832	5	N/A	FDD	N/A
		7	2543	10	50	2663	10	N/A		N/A
		20	847	10	20	806	10	10.5		IMD2
								13.2[3]		
	CA_3A-20A	3	1775	10	50	1870	10	N/A	FDD	N/A
		20	855	5	25	896	5	N/A		N/A
		7	2510	10	50	2630	10	26.0		IMD2[1]

								28.7[3]		
CA_3A-7A-28A	CA_3A-7A	3	1747	5	25	1842	5	N/A	FDD	N/A
		7	2543	5	25	2663	5	N/A		N/A
		28	741	5	25	796.0	5	20		IMD2
	CA_7A-28A	7	2543	5	25	2663	5	N/A	FDD	N/A
		28	710.5	5	25	765.5	5	N/A		N/A
		3	1737.5	5	25	1832.5	5	26		IMD2
								28.7[3]		
CA_3A-19A-21A	CA_19A-21A	19	832.5	5	25	877.5	5	N/A	FDD	N/A
		21	1460.4	5	25	1508.4	5	N/A		N/A
		3	1774.6	5	25	1869.6	5	4.0		IMD5
CA_3A-21A-28A	CA_3A-21A	3	1782	5	25	1877	5	N/A	FDD	N/A
		21	1451	5	25	1499	5	N/A		N/A
		28	734	5	25	789	5	3.0		IMD5
CA_19A-21A-42A	CA_19A-21A	19	842.5	5	25	887.5	5	N/A	FDD	N/A
		21	1450.4	5	25	1498.4	5	N/A	FDD	N/A
		42	3508.7	5	25	3508.7	5	13.0	TDD	IMD4
	CA_21A-42A	21	1460.4	5	25	1508.4	5	N/A	FDD	N/A
		42	3500	5	25	3500	5	N/A	FDD	N/A
		19	836.2	5	25	881.2	5	13.0	TDD	IMD4

NOTE 1: This band is subject to IMD3 also which MSD is not specified.
NOTE 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX_L,c}$) as defined in subclause 6.2.5A
NOTE 2: RB_{START} = 0
NOTE 3: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

For intra-band contiguous carrier aggregation the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.3-1, Table 7.3.3-1a, Table 7.3.3-1A, Table 7.3.3-1B, Table 7.3.3-1C, Table 7.3A.0-0h and table 7.3A.0-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the power levels in Table 7.3.1-1 and Table 7.3.3-1a also apply for an SCC assigned in the unpaired part. The requirement is verified using an uplink CA configuration with the largest number of carriers supported by the UE. Table 7.3A.0-1 specifies the maximum number of allocated uplink resource blocks for which the intra-band contiguous carrier aggregation reference sensitivity requirement shall be met. The PCC and SCC allocations as defined in Table 7.3.3-2 and form a contiguous allocation where TX–RX frequency separations of the component carriers are as defined in Table 5.3-1. In case downlink CA configuration has additional SCC(s) compared to uplink CA configuration those are configured furthers away from uplink band. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.3-2 and the downlink PCC carrier centre frequency shall be configured closer to uplink operating band than any of the downlink SCC centre frequency. Unless given by Table 7.3.3-3, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.4.3-1) configured.

Table 7.3A.0-0h: Intra-band contiguous CA uplink configuration for reference sensitivity for Bandwidth Class B

CA configuration / CC combination / N_{RB_agg} / Duplex mode					
Uplink CA configuration	50RB+25RB		50RB+50RB		Duplex Mode
	PCC	SCC	PCC	SCC	
CA_8B	25	0	25	0	FDD

NOTE 1: The carrier centre frequency of SCC in the UL operating band is configured closer to the DL operating band.
NOTE 2: The transmitted power over both PCC and SCC shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 3: The UL resource blocks in both PCC and SCC shall be confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
NOTE 4: The UL resource blocks in PCC shall be located as close as possible to the downlink operating band, while the UL resource blocks in SCC shall be located as far as possible from the downlink operating band.
NOTE 5: In case a CA configuration consists of CC channel bandwidths which are unequal in bandwidth the PCC channel bandwidth shall be the larger one for reference sensitivity test.

Table 7.3A.0-1: Intra-band contiguous CA uplink configuration for reference sensitivity for Bandwidth Class C

CA configuration / CC combination / N_{RB_agg} / Duplex mode													
Uplink CA configuration	100RB+25RB		100RB+50RB		75RB+75RB		75RB+50RB		100RB+75RB		100RB+100RB		Duplex Mode
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	
CA_1C	N/A	N/A	N/A	N/A	75	54	N/A	N/A	N/A	N/A	100	30	FDD
CA_3C	50	0	50	0	N/A	N/A	N/A	N/A	50	0	50	0	FDD
CA_7C	N/A	N/A	75	0	75	0	75	0	75	0	75	0	FDD
CA_38C	N/A	N/A	N/A	N/A	75	75	N/A	N/A	N/A	N/A	100	100	TDD
CA_39C	100	25	100	50	N/A	N/A	N/A	N/A	100	75	N/A	N/A	TDD
CA_40C	N/A	N/A	100	50	75	75	N/A	N/A	100	75	100	100	TDD
CA_41C	100	25	100	50	75	75	75	50	100	75	100	100	TDD
CA_42C	100	25	100	50	N/A	N/A	N/A	N/A	100	75	100	100	TDD

NOTE 1: The carrier centre frequency of SCC in the UL operating band is configured closer to the DL operating band.
NOTE 2: The transmitted power over both PCC and SCC shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 3: The UL resource blocks in both PCC and SCC shall be confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
NOTE 4: The UL resource blocks in PCC shall be located as close as possible to the downlink operating band, while the UL resource blocks in SCC shall be located as far as possible from the downlink operating band.
NOTE 5: In case a CA configuration consists of CC channel bandwidths which are unequal in bandwidth the PCC channel bandwidth shall be the larger one for reference sensitivity test.
NOTE 6: Void.
NOTE 7: Void.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink sub-blocks, the throughput of each downlink component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) and parameters specified in Table 7.3.3-1, Table 7.3.3-1a, Table 7.3.3-1A, Table 7.3.3-1B, Table 7.3.3-1C and Table7.3A.0-3 with reference sensitivity the power level increased by ΔR_{IBNC} given in Table 7.3A.0-3 for the SCC(s). The requirements apply with all downlink carriers active. Unless given by Table 7.3.3-3, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.4.3-1) configured.

Table 7.3A.0-3: Intra-band non-contiguous CA with one uplink configuration for reference sensitivity

CA configuration	Aggregated channel bandwidth (PCC+SCC)	W_{gap} / [MHz]	UL PCC allocation	ΔR_{IBNC} (dB)	Duplex mode
CA_2A-2A	25RB+25RB	$30.0 < W_{gap} \leq 50.0$	12[1]	5.3	FDD
		$30.0 < W_{gap} \leq 50.0$	12[1]	8.0[17]	
		$0.0 < W_{gap} \leq 30.0$	25[1]	0	
	25RB+50RB	$25.0 < W_{gap} \leq 45.0$	12[1]	4.4	
		$25.0 < W_{gap} \leq 45.0$	12[1]	7.1[17]	
		$0.0 < W_{gap} \leq 25.0$	25[1]	0	
	25RB+75RB	$20.0 < W_{gap} \leq 40.0$	12[1]	4.2	
		$20.0 < W_{gap} \leq 40.0$	12[1]	6.9[17]	
		$0.0 < W_{gap} \leq 20.0$	25[1]	0	
	25RB+100RB	$15.0 < W_{gap} \leq 35.0$	12[1]	3.8	
		$30.0 < W_{gap} \leq 50.0$	12[1]	6.5[17]	
		$0.0 < W_{gap} \leq 15.0$	25[1]	0	
	50RB+25RB	$15.0 < W_{gap} \leq 45.0$	12[1]	5.9	
		$15.0 < W_{gap} \leq 45.0$	12[1]	8.6[17]	
		$0.0 < W_{gap} \leq 15.0$	32[1]	0	
	50RB+50RB	$10.0 < W_{gap} \leq 40.0$	12[1]	4.6	
		$10.0 < W_{gap} \leq 45.0$	12[1]	7.3[17]	
		$0.0 < W_{gap} \leq 10.0$	32[1]	0	
	50RB+75RB	$5.0 < W_{gap} \leq 35.0$	12[1]	4.1	
		$5.0 < W_{gap} \leq 35.0$	12[1]	6.8[17]	
		$0.0 < W_{gap} \leq 5.0$	32[1]	0	
	50RB+100RB	$0.0 < W_{gap} \leq 30.0$	12[1]	4.0	
		$0.0 < W_{gap} \leq 30.0$	12[1]	6.7[17]	
	75RB+25RB	$10.0 < W_{gap} \leq 40.0$	12[12]	6.7	
		$10.0 < W_{gap} \leq 40.0$	12[1]	9.4[17]	
		$0.0 < W_{gap} \leq 10.0$	36[1]	0	
	75RB+50RB	$5.0 < W_{gap} \leq 35.0$	12[12]	5.4	
		$5.0 < W_{gap} \leq 35.0$	12[12]	8.1[17]	
		$0.0 < W_{gap} \leq 5.0$	36[1]	0	
	75RB+75RB	$0.0 < W_{gap} \leq 30.0$	12[12]	4.6	
		$0.0 < W_{gap} \leq 30.0$	12[12]	7.3[17]	
	75RB+100RB	$0.0 < W_{gap} \leq 25.0$	12[12]	4.2	
		$0.0 < W_{gap} \leq 25.0$	12[12]	6.9[17]	
	100RB+25RB	$0.0 < W_{gap} \leq 35.0$	16[13]	7.2	
		$0.0 < W_{gap} \leq 35.0$	16[12]	9.9[17]	
	100RB+50RB	$0.0 < W_{gap} \leq 30.0$	16[13]	5.8	
		$0.0 < W_{gap} \leq 30.0$	16[13]	8.5[17]	
	100RB+75RB	$0.0 < W_{gap} \leq 25.0$	16[13]	5.0	
		$0.0 < W_{gap} \leq 25.0$	16[13]	7.7[17]	
	100RB+100RB	$0.0 < W_{gap} \leq 20.0$	16[13]	4.6	
		$0.0 < W_{gap} \leq 20.0$	16[13]	7.3[17]	
CA_3A-3A	15RB+25RB	$47.0 < Wgap \leq 67.0$	12[1]	4.5	FDD
		$0.0 < Wgap \leq 47.0$	15[1]	0	
	25RB+15RB	$47.0 < Wgap \leq 67.0$	12[1]	4.9	
		$0.0 < Wgap \leq 47.0$	25[1]	0	
	25RB+25RB	$45.0 < W_{gap} \leq 65.0$	12[1]	4.7	

		45.0 < W_{gap} ≤ 65.0	12[1]	7.4[17]	
		0.0 < W_{gap} ≤ 45.0	25[1]	0	
	25RB+50RB	40.0 < W_{gap} ≤ 60.0	12[1]	3.8	
		40.0 < W_{gap} ≤ 60.0]	12[1]	6.5[17]	
		0.0 < W_{gap} ≤ 40.0	25[1]	0	
	25RB+75RB	35.0 < W_{gap} ≤ 55.0	12[1]	3.6	
		35.0 < W_{gap} ≤ 55.0	12[1]	6.3[17]	
		0.0 < W_{gap} ≤ 35.0	25[1]	0	
	25RB+100RB	30.0 < W_{gap} ≤ 50.0	12[1]	3.4	
		30.0 < W_{gap} ≤ 50.0	12[1]	6.1[17]	
		0.0 < W_{gap} ≤ 30.0	25[1]	0	
	50RB+25RB	30.0 < W_{gap} ≤ 60.0	12[9]	5.1	
		30.0 < W_{gap} ≤ 60.0	12[9]	7.8[17]	
		0.0 < W_{gap} ≤ 30.0	32[1]	0	
	50RB+50RB	25.0 < W_{gap} ≤ 55.0	12[9]	4.3	
		25.0 < W_{gap} ≤ 55.0	12[9]	7.0[17]	
		0.0 < W_{gap} ≤ 25.0	32[1]	0	
	50RB+75RB	20.0 < W_{gap} ≤ 50.0	12[9]	3.8	
		20.0 < W_{gap} ≤ 50.0	12[9]	6.5[17]	
		0.0 < W_{gap} ≤ 20.0	32[1]	0	
	50RB+100RB	15.0 < W_{gap} ≤ 45.0	12[9]	3.4	
		15.0 < W_{gap} ≤ 45.0	12[9]	6.1[17]	
		0.0 < W_{gap} ≤ 15.0	32[1]	0	
	75RB+25RB	25.0 < W_{gap} ≤ 55.0	12[10]	6.0	
		25.0 < W_{gap} ≤ 55.0	12[10]	8.7[17]	
		0.0 < W_{gap} ≤ 25.0	32[1]	0	
	75RB+50RB	20.0 < W_{gap} ≤ 50.0	12[10]	4.7	
		20.0 < W_{gap} ≤ 55.0	12[10]	7.4[17]	
		0.0 < W_{gap} ≤ 20.0	32[1]	0	
	75RB+75RB	15.0 < W_{gap} ≤ 45.0	12[10]	4.2	
		15.0 < W_{gap} ≤ 45.0	12[10]	6.9[17]	
		0.0 < W_{gap} ≤ 15.0	32[1]	0	
	75RB+100RB	10.0 < W_{gap} ≤ 40.0	12[10]	3.8	
		10.0 < W_{gap} ≤ 40.0	12[10]	6.5[17]	
		0.0 < W_{gap} ≤ 10.0	32[1]	0	
	100RB+25RB	15.0 < W_{gap} ≤ 50.0	16[11]	6.5	
		15.0 < W_{gap} ≤ 50.0	16[11]	9.2[17]	
		0.0 < W_{gap} ≤ 15.0	32[1]	0	
	100RB+50RB	10.0 < W_{gap} ≤ 45.0	16[11]	5.1	
		10.0 < W_{gap} ≤ 45.0	16[11]	7.8[17]	
		0.0 < W_{gap} ≤ 10.0	32[1]	0	
	100RB+75RB	5.0 < W_{gap} ≤ 40.0	16[11]	4.5	
		5.0 < W_{gap} ≤ 40.0	16[11]	7.2[17]	
		0.0 < W_{gap} ≤ 5.0	32[1]	0	
	100RB+100RB	0.0 < W_{gap} ≤ 35.0	16[11]	4.1	
		0.0 < W_{gap} ≤ 35.0	16[11]	6.8[17]	
CA_4A-4A	NOTE 6	NOTE 7	NOTE 8	0.0	FDD
CA_5A-5A	25RB+25RB	NOTE 7	12[1]	5.3	FDD
	25RB+50RB	NOTE 7	12[1]	4.4	
	50RB+25RB	NOTE 7	12[1]	5.9	

	50RB+50RB	NOTE 7	12[1]	4.6	
CA_7A-7A	25RB+25RB	0< $W_{gap} \leqslant 60$	25	0.0	FDD
	25RB+50RB	0 < $W_{gap} \leqslant 55$	25	0.0	
	25RB+75RB	0 < $W_{gap} \leqslant 50$	25	0.0	
	25RB+100RB	0 < $W_{gap} \leqslant 45$	25	0.0	
	50RB+25RB	30 < $W_{gap} \leqslant 55$	32[1]	0.0	
		0 < $W_{gap} \leqslant 30$	50	0.0	
	50RB+50RB	25.0 < W_{gap} ≤ 50.0	32[1]	0.0	
		0.0 < W_{gap} ≤ 25.0	50	0.0	
	50RB+75RB	20 < $W_{gap} \leqslant 45$	32[1]	0.0	
		0 < $W_{gap} \leqslant 20$	50	0.0	
	50RB+100RB	15 < $W_{gap} \leqslant 40$	32[1]	0.0	
		0 < $W_{gap} \leqslant 15$	50	0.0	
	75RB+25RB	20.0 < W_{gap} ≤ 50.0	32[1]	0.0	
		0.0 < W_{gap} ≤ 20.0	50[1]	0.0	
	75RB+50RB	20.0 < W_{gap} ≤ 45.0	32[1]	0.0	
		0.0 < W_{gap} ≤ 20.0	50[1]	0.0	
	75RB+75RB	15.0 < W_{gap} ≤ 40.0	32[1]	0.0	
		0.0 < W_{gap} ≤ 15.0	50[1]	0.0	
	75RB+100RB	10 < $W_{gap} \leqslant 35$	32[1]	0.0	
		0 < $W_{gap} \leqslant 10$	50[1]	0.0	
	100RB+25RB	25 < $W_{gap} \leqslant 45$	32[1]	0.0	
		0 < $W_{gap} \leqslant 25$	45[1]	0.0	
	100RB+50RB	20 < $W_{gap} \leqslant 40$	32[1]	0.0	
		0 < $W_{gap} \leqslant 20$	45[1]	0.0	
	100RB+75RB	15.0 < W_{gap} ≤ 35.0	36[1]	0.0	
		0.0 < W_{gap} ≤ 15.0	50[1]	0.0	
	100RB+100RB	15.0 < W_{gap} ≤ 30.0	32[1]	0.0	
		0.0 < W_{gap} ≤ 15.0	45[1]	0.0	
CA_12A-12A	25RB+25RB	0.0 < W_{gap} ≤ 7.0	5[13]	3	FDD
CA_23A-23A	NOTE 6	NOTE 7	NOTE 8	0.0	FDD
CA_25A-25A	25RB+25RB	30.0 < W_{gap} ≤ 55.0	10[1]	5.0	FDD
		0.0 < W_{gap} ≤ 30.0	25[1]	0.0	
	25RB+50RB	25.0 < W_{gap} ≤ 50.0	10[1]	4.5	
		0.0 < W_{gap} ≤ 25.0	25[1]	0.0	
	25RB+75RB	20 < W_{gap} ≤ 45	10[1]	4.3	
		0 < W_{gap} ≤ 20	25[1]	0	
	25RB+100RB	15 < W_{gap} ≤ 40	10[1]	4.1	
		0 < W_{gap} ≤ 15	25[1]	0	
	50RB+25RB	15.0 < W_{gap} ≤ 50.0	10[4]	5.5	
		0.0 < W_{gap} ≤ 15.0	32[1]	0.0	
	50RB+50RB	10.0 < W_{gap} ≤ 45.0	10[4]	5.0	
		0.0 < W_{gap} ≤ 10.0	32[1]	0.0	
	50RB+75RB	5 < W_{gap} ≤ 40	10[4]	4.5	
		0 < W_{gap} ≤ 5	32[1]	0	
	50RB+100RB	0 < W_{gap} ≤ 35	10[4]	4.2	
	75RB+25RB	10 < W_{gap} ≤ 45	10[14]	7.6	
		0 < W_{gap} ≤ 10	32[1]	0	
	75RB+50RB	5 < W_{gap} ≤ 40	10[14]	6.7	
		0 < W_{gap} ≤ 5	32[1]	0	
	75RB+75RB	0 < W_{gap} ≤ 35	10[14]	5.6	
	75RB+100RB	0 < W_{gap} ≤ 30	10[14]	4.8	
	100RB+25RB	0 < W_{gap} ≤ 40	12[15]	8	
	100RB+50RB	0 < W_{gap} ≤ 35	12[15]	6.7	
	100RB+75RB	0 < W_{gap} ≤ 30	12[15]	6.1	
	100RB+100RB	0 < W_{gap} ≤ 25	12[15]	5.7	
CA_40A-40A	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_40A-40C	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_40C-40C	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_41A-41A	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_41A-41C	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_41A-41D	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_41C-41C	NOTE 6	NOTE 7	NOTE 8	0.0	TDD

CA_42A-42A	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_42A-42C	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_42A-42D	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_42C-42C	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_48A-48A	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_48A-48C	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_48A-48D	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_48C-48C	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_48C-48D	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
CA_66A-66A	NOTE 6	NOTE 7	NOTE 8, NOTE 16	0.0	FDD
CA_66A-66B	NOTE 6	NOTE 7	NOTE 8, NOTE 16	0.0	FDD
CA_66A-66C	NOTE 6	NOTE 7	NOTE 8, NOTE 16	0.0	FDD

NOTE 1: refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission.
NOTE 2: W_{gap} is the sub-block gap between the two sub-blocks.
NOTE 3: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.
NOTE 4: refers to the UL resource blocks shall be located at RB_{start}=33.
NOTE 5: For the TDD intra-band non-contiguous CA configurations, the minimum requirements apply only in synchronized operation between all component carriers.
NOTE 6: All combinations of channel bandwidths defined in Table 5.4.2A.1-3.
NOTE 7: All applicable sub-block gap sizes.
NOTE 8: The PCC allocation is same as Transmission bandwidth configuration N_{RB} as defined in Table 5.4.2-1. In case of uplink sub-block is TDD intra-band contiguous CA then the uplink PCC and SCC allocations are the same as N_{RB_agg} defined in Table 7.3A.0-1.
NOTE 9: refers to the UL resource blocks shall be located at RB_{start}=25.
NOTE 10: refers to the UL resource blocks shall be located at RB_{start}=35.
NOTE 11: refers to the UL resource blocks shall be located at RB_{start}=50.
NOTE 12: refers to the UL resource blocks shall be located at RB_{start}=39.
NOTE 13: refers to the UL resource blocks shall be located at RB_{start}=57.
NOTE 14: refers to the UL resource blocks shall be located at RB_{start}=44.
NOTE 15: refers to the UL resource blocks shall be located at RB_{start}=62.
NOTE 16: The carrier centre frequency of PCC in the DL operating band is configured closer to the UL operating band.
NOTE 17: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 18: refers to the UL resource blocks shall be located at RBstart=12.

For intra-band non-contiguous carrier aggregation with two uplink and downlink carriers the reference sensitivity is defined to be met with both downlink and uplink carriers activated. The downlink PCC and SCC minimum requirements for reference sensitivity power level as specified in Table 7.3.3-1, Table 7.3.3-1a, Table 7.3.3-1A, Table 7.3.3-1B and Table 7.3.3-1C are increased by amount of ΔR_{2UL_PCC} and ΔR_{2UL_SCC} which are defined in Table 7.3A.0-4 when uplink PCC and SCC allocations are according to the Table 7.3A.0-4.

Table 7.3A.0-4: Intra-band non-contiguous CA with two uplinks configuration for reference sensitivity

CA configuration	Aggregated channel bandwidth (PCC+SCC)	W_{gap} / [MHz]	UL PCC allocation	UL SCC allocation	ΔR_{2UL_PCC} (dB)	ΔR_{2UL_SCC} (dB)	Duplex mode
CA_4A-4A	NOTE 2	NOTE 3	NOTE 4	NOTE 5	0.0	0.0	FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: All combinations of channel bandwidths defined in Table 5.4.2A.1-3.
NOTE 3: All applicable sub-block gap sizes.
NOTE 4: The PCC allocation is same as Transmission bandwidth configuration N_{RB} as defined in Table 5.4.2-1.
NOTE 5: The SCC allocation is same as Transmission bandwidth configuration N_{RB} as defined in Table 5.4.2-1.

For combinations of intra-band and inter-band carrier aggregation with up to five downlink carriers (up to two non-contiguous sub-blocks per band and up to four contiguously aggregated carriers per band) and up to three uplink carriers (up to two contiguously aggregated carriers per band), the requirement is defined with an uplink configuration in accordance with Table 7.3A.0-3 when the uplink is active in a band supporting two non-contiguous component

carriers, Table 7.3A.0-1 when the uplink (up to two contiguously aggregated uplink carriers) is active in a band supporting two contiguous component carriers and in accordance with Table 7.3.3-2 when an uplink is active in a band supporting one carrier per band. The downlink PCC shall be configured closer to the uplink operating band than the downlink SCC(s) when the uplink is active in band(s) supporting contiguous aggregation of up to four component carriers. The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band when the uplink is active in band(s) supporting non-contiguous aggregation of up to two sub-blocks. For these uplink configurations, the UE shall meet the reference sensitivity requirements for intra-band non-contiguous carrier aggregation of two downlink sub-blocks, the requirements for intra-band contiguous carrier aggregation for the contiguously aggregated downlink carriers and for any remaining component carrier(s) the requirements specified in subclause 7.3.3. For the two component carriers within the same band, ΔR_{IBNC} = 0 dB for all sub-block gaps (Table 7.3A.0-3) when the uplink is active in another band. All downlink carriers shall be active throughout the tests and the requirements for the downlinks shall be met with all uplink carriers active in each band capable of UL operation. For component carriers configured in Band 46, the said requirements for intra-band carrier aggregation of downlink carriers are replaced by the requirements in Table 7.3A.0-0eA for the uplink in any band other than band 46 with the uplink configuration specified in Table 7.3.3-2. Unless given by Table 7.3.3-3, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.4.3-1) configured.

For the UE that supports any of combinations of intra-band and inter-band carrier aggregation given in Table 7.3A.0-5, exceptions to the aforementioned requirements are allowed when the uplink is active in a lower-frequency band and is within a specified frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band as noted in Table 7.3A.0-5. For these exceptions, the UE shall meet the requirements specified in Table 7.3A.0-5 and Table 7.3A.0-6.

Table 7.3A.0-5: Reference sensitivity for carrier aggregation QPSK $P_{REFSENS, CA}$ (exceptions due to harmonic issues in the combinations of intra-band and inter-band CA)

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A-7C-28A[5,6]	1			-89.8	-89.4	-89	-88.7	FDD
	3				-94	-92.2	-91	
					-96.7[11]	-94.9[11]	-93.7[11]	
	7				-95	-93.2	-92	
	28				-95	-93.2	-92	
					-95.3	-93.5	-90.8	
CA_1A-3C-8A[4]	1			N/A	N/A	N/A	N/A	FDD
	3			N/A	N/A	N/A	N/A	
	8		N/A	N/A	N/A			
CA_1A-3A-19A-42C[8,9]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[11]	-99.5[11]	-97.7[11]	-96.5[11]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	19			-100	-97	-95.2		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-19A-42C[10]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[11]	-99.5[11]	-97.7[11]	-96.5[11]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	19			-100	-97	-95.2		
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_1A-3A-21A-42C[8,9]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[4]	-99.5[4]	-97.7[4]	-96.5[4]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[4]	-96.4[4]	-94.6[4]	-93.4[4]	
	21			-99.5	-96.5	-94.7		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-21A-42C[10]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[4]	-99.5[4]	-97.7[4]	-96.5[4]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[4]	-96.4[4]	-94.6[4]	-93.4[4]	
	21			-99.5	-96.5	-94.7		
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_1A-3C-28A	1			-89.8	-89.4	-89	-88.7	FDD
	3			-97	-94	-92.2	-91	
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	28			-98.3	-95.3	-93.5	-90.8	

CA_1A-3A-28A-42C[8,9]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[4]	-99.5[4]	-97.7[4]	-96.5[4]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[4]	-96.4[4]	-94.6[4]	-93.4[4]	
	28			-98.3	-95.3			
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-28A-42C[10]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[4]	-99.5[4]	-97.7[4]	-96.5[4]	
	3			-96.7	-93.7	-91.9	-90.7	
				-99.4[4]	-96.4[4]	-94.6[4]	-93.4[4]	
	28			-98.3	-95.3			
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_1A-3A-42C[8,9]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[1][1]	-99.5[11]	-97.7[11]	-96.5[11]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_1A-3A-42C[10]	1			-99.8	-96.8	-95	-93.8	FDD
				-102.5[1][1]	-99.5[11]	-97.7[11]	-96.5[11]	
	3			-96.8	-93.8	-92	-90.8	
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	42			-97.1	-94.7	-93.2	-92.5	TDD

CA_1A-7C-28A[5,6]	1			-89.8	-89.4	-89	-88.7	FDD
	7				-95	-93.2	-92	
					-97.7[11]	-95.9[11]	-94.7[11]	
	28				-95.3	-93.5	-90.8	
CA_1A-21A-28A-42C[4, 14]	1			N/A	N/A	N/A	N/A	FDD
	21			N/A	N/A	N/A		
	28			N/A	N/A			
	42			N/A	N/A	N/A	N/A	TDD
CA_1A-28A-42C[5,6,12,13]	1			-89.8	-89.4	-89	-88.7	FDD
	28			-98.3	-95.3			
	42			-85.7	-85.4	-85.1	-84.9	TDD
CA_2A-2A-4A-12A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	4			-90	-89.5	-89	-88.5	
	12			-96.5	-93.5			
CA_2A-2A-5A-12A-66A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	5			-97.5	-94.5			
	12			-96.5	-93.5			
	66			-89.5	-89	-88.5	-88	
CA_2A-2A-12A-30A-66A[5,6]	2			-97.6	-94.6	-92.8	-91.6	FDD
				-100.3[20]	-97.3[20]	-95.5[20]	-94.3[20]	
	12			-96.5	-93.5			
	30			-98.5	-95.5			
	66			-89.5	-89	-88.5	-88	
CA_2A-2A-12A-66A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	12			-96.5	-93.5			
	66			-89.5	-89	-88.5	-88	
CA_2A-2A-12B-66A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	12			-96.5	-93.5			
	66			-89.5	-89	-88.5	-88	
CA_2A-12B-66A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	12			-96.5	-93.5			
	16			-89.5	-89	-88.5	-88	

CA_2A-12B-66A-66A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	12			-96.5	-93.5			
	66			-89.5	-89	-88.5	-88	
CA_2A-4A-4A-12A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	4			-90	-89.5	-89	-88.5	
	12			-96.5	-93.5			
CA_2A-4A-12A-12A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	4			-90	-89.5	-89	-88.5	
	12			-96.5	-93.5			
CA_2A-4A-12B[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[20]	-97.4[20]	-95.6[20]	-94.4[20]	
	4			-90	-89.5	-89	-88.5	
	12			-96.5	-93.5			
CA_2A-12A-66A-66A[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	12			-96.5	-93.5			
	66			-89.5	-89	-88.5	-88	
CA_2A-12A-66C[5,6]	2			-97.7	-94.7	-92.9	-91.7	FDD
				-100.4[11]	-97.4[11]	-95.6[11]	-94.4[11]	
	12			-96.5	-93.5			
	66			-89.5	-89	-88.5	-88	
CA_3A-3A-7A-7A-8A[4]	3			N/A	N/A	N/A	N/A	
	7			N/A	N/A	N/A	N/A	
	8			N/A	N/A			
CA_3A-3A-7A-7A-8A[4,5,6]	3			-97	-94	-92.2	-91	FDD
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	7			-88	-87,4	-87	-86,7	
	8			-96,8	-93,8			
CA_3A-3A-7A-8A[4]	3			N/A	N/A	N/A	N/A	FDD
	7			N/A	N/A	N/A	N/A	
	8			N/A	N/A			
CA_3A-3A-7A-8A[4,5,6]	3			-97	-94	-92.2	-91	FDD
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	7			-88	-87.4	-87	-86.7	
	8			-96.8	-93.8			
CA_3A-3A-8A[4]	3			N/A	N/A	N/A	N/A	FDD
	8			N/A	N/A			
CA_3A-7A-7A-8A[4]	3			N/A	N/A	N/A	N/A	FDD
	7			N/A	N/A	N/A	N/A	
	8			N/A	N/A			
CA_3A-7A-7A-8A[4,5,6]	3			-97	-94	-92.2	-91	FDD
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	7			-88	-87.4	-87	-86.7	
	8			-96.8	-93.8			
CA_3A-19A-42C[8,9]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	

	19			-100	-97	-95.2		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-19A-42C[10]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	19			-100	-97	-95.2		
	42			-97.1	-94.7	-93.2	-92.5	TDD

CA_3A-21A-42C[1,2]	3			-96.7	-93.7	-91.9	-90.7	FDD
				-99.4[4]	-96.4[4]	-94.6[4]	-93.4[4]	
	21			-99.5	-96.5	-94.7		
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-21A-42C[3]	3			-96.7	-93.7	-91.9	-90.7	FDD
				-99.4[4]	-96.4[4]	-94.6[4]	-93.4[4]	
	21			-99.5	-96.5	-94.7		
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-28A-40C[8,9]	3			-97	-94	-92.2	-91	FDD
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	28			-60.7	-60.7	-60.7	-60.7	
	40			-100	-97	-95.2	-94	TDD
CA_3A-28A-40D[8,9]	3			-97	-94	-92.2	-91	FDD
				-99.7[11]	-96.7[11]	-94.9[11]	-93.7[11]	
	28			-60.7	-60.7	-60.7	-60.7	
	40				-97	-95.2	-94	TDD
CA_3A-28A-41A-42C[8,9,20]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD
					-97.2[11]	-95.4[11]	-94.2[11]	
	42				-71.7	-71.7	-71.7	
CA_3A-28A-41A-42C[10,20]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD
					-97.2[11]	-95.4[11]	-94.2[11]	
	42				-94.7	-93.2	-92.5	
CA_3A-28A-41A-42C[12,13,20]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD
					-97.2[11]	-95.4[11]	-94.2[11]	
	42				-85.4	-85.1	-84.9	
CA_3A-28A-41C-42A[8,9,20]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD
					-97.2[11]	-95.4[11]	-94.2[11]	
	42				-71.7	-71.7	-71.7	
CA_3A-28A-41C-42A[10,20]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD
					-97.2[11]	-95.4[11]	-94.2[11]	
	42				-94.7	-93.2	-92.5	
CA_3A-28A-41C-42A[12,13,20]	3			-96.5	-93.5	-91.7	-90.5	FDD
				-99.2[11]	-96.2[11]	-94.4[11]	-93.2[11]	
	28			-98.3	-95.3			
	41				-94.5	-92.7	-91.5	TDD
					-97.2[11]	-95.4[11]	-94.2[11]	
	42				-85.4	-85.1	-84.9	
CA_3A-28A-42C[8,9]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	28			-98.3	-95.3			
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-28A-42C[10]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[6]	-96.5 [6]	-94.7[6]	-93.5[6]	
	28			-98.3	-95.3			
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3A-28A-42C[12,13]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[6]	-96.5[6]	-94.7[6]	-93.5[6]	
	28			-98.3	-95.3			
	42			-85.7	-85.4	-85.1	-84.9	TDD
CA_3A-42C[8,9]	3			-96.8	-93.8	-92	-90.8	FDD

				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	42			-71.7	-71.7	-71.7	-71.7	TDD
CA_3A-42C[10]	3			-96.8	-93.8	-92	-90.8	FDD
				-99.5[11]	-96.5[11]	-94.7[11]	-93.5[11]	
	42			-97.1	-94.7	-93.2	-92.5	TDD
CA_3C-8A[4]	3			N/A	N/A	N/A	N/A	FDD
	8		N/A	N/A	N/A			
CA_4A-4A-5A-12A[5,6]	4			-90	-89.5	-89	-88.5	FDD
	5			-97.5	-94.5			
	12			-96.5	-93.5			
CA_4A-4A-12A[5,6]	4			-90	-89.5	-89	-88.5	FDD
	12			-96.5	-93.5			
CA_4A-4A-12A-12A[5,6]	4			-90	-89.5	-89	-88.5	FDD
	12			-96.5	-93.5			
CA_4A-4A-12A-30A[5,6]	4			-90	-89.5	-89	-88.5	FDD
	12			-96.5	-93.5			
	30			-98.5	-95.5			
CA_4A-4A-12B[5,6]	4			-90	-89.5	-89	-88.5	FDD
	12			-96.5	-93.5			
CA_4A-5A-12B[5,6]	4			-90	-89.5	-89	-88.5	FDD
	5			-97.5	-94.5			
	12			-96.5	-93.5			
CA_4A-12A-12A[5,6]	4			-90	-89.5	-89	-88.5	FDD
	12			-96.5	-93.5			
CA_4A-12B[5,6]	4			-90	-89.5	-89	-88.5	FDD
	12			-96.5	-93.5			
CA_4A-5A-12A-12A[5,6]	4			-90	-89.5	-89	-88.5	FDD
	5			-97.5	-94.5			
	12			-96.5	-93.5			
CA_7A-7A-8A[5,6]	7			-88	-87.4	-87	-86.7	FDD
	8			-96.8	-93.8			
CA_8A-41C[7]	8	N/A	N/A	N/A	N/A			FDD
	41				N/A	N/A	N/A	TDD
CA_8A-42C[15,16]	8	-102	-99	-96.8	-93.8			FDD
	42			-84.8	-84.7	-84.6	-84.5	TDD
CA_12A-66A-66A[5,6]	12			-96.5	-93.5			FDD
	66			-89.5	-89	-88.5	-88	
CA_12A-66C[5,6]	12			-96.5	-93.5			FDD
	66			-89.5	-89	-88.5	-88	
CA_12B-66A[5,6]	12			-96.5	-93.5			FDD
	66			-89.5	-89	-88.5	-88	
CA_12B-66A-66A[5,6]	12			-96.5	-93.5			FDD
	66			-89.5	-89	-88.5	-88	

CA_21A-28A-42C[4,14]	21			N/A	N/A	N/A	N/A	FDD
	28			N/A	N/A	N/A		
	42			N/A	N/A			TDD
CA_26A-41C[7]	26			N/A	N/A	N/A		FDD
	41			N/A	N/A	N/A	N/A	TDD
CA_28A-40C[16,17]	28			-60.7	-60.7	-60.7	-60.7	FDD
	40			-100	-97	-95.2	-94	TDD
CA_28A-40D[16,17]	28			-60.7	-60.7	-60.7	-60.7	FDD
	40			-100	-97	-95.2	-94	TDD
CA_28A-41A-42C[12, 13]	28			-98.3	-95.3			FDD
	41				-94.6	-92.8	-91.6	TDD
	42				-85.4	-85.1	-84.9	
CA_28A-41C-42A[12, 13]	28			-98.3	-95.3			FDD
	41				-94.6	-92.8	-91.6	TDD
	42				-85.4	-85.1	-84.9	
CA_28A-41C-42C[12,13]	28			-98.3	-95.3			FDD
	41				-94.6	-92.8	-91.6	TDD
	42				-85.4	-85.1	-84.9	
CA_28A-42C[12,13]	28			-98.3	-95.3	-93.5	-92.3	FDD
	42			-85.7	-85.4	-85.1	-84.9	TDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: The signal power is specified per port
NOTE 4: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity is only verified when this is not the case (the requirements specified in clause 7.3.3 apply unless otherwise specified).
NOTE 5: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band.
NOTE 6: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$ with f_{DL}^{HB} the carrier frequency of a high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the low band.
NOTE 7: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity is only verified when this is not the case (the requirements specified in clause 7.3.3 apply).
NOTE 8: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the E-UTRA configuration: ΔF_{HD} = 10 MHz for CA_3A-42C, CA_1A-3A-19A-42C, CA_1A-3A-21A-42C, CA_1A-3A-42C, CA_3A-28A-42C, CA_3A-19A-42C, CA_3A-28A-41A-42C and CA_3A-28A-41C-42A.
NOTE 9: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.
NOTE 10: The requirements are only applicable to channel bandwidths with a carrier frequency at $\pm(20 + BW_{Channel}^{HB}/2)$ MHz offset from $2 f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.
NOTE 11: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 12: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 5th transmitter harmonic is within the downlink transmission bandwidth of a high band.
NOTE 13: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.5 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} the carrier frequency of a high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the low band.

NOTE 14: No requirements apply when there is at least one individual RE on band 28 uplink outside frequencies 728 – 738 MHz. The reference sensitivity is only verified when all configured RE's are confined within frequencies 728 – 738 MHz (the requirements specified in clause 7.3.1 of [6] apply).

NOTE 15: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 4th transmitter harmonic is within the downlink transmission bandwidth of a high band.

NOTE 16: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.4 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} the carrier frequency of a high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the low band.

NOTE 17: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3rd harmonic is within the uplink transmission bandwidth or the uplink adjacent channel's transmission bandwidth of an aggressor (higher) band.

NOTE 18: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{LB} the carrier frequency in the victim (lower) band and $BW_{Channel}^{HB}$ the channel bandwidth configured in the higher band.

NOTE 19: The requirement for B46 does not apply when there is at least one individual RE within the B46 downlink transmission bandwidth which falls into the reference sensitivity exclusion region as specified in Table 6.2.4.3-3.

NOTE 20: The B41 requirements are modified by -0.1dB when carrier frequency of the assigned E-UTRA channel bandwidth is within 2545-2690 MHz.

Table 7.3A.0-6: Uplink configuration for the low band (exceptions due to harmonic issues in the combinations of intra-band and inter-band CA)

E-UTRA Band / Channel bandwidth of the high band / N_{RB} / Duplex mode								
EUTRA CA Configuration	**UL band**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex mode**
CA_1A-3A-7C-28A	28				16	25	25	FDD
CA_1A-3A-19A-42C	3			12	25	36	50	FDD
CA_1A-3A-21A-42C	3			12	25	36	50	FDD
CA_1A-3C-28A	28			8	16	25	25	FDD
CA_1A-3A-28A-42C	3			12	25	36	50	FDD
CA_1A-3A-42C	3			12	25	36	50	FDD
CA_1A-7C-28A	28				16	25	25	FDD
CA_1A-28A-42C	28			8	16	25	25	FDD
CA_2A-2A-4A-12A	12			8	16	20	20	FDD
CA_2A-2A-5A-12A-66A	12			8	16	20	20	FDD
CA_2A-2A-12A-30A-66A	12			8	16	25	25	FDD
CA_2A-2A-12A-66A	12			8	16			FDD
CA_2A-2A-12B-66A	12			8	16	20	20	FDD
CA_2A-4A-4A-12A	12			8	16	20	20	FDD
CA_2A-4A-12A-12A	12			8	16	20	20	FDD
CA_2A-4A-12B	12			8	16			FDD
CA_2A-12A-66A-66A	12			8	16			FDD
CA_2A-12A-66C	12			8	16			FDD
CA_2A-12B-66A	12			8	16	20	20	FDD
CA_2A-12B-66A-66A	12			8	16	20	20	FDD
CA_2A-46A-46A-66A CA_2A-46C-66A	2			25	50	50[1]	50[1]	FDD
CA_2A-46A-46A-66A CA_2A-46C-66A	66			25	50	50[1]	50[1]	FDD
CA_3A-3A-7A-7A-8A	8			8	16	25	25	FDD
CA_3A-3A-7A-8A	8			8	16	25	25	FDD
CA_3A-7A-7A-8A	8			8	16	25	25	FDD
CA_3A-19A-42C	3			12	25	36	50	FDD
CA_3A-42C	3			12	25	36	50	FDD
CA_3A-21A-42C	3			12	25	36	50	FDD
CA_3A-28A-40C	40			25	50	75	100	TDD
CA_3A-28A-40D	40				50	75	100	TDD
CA_3A-28A-41A-42C	3				25	36	50	FDD
	28				10	15	20	FDD
CA_3A-28A-41C-42A	3				25	36	50	FDD
	28				10	15	20	FDD
CA_3A-28A-42C	3			12	25	36	50	FDD
CA_3A-28A-42C	28			8	16			FDD
CA_4A-4A-5A-12A	12			8	16	20	20	FDD
CA_4A-4A-12A	12			8	16	20	20	FDD
CA_4A-4A-12A-12A	12			8	16	20	20	FDD
CA_4A-4A-12A-30A	12			8	16	20	20	FDD
CA_4A-4A-12B	12			8	16			FDD
CA_4A-12A-12A	12			8	16	20	20	FDD

CA_4A-12B	12			8	16	20	20	FDD
CA_4A-5A-12A-12A	12			8	16	20	20	FDD
CA_4A-5A-12B	12			8	16			FDD
CA_7A-7A-8A	8			8	16	25	25	FDD
CA_8A-42C	8			8	16	25	25	FDD
CA_12A-66A-66A	12			8	16	20	20	FDD
CA_12A-66C	12			8	16	20	20	FDD
CA_12B-66A	12			8	16	20	20	FDD
CA_12B-66A-66A	12			8	16	20	20	FDD
CA_28A-40C	40			25	50	75	100	TDD
CA_28A-40D	40			25	50	75	100	TDD
CA_28A-41A-42C	28				10	15	20	FDD
CA_28A-41C-42A	28				10	15	20	FDD
CA_28A-41C-42C	28				10	15	20	FDD
CA_28A-42C	28			5	10	15	20	FDD

NOTE 1: refers to the UL resource blocks, which shall be centred within the transmission bandwidth configuration for the channel bandwidth.
NOTE 2: the UL configuration applies regardless of the channel bandwidth of the low band unless the UL resource blocks exceed that specified in Table 7.3.3-2 for the uplink bandwidth in which case the allocation according to Table 7.3.3-2 applies.

The normative reference for this requirement is TS 36.101[2] clause 7.3.1 and 7.3.1A.

7.3A.1 Reference sensitivity level for CA (intra-band contiguous DL CA and UL CA)

7.3A.1.1 Test purpose

To verify the ability of UE that support CA to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

7.3A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.1.4 Test description

7.3A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3A.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3A.1.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	C: Low range, High range
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 3)

Test Parameters for CA Configurations

CA Configuration / N_{RB_agg}		DL Allocation		UL Allocation					
PCC N_{RB}	SCC N_{RB}	CC MOD	PCC & SCC RB allocation	CC MOD	N_{RB_alloc}	PCC & SCC RB allocations (L_{CRB} @ RB_{start})			
50	25	QPSK	50+25	QPSK	25	P_25@25	S_0@0	-	-
50	50	QPSK	50+50	QPSK	25	P_25@25	S_0@0	-	-
50	100	QPSK	50+100	QPSK	150	P_50@0	S_100@0	-	-
75	50	QPSK	75+50	QPSK	75	P_75@0	S_0@0	-	-
75	75	QPSK	75+75	QPSK	75	P_75@0	S_0@0	-	-
75	75	QPSK	75+75	QPSK	129	P_75@0	S_54@0	-	-
75	75	QPSK	75+75	QPSK	150	P_75@0	S_75@0	-	-
100	25	QPSK	100+25	QPSK	50	P_50@50	S_0@0	-	-
100	25	QPSK	100+25	QPSK	125	P_100@0	S_25@0	-	-
100	50	QPSK	100+50	QPSK	75	P_75@25	S_0@0	-	-
100	50	QPSK	100+50	QPSK	150	P_100@0	S_50@0	-	-
100	75	QPSK	100+75	QPSK	175	P_100@0	S_75@0	-	-
100	100	QPSK	100+100	QPSK	50	P_50@50	S_0@0	-	-
100	100	QPSK	100+100	QPSK	75	P_75@50	S_0@0	-	-
100	100	QPSK	100+100	QPSK	130	P_100@0	S_30@0	-	-
100	100	QPSK	100+100	QPSK	200	P_100@0	S_100@0	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.0-1 for UE supporting two uplink carriers is tested per Test CA configuration.
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg}, only the combination with the highest NRB_PCC is tested.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.32 as appropriate if the UE supports 2 Rx antennas or Figure A.80 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.3A.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3A.1.4.3.

7.3A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.3A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the appropriate REFSENS value defined in Table 7.3A.1.5-1. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

7. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

CA Configuration	100RB+25RB		100RB+50RB		75RB+75RB		75RB+50RB		100RB+75RB		100RB+100RB	
	100RB	25RB	100RB	50RB	75RB	75RB	75RB	50RB	100RB	75RB	100RB	100RB
CA_1C	-	-	-	-	-94.5	-94.5	-	-	-	-	-93.3	-93.3
					-97.2[4]	-97.2[4]					-96.0[4]	-96.0[4]
CA_3C	-90.3	-96.3	-90.3	-93.3	-	-	-	-	-90.3	-91.5	-90.3	-90.3
	-93.0[4]	-99.0[4]	-93.0[4]	-96.0[4]					-93.0[4]	-94.2[4]	-93.0[4]	-93.0[4]
CA_7C	-	-	-	-	-92.5	-92.5	-92.5	-94.3	-	-	-91.3	-91.3
					-95.2[4]	-95.2[4]	-95.2[4]	-97.0[4]			-94.0[4]	-94.0[4]
CA_38C	-	-	-	-	-94.5	-94.5	-	-	-	-	-93.3	-93.3
CA_39C	-93.3	-99.3	-93.3	-96.3	-	-	-	-	-93.3	-94.5	-	-
	-96.0[4]	-102.0[4]	-96.0[4]	-99.0[4]					-96.0[4]	-97.2[4]		
CA_40C	-	-	-93.3	-96.3	-94.5	-94.5	-	-	-93.3	-94.5	-93.3	-93.3
			-96.0[4]	-99.0[4]	-97.2[4]	-97.2[4]			-96.0[4]	-97.2[4]	-96.0[4]	-96.0[4]
CA_41C	-91.3	-97.3	-91.3	-94.3	-92.5	-92.5	-92.5	-94.3	-91.3	-92.5	-91.3	-91.3
			-94.0[4]	-97.0[4]	-95.2[4]	-95.2[4]	-95.2[4]	-97.0[4]	-94.0[4]	-95.2[4]	-94.0[4]	-94.0[4]
CA_42C	-92	-98	-92	-95	-	-	-	-	-92	-93.2	-92	-92
	-94.2[4]	-100.2[4]	-94.2[4]	-97.2[4]					-94.2[4]	-95.4[4]	-94.2[4]	-94.2[4]

Note 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two u carriers.
Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as desc Annex A.5.1.1/A.5.2.1
Note 3: The signal power is specified per port
Note 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

7.3A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

7.3A.1.5 Test requirement

For intra-band contiguous carrier aggregation the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.1.5-1 and table 7.3A.1.5-2.

Table 7.3A.1.5-1: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

In case the UE supports more than one of the inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL (i.e. bands listed in Table 7.3A.0-0a), then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied
- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 7.3.3-1A that would apply for that operating band among the supported CA configurations

The reference receive sensitivity (REFSENS) requirement for intra-band specified in Table 7.3A.1.5-1 shall be met for each uplink CA configurations less than or equal to that specified in Table 7.3A.1.5-2.

NOTE: Table 7.3A.1.5-2 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3A.1.5-2: Intra-band CA uplink configuration for reference sensitivity

CA configuration / CC combination / NRB_agg / Duplex mode													
CA configuration	100RB+25RB		100RB+50RB		75RB+75RB		75RB+50RB		100RB+75RB		100RB+100RB		Duplex Mode
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	

CA_1C	N/A	N/A	N/A	N/A	75	54	N/A	N/A	N/A	N/A	100	30	FDD
CA_3C	50	0	50	0	N/A	N/A	N/A	N/A	50	0	50	0	FDD
CA_7C	N/A	N/A	N/A	N/A	75	0	75	0	N/A	N/A	75	0	FDD
CA_38C	N/A	N/A	N/A	N/A	75	75	N/A	N/A	N/A	N/A	100	100	TDD
CA_39C	100	25	100	50	N/A	N/A	N/A	N/A	100	75	N/A	N/A	TDD
CA_40C	N/A	N/A	100	50	75	75	N/A	N/A	100	75	100	100	TDD
CA_41C	100	25	100	50	75	75	75	50	100	75	100	100	TDD
CA_42C	100	25	100	50	N/A	N/A	N/A	N/A	100	75	100	100	TDD

Note 1: The carrier centre frequency of SCC in the UL operating band is configured closer to the DL operating band.
Note 2: The transmitted power over both PCC and SCC shall be set to P_{UMAX} as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two uplink carriers.
Note 3: The UL resource blocks in both PCC and SCC shall be confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2A-1).
Note 4: The UL resource blocks in PCC shall be located as close as possible to the downlink operating band, while the UL resource blocks in SCC shall be located as far as possible from the downlink operating band.
Note 5: In case a CA configuration consists of CC channel bandwidths which are unequal in bandwidth the PCC channel bandwidth shall be the larger one for reference sensitivity test.

7.3A.2 Reference sensitivity level for CA (intra-band contiguous DL CA without UL CA)

7.3A.2.1 Test purpose

Same as in clause 7.3A.1.1.

7.3A.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA. This test case applies only for CA Configurations that do not support UL CA.

7.3A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.2.4 Test description

7.3A.2.4.1 Initial conditions

Same as in clause 7.3A.1.4.1 with the following exceptions:

- Instead of Table 7.3A.1.4.1-1→ use Table 7.3A.2.4.1-1.

Table 7.3A.2.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			B: Low range, High range C: Low range, High range (Note 4)						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg}, Highest N_{RB_agg} (Notes 3, 4)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**					
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	QPSK	6+25	QPSK	6	P_6@0	-	-	-
15	50	QPSK	15+50	QPSK	15	P_15@0	-	-	-
25	25	QPSK	25+25	QPSK	20	P_20@0	-	-	-
25	25	QPSK	25+25	QPSK	25	P_25@0	-	-	-
25	50	QPSK	25+50	QPSK	20	P_20@0	-	-	-
25	100	QPSK	25+100	QPSK	25	P_25@0	-	-	-
50	25	QPSK	50+25	QPSK	25	P_25@25	-	-	-
50	50	QPSK	50+50	QPSK	25	P_25@25	-	-	-
50	50	QPSK	50+50	QPSK	50	P_50@0	-	-	-
50	75	QPSK	50+75	QPSK	50	P_50@0	-	-	-
75	25	QPSK	75+25	QPSK	75	P_75@0	-	-	-
75	50	QPSK	75+50	QPSK	75	P_75@0	-	-	-
75	75	QPSK	75+75	QPSK	75	P_75@0	-	-	-
100	25	QPSK	100+25	QPSK	50	P_50@50	-	-	-
100	25	QPSK	100+25	QPSK	100	P_100@0	-	-	-
100	50	QPSK	100+50	QPSK	75	P_75@25	-	-	-
100	50	QPSK	100+50	QPSK	100	P_100@0	-	-	-
100	75	QPSK	100+75	QPSK	100	P_100@0	-	-	-
100	100	QPSK	100+100	QPSK	50	P_50@50	-	-	-
100	100	QPSK	100+100	QPSK	75	P_75@25	-	-	-
100	100	QPSK	100+100	QPSK	100	P_100@0	-	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3.3-2 for UE supporting one uplink carrier is tested per Test CA configuration.									
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.									
Note 4: For CA_70C all test frequency IDs shall be tested according to table 4.3.1.1.70A-1, in TS 36.508 [7].									

7.3A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.3A.2.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.2.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the appropriate REFSENS value defined in Tables 7.3A.1.5-1 to 7.3A.1.5-7. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

7. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

7.3A.2.4.3 Message contents

Same as in clause 7.3A.1.4.3.

7.3A.2.5 Test requirement

Same as in clause 7.3A.1.5 with the following test requirement defined in Table 7.3A.2.5-1 additions.

Table 7.3A.2.5-1: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band contiguous DL CA without UL CA

CA Configuration	25RB+6RB		25RB+15RB		25RB+25RB		50RB+6RB		50RB+15RB		Duplex Mode
	25RB	6RB	25RB	15RB	25RB	25RB	50RB	6RB	50RB	15RB	
CA_27B	-97.3	-102.5	-97.3	-99.5	-97.3	-97.3	-94.3	-102.5	-94.3	-99.5	FDD
Note 1: The transmitter shall be set to P_{UMAX} as defined in clause 6.2.5 Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 Note 3: The signal power is specified per port											

Table 7.3A.2.5-2: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band contiguous DL CA without UL CA (table 2)

CA Configuration	50RB+50RB		25RB+75RB								Duplex Mode
	50RB	50RB	25RB	75RB							
CA_23B	-96.3	-96.3	-99.3	-94.5							FDD
Note 1: The transmitter shall be set to P_{UMAX} as defined in clause 6.2.5 Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 Note 3: The signal power is specified per port											

Table 7.3A.2.5-3: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band contiguous DL CA without UL CA (table 3)

Configuration / CC combination / N_{RB_agg} / Duplex mode													
CA configuration	100RB+25RB		100RB+50RB		75RB+75RB		75RB+50RB		100RB+75RB		100RB+100RB		Duplex Mode
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	
CA_66C	-92.8	-98.8	-92.8	-95.8	-94	-94	-94	-95.8	-92.8	-94	-92.8	-92.8	FDD
Note 1: The transmitter shall be set to P_{UMAX} as defined in clause 6.2.5 Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 Note 3: The signal power is specified per port													

Table 7.3A.2.5-4: Intra-band CA without UL CA uplink configuration for reference sensitivity (table 4)

CA configuration / CC combination / N_{RB_agg} / Duplex mode													
Uplink CA configuration	100RB+25RB		100RB+50RB		75RB+75RB		75RB+50RB		100RB+75RB		100RB+100RB		Duplex Mode
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	
CA_66C (NOTE 7)	100	N/A	100	N/A	75	N/A	75	N/A	100	N/A	100	N/A	FDD

NOTE 1: The carrier centre frequency of SCC in the UL operating band is configured closer to the DL operating band.
NOTE 2: The transmitted power over both PCC and SCC shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 3: The UL resource blocks in both PCC and SCC shall be confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1).
NOTE 4: The UL resource blocks in PCC shall be located as close as possible to the downlink operating band, while the UL resource blocks in SCC shall be located as far as possible from the downlink operating band.
NOTE 5: In case a CA configuration consists of CC channel bandwidths which are unequal in bandwidth the PCC channel bandwidth shall be the larger one for reference sensitivity test.
NOTE 6: Void.
NOTE 7: The PCC is contained within 1710-1780 MHz.

Table 7.3A.2.5-5: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band contiguous DL CA without UL CA (table 5)

Configuration / CC combination / N_{RB_agg} / Duplex mode									
CA configuration	75RB+25RB		50RB+50RB		50RB+25RB		25RB+25RB		Duplex Mode
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	
CA_66B	-94	-98.8	-95.8	-95.8	-95.8	-98.8	-98.8	-98.8	FDD

Note 1: The transmitter shall be set to P_{UMAX} as defined in clause 6.2.5A
Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
Note 3: The signal power is specified per port

Table 7.3A.2.5-6: Intra-band CA without UL CA uplink configuration for reference sensitivity (table 6)

Configuration / CC combination / N_{RB_agg} / Duplex mode									
Uplink CA configuration	75RB+25RB		50RB+50RB		50RB+25RB		25RB+25RB		Duplex Mode
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	
CA_66B (NOTE 7)	75	N/A	50	N/A	50	N/A	25	N/A	FDD

NOTE 1: The carrier centre frequency of SCC in the UL operating band is configured closer to the DL operating band.
NOTE 2: The transmitted power over both PCC and SCC shall be set to PUMAX as defined in subclause 6.2.5A.
NOTE 3: The UL resource blocks in both PCC and SCC shall be confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1).
NOTE 4: The UL resource blocks in PCC shall be located as close as possible to the downlink operating band, while the UL resource blocks in SCC shall be located as far as possible from the downlink operating band.
NOTE 5: In case a CA configuration consists of CC channel bandwidths which are unequal in bandwidth the PCC channel bandwidth shall be the larger one for reference sensitivity test.
NOTE 6: Void.
NOTE 7: The PCC is contained within 1710-1780 MHz.

Table 7.3A.2.5-7: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band contiguous DL CA without UL CA (table 7)

Configuration / CC combination / N_{RB_agg} / Duplex mode													
CA configuration	25RB+100RB		50RB+75RB		75RB+50RB								Duplex Mode
	PCC	SCC	PCC	SCC	PCC	SCC							
CA_70C	-99.3	-93.3	-96.3	-94.5	-94.5	-96.3							FDD
Note 1: The transmitter shall be set to P_{UMAX} as defined in clause 6.2.5 Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 Note 3: The signal power is specified per port													

7.3A.3 Reference sensitivity level for CA (inter-band DL CA without UL CA)

7.3A.3.1 Test purpose

Same as in clause 7.3A.1.1.

7.3A.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 2DL CA with FDD-TDD inter-band CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support DL LAA.

7.3A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.3.4 Test description

7.3A.3.4.1 Initial conditions

Same as in clause 7.3A.1.4.1 with the following exceptions:

- Instead of Table 7.3A.1.4.1-1→ use Table 7.3A.3.4.1-1.
- Instead of clause 7.3A.1.4.3 use clause 7.3A.3.4.3.

Table 7.3A.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1					NC, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2.					A: Mid range for PCC and SCC, unless otherwise specified in the Tables 7.3A.3.4.1-2 to 7.3A.3.4.1-29	
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Highest N_{RB_agg}, unless otherwise specified in the Tables 7.3A.3.4.1-2 to 7.3A.3.4.1-29	
Network signalling value					NS_01 Unless given by Table 7.3.3.-3 for the band with active uplink carrier	
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**			**UL Allocation**	
PCC NRB	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC N_{RB_alloc}**
25	25	QPSK	25	25	QPSK	25
25	25	QPSK	25	25	QPSK	8
50	50	QPSK	50	50	QPSK	50
50	50	QPSK	50	50	QPSK	25
50	50	QPSK	50	50	QPSK	20
50	50	QPSK	50	50	QPSK	16
50	75	QPSK	50	75	QPSK	50
50	75	QPSK	50	75	QPSK	25
50	75	QPSK	50	75	QPSK	20
50	100	QPSK	50	100	QPSK	50
50	100	QPSK	50	100	QPSK	25
50	100	QPSK	50	100	QPSK	20
75	25	QPSK	75	25	QPSK	75
75	25	QPSK	75	25	QPSK	20
75	50	QPSK	75	50	QPSK	75
75	50	QPSK	75	50	QPSK	50
75	50	QPSK	75	50	QPSK	25
75	50	QPSK	75	50	QPSK	20
75	50	QPSK	75	50	QPSK	18
75	75	QPSK	75	75	QPSK	75
75	75	QPSK	75	75	QPSK	50
75	75	QPSK	75	75	QPSK	25
75	75	QPSK	75	75	QPSK	20
75	100	QPSK	75	100	QPSK	75
75	100	QPSK	75	100	QPSK	50

75	100	QPSK	75	100	QPSK	25
75	100	QPSK	75	100	QPSK	20
100	25	QPSK	100	25	QPSK	25
100	50	QPSK	100	50	QPSK	100
100	50	QPSK	100	50	QPSK	75
100	50	QPSK	100	50	QPSK	50
100	50	QPSK	100	50	QPSK	25
100	50	QPSK	100	50	QPSK	20
100	75	QPSK	100	75	QPSK	100
100	75	QPSK	100	75	QPSK	75
100	75	QPSK	100	75	QPSK	50
100	75	QPSK	100	75	QPSK	25
100	75	QPSK	100	75	QPSK	25
100	75	QPSK	100	75	QPSK	20
100	100	QPSK	100	100	QPSK	20
100	100	QPSK	100	100	QPSK	25
100	100	QPSK	100	100	QPSK	45
100	100	QPSK	100	100	QPSK	50
100	100	QPSK	100	100	QPSK	75
100	100	QPSK	100	100	QPSK	100

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.3.5-2 for UE supporting one uplink carrier is tested per Test CA configuration.
Note 3: The UL resource blocks shall be located as close as possible to the downlink PCC but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 4: The frequencies of PCC and SCC shall be switched and tested in each configuration, according to the UE declared capability for UL support (within CA operation) in the individual bands.

Table 7.3A.3.4.1-1a: Void

Table 7.3A.3.4.1-2: Test frequencies and Test CC combinations for CA_1A-3A

CBW			Band 3		
			5MHz	15MHz	20MHz
			High range		
Band 1 as PCC (Note 1)	**20MHz**	**Low range**	X^2	X^2	X^2
		Mid range	-	-	X^3
Band 1 as SCC	**20MHz**	**Low range**	-	-	X

Note 1: For Band 1 as PCC, the exceptions described in Table 7.3A.0-0bA are tested.
Note 2: This is the case that the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. The appropriate Uplink RB allocation value according to Table 7.3A.0-0bB should be applied.
Note 3: This is the case that the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. The appropriate Uplink RB allocation value according to Table 7.3A.0-0bB should be applied.

Table 7.3A.3.4.1-3: Test frequencies and Test CC combinations for CA_1A-11A

CBW			Band 11	
			10MHz	10MHz
			Low range	High range
Band 1	20MHz	Low range		X
	20MHz	High range	X	

Table 7.3A.3.4.1-4: Test frequencies and Test CC combinations for CA_1A-18A

CBW			Band 18	
			10MHz	15MHz
			Low range	Mid range
Band 1	10MHz	Low range	X	
	15MHz		X	
	20MHz		X	X

Table 7.3A.3.4.1-5: Test frequencies and Test CC combinations for CA_1A-19A

CBW			Band 19	
			10MHz	15MHz
			High range	Mid range
Band 1	10MHz	Mid range		X
	15MHz		X	
	20MHz			X

Table 7.3A.3.4.1-6: Test frequencies and Test CC combinations for CA_1A-21A

CBW			Band 21	
			10MHz	15MHz
			High range	Mid range
Band 1	15MHz	Mid range	X	X
	20MHz		-	X

Table 7.3A.3.4.1-7: Test frequencies and Test CC combinations for CA_1A-26A

CBW			Band 26	
			10MHz	15MHz
			Low range	Low range
Band 1	10MHz	Low range	X	
	15MHz		X	
	20MHz		X	X

Table 7.3A.3.4.1-8: Test frequencies and Test CC combinations for CA_1A-28A

CBW			Band 28		
			5MHz	20MHz	
			Mid range	Low range	High range
Band 1 as PCC	20MHz	Low range	-	X	-
		High range	-	-	X
Band 1 as SCC	5MHz	High range	X[1,2]	-	-
	20MHz	Low range	-	X	-
		High range	-	-	X

Note 1: For Band 1 as SCC the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 6.

Note 2: Band 28:f_{UL} = 722.5 MHz (N_{UL} = 27405), f_{DL} = 777.5 MHz (N_{DL} = 9405)
Band 1:f_{DL} = 2167.5 MHz (N_{DL} = 575)

Table 7.3A.3.4.1-9: Test frequencies and Test CC combinations for CA_1A-41A

CBW			Band 41 as SCC
			20MHz
			Mid range
Band 1 as PCC	20MHz	Low range	X
	20MHz	High range	X

Table 7.3A.3.4.1-10: Test frequencies and Test CC combinations for CA_2A-13A

CBW			Band 13
			10MHz
			Mid range
Band 2	10MHz	Low range	X
	15 MHz	Mid range	X
	20 MHz	High range	X

Table 7.3A.3.4.1-11: Test frequencies and Test CC combinations for CA_3A-8A

CBW	Band 8	
	5 MHz	10 MHz
	High range	

Band 3	**10MHz**	Mid range	-	X
	15MHz		X	-
	20MHz		X	X

Table 7.3A.3.4.1-11a: Test frequencies and Test CC combinations for CA_3A-11A

CBW			**Band 11**
			10MHz
			Low range
Band 3	**15MHz**	**Mid range**	X[1]
Note 1: Band 3: f_{UL} = 1757.4MHz (N_{UL} = 19674), f_{DL} = 1852.4MHz (N_{DL} = 1674) Band 11: f_{UL} = 1432.9MHz (N_{UL} = 22800), f_{DL} = 1480.9MHz (N_{DL} = 4800)			

Table 7.3A.3.4.1-12: Test frequencies and Test CC combinations for CA_3A-19A

CBW			**Band 19**	
			10MHz	**15MHz**
			High range	**Mid range**
Band 3	**15MHz**	High range	X	X
	20MHz		X	X

Table 7.3A.3.4.1-13: Test frequencies and Test CC combinations for CA_3A-26A

CBW			**Band 26**	
			10MHz	**15MHz**
			Low range	
Band 3	**10MHz**	Mid range	X	-
	15MHz		X	-
	20MHz		X	X

Table 7.3A.3.4.1-14: Test frequencies and Test CC combinations for CA_3A-27A

CBW			**Band 27**
			10MHz
			High range
Band 3	**10MHz**	Mid range	X
	15MHz		X
	20MHz		X

Table 7.3A.3.4.1-15: Test frequencies and Test CC combinations for CA_3A-28A

CBW			Band 28	
			20MHz	
			Low range	High range
Band 3	20MHz	Low range	X	-
		High range	-	X

Table 7.3A.3.4.1-15a: Test frequencies and Test CC combinations for CA_3A-69A

CBW			Band 69 (SCC only)
			20MHz
			Mid range
Band 3 (PCC)	20MHz	Mid range	X

Table 7.3A.3.4.1-16: Test frequencies and Test CC combinations for CA_3A-42A

CBW			Band 42		
			20MHz		
			Low range	Mid range	High range
Band 3 as PCC (Note 1)	20MHz	Low range	X[2]	-	-
		High range	-	X[3]	-
Band 3 as SCC	20MHz	Mid range	X	-	X

Note 1: For Band 3 as PCC, the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 10 or Note 11.

Note 2: Test point fulfils the equation in Note 10 in Table 7.3A.0-0a.
Band 3: f_{UL} = 1720MHz (N_{UL} = 19300), f_{DL} = 1815MHz (N_{DL} = 1300)
Band 42: $f_{UL/DL}$ = 3440MHz ($N_{UL/DL}$ = 41990)

Note 3: Test point fulfils the equation in Note 11 in Table 7.3A.0-0a.
Band 3: f_{UL} = 1775MHz (N_{UL} = 19850), f_{DL} = 1870MHz (N_{DL} = 1850)
Band 42: $f_{UL/DL}$ = 3520MHz (N_{DL} = 42790)

Table 7.3A.3.4.1-17: Test frequencies and Test CC combinations for CA_4A-5A

CBW			Band 5		
			10 MHz		
			Low range	Mid range	High range
Band 4	10MHz	Mid range	X	X	X

Table 7.3A.3.4.1-18: Test frequencies and Test CC combinations for CA_4A-13A

CBW			Band 13
			10MHz
			Mid range
Band 4	10MHz	Low range	X
	15 MHz	Mid range	X
	20 MHz	High range	X

Table 7.3A.3.4.1-19: Test frequencies and Test CC combinations for CA_4A-17A

CBW			Band 17		
			10MHz		
			Low range	Mid range	High range
Band 4 as PCC	10 MHz	Mid range	X	-	X
Band 4 as SCC (Note 1)	10MHz	Low range	X[2]	-	-
		Mid range	-	X[3]	-
		High range	-	-	X[4]

Note 1: For Band 4 as SCC the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 6.

Note 2: Band 17: f_{UL} = 709.1 MHz (N_{UL} = 23781), f_{DL} = 739.1 MHz (N_{DL} = 5781)
Band 4: f_{DL} = 2127.3 MHz (N_{DL} = 2123)

Note 3: Band 17: f_{UL} = 710 MHz (N_{UL} = 23790), f_{DL} = 740 MHz (N_{DL} = 5790)
Band 4: f_{DL} = 2130 MHz (N_{DL} = 2150)

Note 4: Band 17: f_{UL} = 710.9 MHz (N_{UL} = 23799), f_{DL} = 740.9 MHz (N_{DL} = 5799)
Band 4: f_{DL} = 2132.7 MHz (N_{DL} = 2177)

Table 7.3A.3.4.1-19.0: Test frequencies and Test CC combinations for CA_4A-28A

CBW			Band 28	
			20MHz	
			Low range	Mid range
Band 4 as PCC	20MHz	Mid range	-	X
Band 4 as SCC	20MHz	Mid range	X[1,2]	X

Note 1: For Band 4 as SCC the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 6.

Note 2: Band 28: f_{UL} = 713 MHz (N_{UL} = 27310), f_{DL} = 768 MHz (N_{DL} = 9310)
Band 4: f_{DL} = 2139 MHz (N_{DL} = 2240)

Table 7.3A.3.4.1-19a: Test frequencies and Test CC combinations for CA_7A-8A

CBW			Band 8	
			10MHz	
			Low range	Mid range
Band 7 as PCC	20MHz	Mid range	-	X
Band 7 as SCC	20MHz	Mid range	X[1,2]	X

Note 1: For Band 7 as SCC the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 6.

Note 2: Band 8: f_{UL} = 885 MHz (N_{UL} = 21500), f_{DL} = 930 MHz (N_{DL} = 3500)
Band 7: f_{DL} = 2655 MHz (N_{DL} = 3100)

Table 7.3A.3.4.1-20: Test frequencies and Test CC combinations for CA_7A-28A

CBW			Band 28	
			10MHz	15MHz
			High range	Mid range
Band 7	15MHz	High range		X
	20MHz	Mid range	X	X

Table 7.3A.3.4.1-21: Test frequencies and Test CC combinations for CA_8A-11A

CBW			Band 11
			10MHz
			Low range
Band 8	10MHz	High range	X

Table 7.3A.3.4.1-21a: Test frequencies and Test CC combinations for CA_8A-28A

CBW			Band 28	
			20MHz	
			Low range	High range
Band 8 as PCC	10MHz	Low range	X	X
		High range	X	X

Table 7.3A.3.4.1-22: Test frequencies and Test CC combinations for CA_8A-42A

CBW			Band 42		
			20MHz		
			Low range	Mid range	High range
Band 8 as PCC	5MHz	Mid range	-	X	X[1,2]
	10MHz	Low range	X	-	-
		High range	-	-	X
Band 8 as SCC	10MHz	Mid range	-	X	-

Note 1: For Band 8 as PCC, the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 12 or Note 13.

Note 2: Test point fulfils the equation in Note 12 and 13 in Table 7.3A.0-0a.
Band 8: f_{UL} = 897.5MHz (N_{UL} = 21625), f_{DL} = 942.5MHz (N_{DL} = 3625)
Band 42: $f_{UL/DL}$ = 3590MHz ($N_{UL/DL}$ = 43490)

Table 7.3A.3.4.1-23: Test frequencies and Test CC combinations for CA_11A-18A

CBW			Band 18	
			10MHz	15MHz
			Low range	Mid range
Band 11	10MHz	High range	X	X

Table 7.3A.3.4.1-23a: Test frequencies and Test CC combinations for CA_11A-28A

CBW			Band 28	
			10MHz	
			Mid range	High range
Band 11 as PCC	10MHz	Low range		X[2]
		High range	X[3]	
Band 11 as SCC	10MHz	Low range		X[1,2]
		High range	X[3]	

Note 1: For Band 11 as SCC the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 10.

Note 2: Band 11: f_{UL} = 1432.9 MHz (N_{UL} = 22800), f_{DL} = 1480.9 MHz (N_{DL} = 4800)
Band 28: f_{UL} = 743 MHz (N_{UL} = 27610), f_{DL} = 798 MHz (N_{DL} = 9610)

Note 3: Band 11: f_{UL} = 1442.9 MHz (N_{UL} = 22900), f_{DL} = 1490.9 MHz (N_{DL} = 4900)
Band 28: f_{UL} = 723 MHz (N_{UL} = 27410), f_{DL} = 778 MHz (N_{DL} = 9410)

Table 7.3A.3.4.1-23b: Test frequencies and Test CC combinations for CA_12A-66A

CBW			Band 66					
			5MHz	10MHz		15MHz		20MHz
			Low range	Low range	Mid range	Low range	Mid range	Mid range
Band 12 as PCC	5MHz	Low range	X[2]					
		Mid range		X[3]				
	10MHz	Mid range			X		X	X
		High range				X[4]		
Band 12 as SCC	10MHz	Mid			X		X	X

Note 1: For Band 12 as PCC, the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 5 or Note 6.

Note 2: Test point fulfils the equation in Note 5 and 6 in Table 7.3A.0-0a.
Band 12: f_{UL} = 704MHz (N_{UL} = 23060), f_{DL} = 734MHz (N_{DL} = 5060)
Band 66: f_{UL} = 1712.5MHz (N_{UL} = 131997), f_{DL} = 2112.5MHz (N_{DL} = 66461)

Note 3: Band 12: f_{UL} = 707.5MHz (N_{UL} = 23095), f_{DL} = 737.5MHz (N_{DL} = 5095)
Band 66: f_{UL} = 1720MHz (N_{UL} = 132072), f_{DL} = 2120MHz (N_{DL} = 66536)

Note 4: Band 12: f_{UL} = 711MHz (N_{UL} = 23130), f_{DL} = 741MHz (N_{DL} = 5130)
Band 66: f_{UL} = 1717.5MHz (N_{UL} = 132047), f_{DL} = 2117.5MHz (N_{DL} = 66511)

Table 7.3A.3.4.1-24: Test frequencies and Test CC combinations for CA_18A-28A

CBW			Band 28		
			5MHz	10MHz	
			High range	Mid range	High range
Band 18	10MHz	Low range		X	
	15MHz	Middle range	X		X

Table 7.3A.3.4.1-25: Test frequencies and Test CC combinations for CA_19A-21A

CBW			Band 21	
			10MHz	15MHz
			High range	Mid range
Band 19	10MHz	High range		X
	15MHz	Mid range	X	X

Table 7.3A.3.4.1-26: Test frequencies and Test CC combinations for CA_26A-41A

CBW			Band 41
			20MHz
			Mid range
Band 26	10MHz	Low range	X
	15MHz		X

Table 7.3A.3.4.1-27: Test frequencies and Test CC combinations for CA_28A-41A

CBW			Band 41		
			20MHz		
			Low range	Mid range	High range
Band 28	10MHz	Low range	X	-	-
		Mid range	-	X	-
		High range	-	X	X

Table 7.3A.3.4.1-27a: Test frequencies and Test CC combinations for CA_28A-40A

CBW			Band 40		
			20MHz		
			Low range	Mid range	High range
Band 28 as PCC	20MHz	Mid range	-	X	-
Band 28 as SCC	20MHz	Low range	-	-	X
		Mid range	-	-	-
		High range	X	-	-
Note 1: B20+B40 and B28+B40 can have high MSD levels due to harmonic mixing problem in the receiver when the UL in B40 is active and these scenarios need not be tested according to RAN4 agreement.					

Table 7.3A.3.4.1-28: Test frequencies and Test CC combinations for CA_28A-42A

CBW			Band 42			
			5MHz		20MHz	
			Mid range	High range	Low range	High range
Band 28 as PCC	5MHz	Low range	X[1,3]	-	-	-
		Mid range	-	X[1,2]	-	-
	20MHz	Low range	-	-	X	-
		High range	-	-	-	X
Band 28 as SCC	20MHz	Low range	-	-	X	-
		High range	-	-	-	X

Note 1: For Band 28 as PCC the exceptions described in Table 7.3A.0-0a are tested. For this purpose the test frequencies are selected to fulfil the equation in Table 7.3A.0-0a Note 16.
Note 2: Band 28:f_{UL} = 719.5 MHz (N_{UL} = 27375), f_{DL} = 774.5 MHz (N_{DL} = 9375).
Note 3: Band 42:$f_{UL/DL}$ =3527.5 MHz ($N_{UL/DL}$ = 42865).

Table 7.3A.3.4.1-29: Test frequencies and Test CC combinations for CA_39A-41A

CBW			Band 41
			20MHz
			Mid range
Band 39	20 MHz	Low range	X
		Mid range	X
		High range	X

7.3A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A3.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.3A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.3.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the appropriate REFSENS value defined in Table 7.3A.3.5-1. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

7. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

7.3A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

7.3A.3.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 36.508 [7] subclause 4.6 can be used without exceptions.

7.3A.3.4.3.2 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3A.3.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_06"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

7.3A.3.5 Test requirement

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.3A.3.5-1 and Table 7.3A.3.5-2 (originated from single carrier Tables 7.3.5-1 and 7.3.5-2). The reference sensitivity is defined to be met with both downlink component carriers active and either of the uplink component carriers active.

Table 7.3A.3.5-1: Reference sensitivity QPSK $P_{REFSENS}$ for inter-band

		Channel bandwidth						
CA Configuration	**E-UTRA Band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
CA_1A-3A	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	3 (Note 6)			-93.3	-90.8	-89.3	-88.3	
CA_1A-5A	1	-	-	-	-96.3	-	-	FDD
		-	-	-	-99.0[19]	-	-	
	5	-	-	-	-94.3	-	-	
CA_1A-7A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	7	-	-	-	-94.3	-92.5	-91.3	
		-	-	-	-97.0[19]	-95.2[19]	-94.0[19]	
CA_1A-8A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	8	-	-	-96.3	-93.3	-	-	
CA_1A-11A	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	11			-99.3	-96.3			
CA_1A-18A	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	18	-	-	-99.3	-96.3	-94.5	-	
CA_1A-19A	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	18	-	-	-99.3	-96.3	-94.5	-	
CA_1A-20A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	

	20	-	-	-96.3	-93.3	-90.5	-89.3	
		-	-	-99.0[19]	-96.0[19]	-93.2[19]	-92.0[19]	
CA_1A-21A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	21	-	-	-99.3	-96.3	-94.5	-	
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-	
CA_1A-26A	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	26	-	-	-96.8[5]	-93.8[5]	-92[5]	-	
CA_1A-28A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	1 (Note 4)	-	-	-89.1	-88.7	-88.3	-88.0	
	28	-	-	-97.6	-94.6	-92.8	-90.1	
CA_1A-40A (Note 14)	1			-99.3	-96.3	-94.5	-93.3	FDD
	1			-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	40	-	-	[-92.7]	-91.2	-89.7	-88.7	TDD
CA_1A-40A (Note 15)	1	-	-	-91.0	[-88.8]	[-87.2]	[-86.2]	FDD
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
CA_1A-41A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
		-	-	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
CA_1A-42A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[19]	-97.2[19]	-95.4[19]	-94.2[19]	
CA_1A-46A (Note 17)	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	1	-	-	-102[19]	-99[19]	-97.2[19]	-96[19]	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_2A-4A	2	-102.0	-99.0	-97.3	-94.3	-92.5	-91.3	FDD
		-104.7[19]	-101.7[19]	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
	4	-	-	-99.3	-96.3	-94.5	-93.3	
CA_2A-5A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
	5	-	-	-97.3	-94.3	-	-	
CA_2A-7A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
				-100[19]	97[19]	-95.2[19]	92[19]	
	7	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100[19]	97[19]	-95.2[19]	92[19]	
CA_2A-12A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
	12	-	-98	-96.3	-93.3	-	-	
CA_2A-13A	2	-	-	-	-94.3	-92.5	-91.3	FDD
					-97.0[19]	-95.2[19]	-94.0[19]	
	13	-	-	-	-93.3	-	-	
CA_2A-17A	2	-	-	-97.3	-94.3	-	-	FDD
		-	-	-100.0[19]	-97.0[19]	-	-	
	17	-	-	-96.3	-93.3	-	-	
CA_2A-29A	2	-	-	-97.3	-94.3	-	-	FDD
		-	-	-100.0[19]	-97.0[19]	-	-	
	29	-	-98	-96.3	-93.3	-	-	

CA_2A-30A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
				-100[19]	97[19]	-95.2[19]	92[19]	
	30	-	-	-98.3	-95.3	-	-	
CA_2A-46A (Note 17)	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
	2	-	-	-100[19]	-97[19]	-95.2[19]	-94[19]	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_2A-66A	2	-101.7	-98.7	-97.3	-94.3	-92.5	-91.3	FDD
		-104.4[19]	-101.4[19]	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
	66	-	-	-98.8	-95.8	-94	-92.8	
CA_3A-5A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	5	-	-99.5	-97.3	-94.3	-	-	
CA_3A-7A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	7	-	-	-	-94.3	-92.5	-91.3	
		-	-	-	-97.0[19]	-95.2[19]	-94.0[19]	
CA_3A-8A	3	-	-	-	-93.3	-91.5	-90.3	FDD
		-	-	-	-96.0[19]	-94.2[19]	-93.0[19]	
	8	-	-	-96.3	-93.3	-	-	
CA_3A-11A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	11	-	-	-99.3	-96.3	-	-	
CA_3A-19A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	19	-	-	-99.3	-96.3	-94.5	-	
CA_3A-20A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	20	-	-	-96.3	-93.3	-	-	
		-	-	-99.0[19]	-96.0[19]	-	-	
CA_3A-26A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	26	-	-	-96.8[5]	-93.8[5]	-92[5]	-	
CA_3A-27A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	27	-	-	-97.3	-94.3	-	-	
CA_3A-28A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	28	-	-	-97.8	-94.8	-93	-90.3	
CA_3A-38A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
	38	-	-	-99.3	-96.3	-94.5	-93.3	TDD
CA_3A-40A (Note 12)	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	40	-	-	-94.7	-92.2	-90.6	-89.5	TDD
CA_3A-40A (Note 15)	3	-	-	-93.5	-90.5	-88.8	-87.6	FDD
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD

CA_3A-41A (Note 11)	3	-	-	[-93.3]	[-90.3]	[-88.5]	[-87.2]	FDD
	41	-	-	-96.8[10]	-93.8[10]	-92[10]	-90.8[10]	TDD
		-	-	-99.5[10,19]	-96.5[10,19]	-94.7[10,19]	-93.5[10,19]	
CA_3A-41A (Note 12)	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	41	-	-	[-92.6][10]	[-90][10]	[-88.5][10]	[-87.4][10]	TDD
CA_3A-42A	3	-	-	-96.1	-93.1	-91.3	-90.1	FDD
		-	-	-98.8[19]	-95.8[19]	-94.0[19]	-92.8[19]	
	42	-	-	-98	-95	-93.2	-92	
		-	-	-100.2[19]	-97.2[19]	-95.4[19]	-94.2[19]	
	42 (Note 7)	-	-	-70.7	-70.7	-70.7	-70.7	TDD
	42 (Note 8)	-	-	-96.1	-93.7	-92.2	-91.5	
CA_3A-46A (Note 17)	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[19]	-96.0[19]	-94.2[19]	-93.0[19]	
	46	-	-	-	-	-	-88.5	TDD
CA_3A-69A	3			-	-	-	-90.3	FDD
				-	-	-	-93.019	
	69			-	-	-	-93.7	
CA_4A-5A	4	-	-	-99.3	-96.3	-	-	FDD
	5	-	-	-97.3	-94.3	-	-	
CA_4A-7A	4	-	-	-99.3	-96.3	-	-	FDD
	7	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
CA_4A-12A	4	-104	-101	-99.3	-96.3	-94.5	-93.3	FDD
	4 (Note 4)	-88.5	-88.5	-89.3	-88.8	-88.3	-87.8	
	12	-	-	-96.3	-93.3	-	-	
CA_4A-13A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	13	-	-	-	-93.3	-	-	
CA_4A-17A	4	-	-	-99.3	-96.3	-	-	FDD
	4 (Note 4)	-	-	[-89.3]	[-88.8]	-	-	
	17	-	-	-96.3	-93.3	-	-	
CA_4A-27A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	27	-	-99.5	-97.3	-94.3	-	-	
CA_4A-28A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	4 (Note 4)	-	-	-89.1	-88.7	-88.3	-88	
	28	-	-	-97.6	-94.6	-92.8	-90.1	
CA_4A-29A	4	-	-	-99.3	-96.3	-	-	FDD
	29	-	-98	-96.3	-93.3	-	-	
CA_4A-46A (Note 17)	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_5A-7A	5	-102.5	-99.5	-97.3	-94.3	-	-	FDD
	7	-	-	-	-94.3	-92.5	-91.3	
		-	-	-	-97.0[19]	-95.2[19]	-94.0[19]	
CA_5A-12A	5			-97.3	-94.3			FDD
	12			-96.3	-93.3			
CA_5A-13A	5	-	-	-97.3	-94.3	-	-	FDD
	13	-	-	-	-93.3	-	-	
CA_5A-25A	5	-	-	-97.3	-94.3	-	-	FDD
	25	-	-	-95.8	-92.8	-91	-89.8	
		-	-	-98.5[19]	-95.5[19]	-93.7[19]	-92.5[19]	
CA_5A-30A	5	-	-	-97.3	-94.3	-	-	FDD
	30	-	-	-98.3	-95.3	-	-	
CA_5A-46A (Note 17)	5	-	-	-97.3	-94.3	-	-	FDD
	46	-	-	-	-91.5	-	-88.5	TDD
CA_5A-66A	5	-	-	-97.3	-94.3	-	-	FDD
	66	-	-	-98.8	-95.8	-94	-92.8	
CA_7A-8A	7	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
	7 (Note 4)	-	-	-87.3	-86.7	-86.3	-86.0	

	8	-	-98.5	-96.3	-93.3	-	-	
CA_7A-20A	7	-	-	-	-94.3	-92.5	-91.3	FDD
		-	-	-	-97.0[19]	-95.2[19]	-94.0[19]	
	20	-	-	-96.3	-93.3	-	-	
		-	-	-99.0[19]	-96.0[19]	-	-	
CA_7A-28A	7	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
	28	-	-	-98.5	-95.5	-93.7	-	
CA_7A-42A (Note 21)	7	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
	42	-	-	-94.6	-92	-90.5	-89.4	TDD
CA_7A-42A (Note 22)	7	-	-	-95.5	-92.5	-90.8	-89.6	FDD
	42	-	-	-97.5	-94.5	-92.7	-91.5	TDD
		-	-	-99.7[19]	-96.7[19]	-94.9[19]	-93.7[19]	
CA_7A-46A (Note 17)	7	-	-	-97.3	-94.3	-92.5	-91.3	FDD
	7	-	-	-100[19]	-97[19]	-95.2[19]	-94[19]	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_8A-11A	8			-96.3	-93.3			FDD
	11			-99.3	-96.3			
CA_8A-28A (Note 23)	8	-	-98.5	-96.3	-93.3	-	-	FDD
	28	-	-	-97.8	-94.8	-93	-90.3	
CA_8A-40A	8	-	-98.5	-96.3	-93.3	-		FDD
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
CA_8A-42A	8	-101.3	-98.3	-96.1	-93.1	-	-	FDD
	42 (Note 16)	-	-	-83.8	-83.7	-83.6	-83.5	TDD
	42	-	-	-98	-95	-93.2	-92	
		-	-	-100.2[19]	-97.2[19]	-95.4[19]	-94.2[19]	
CA_8A-46A (Note 17)	8	-101.5	98.5	-96.3	-93.3	-	-	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_11A-18A	11	-	-	-99.3	-96.3	-	-	FDD
	18	-	-	-99.3	-96.3	-94.5	-	
CA_11A-28A	11	-	-	-99.3	-96.3	-	-	FDD
	11 (Note 7)	-	-	-74.5	-74.5	-	-	
	28	-	-	-97.6	-94.6	-92.8	-91.6	
CA_11A-46A (Note 17)	11	-	-	-99.3	-96.3	-	-	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_12A-25A	12	-	-	-96.3	-93.3	-	-	FDD
	25	-	-	-95.8	-92.8	-91	-89.8	
		-	-	-98.5[19]	-95.5[19]	-93.7[19]	-92.5[19]	
CA_12A-66A	12	-	-	-96.3	-93.3	-	-	FDD
	66	-	-	-98.8	-95.8	-94.0	-93.5	
CA_12A-30A	12	-	-	-96.3	-93.3	-	-	FDD
	30	-	-	-98.3	-95.3	-	-	
CA_13A-46A (Note17)	13	-	-	-96.3	-93.3	-	-	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_13A-66A	13	-	-	-96.3	-93.3	-	-	FDD
	66	-	-	-98.8	-95.8	-94	-92.8	
CA_18A-28A	18	-	-	-99.3	-96.3	-94.5	-	FDD
	28	-	-	-97.8	-94.8	-	-	
CA_19A-21A	19	-	-	-99.3	-96.3	-94.5	-	FDD
	21	-	-	-99.3	-96.3	-94.5	-	

CA_19A-28A	19	-	-	-99.3	-96.3	-94.5	-	FDD
	28	-	-	-97.8	-94.8	-	-	
	28 (Note 9)	-	-	-93.3	-91.3	-	-	
CA_19A-42A	19	-	-	-99.3	-96.3	-94.5	-	FDD
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[19]	-97.2[19]	-95.4[19]	-94.2[19]	
CA_19A-46A (Note 17)	19	-	-	-99.3	-96.3	-94.5	-	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_20A-31A	20	-	-	-96.3	-93.3	-90.5	-89.3	FDD
		-	-	-99.0[19]	-96.0[19]	-93.2[19]	-92.0[19]	
	31	-	-95.0	-92.8	-	-	-	
CA_20A-32A	20	-	-	-96.3	-93.3	-	-	FDD
		-	-	-99.0[19]	-96.0[19]	-	-	
	32	-	-	-99.3	-96.3	-94.5	-93.3	
CA_20A-42A	20			-96.3	-93.3	-90.5	-89.3	FDD
	42			-98.0	-95.0	-93.2	-92.0	
CA_20A-67A	20			-96.3	-93.3	-90.5	-89.3	FDD
		-	-	-99.0[19]	-96.0[19]	-93.2[19]	-92.0[19]	
	67			-99.3	-96.3	-94.5	-93.3	
CA_21A-42A	21	-	-	-99.3	-96.3	-94.5	-	FDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-	
	42	-	-	-98	-95	-93.2	-92	TDD
		-	-	-100.2[19]	-97.2[19]	-95.4[19]	-94.2[19]	
CA_21A-46A (Note 17)	21	-	-	-99.3	-96.3	-94.5	-	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_23A-29A	23			-99.3	-96.3	-94.5	-93.3	FDD
	29		-98	-96.3	-93.3			
CA_26A-41A	26	-	-	-96.8[5]	-93.8[5]	-92[5]		FDD
	41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
		-	-	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
CA_28A-40A (Note 20)	28	-	-	-97.8	-94.8	-93	-90.3	FDD
	40	-	-	-94.4	-92.2	-90.7	-89.8	TDD
CA_26A-46A (Note 17)	26	-	-99	-96.8[5]	-93.8[5]	-	-	FDD
	46	-	-	-	-	-	-88.5	TDD
CA_28A-40A (Note 15)	28	-	-	-96.1	-93.4	-91.8	-89.1	FDD
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
CA_28A-41A	28	-	-	-97.8	-94.8	-	-	FDD
	41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
		-	-	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
CA_28A-42A	28	-	-	-97.6	-94.6	-92.8	-91.6	FDD
	42	-	-	-98	-95	-93.2	-92	TDD
	42 (Note13)	-	-	-84.7	-84.4	-84.1	-83.9	TDD
CA_28A-46A (Note 17)	28	-	-	-97.8	-94.8	-93	-90.3	FDD
	46	-	-	-	-91.5	-	-88.5	TDD
CA_29A-66A	29	-	-	-96.3	-93.3	-	-	FDD
	66	-	-	-98.8	-95.8	-94.0	-92.8	
CA_29A-70A	29	-	-	-96.3	-93.3	-	-	FDD
	66	-	-	-99.3	-96.3	-94.5	-	
CA_30A-66A	30	-	-	-98.3	-95.3	-	-	FDD
	66	-	-	-98.8	-95.8	-94.0	-92.8	
CA_39A-41A	39	-	-	-99.3	-96.3	-94.5	-93.3	TDD
		-	-	-102.0[19]	-99.0[19]	-97.2[19]	-96.0[19]	
	41	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[19]	-97.0[19]	-95.2[19]	-94.0[19]	
CA_39A-46A (Note 17)	39	-	-	-99.3	-96.3	-94.5	-93.3	TDD
	46	-	-	-	-	-	-88.5	
CA_40A-46A (Note 17)	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
	46	-	-	-	-91.5	-	-88.5	
CA_41A-42A	41	-	-	-	-93.9	-92.1	-90.9	TDD
	42	-	-	-	-94.8	-93.0	-91.8	
CA_41A-46A (Note 17)	41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
	41	-	-	-100[19]	-97[19]	-95.2[19]	-94[19]	
	46	-	-	-	-	-	-88.5	

CA_42A-46A (Note 17)	42	-	-	-98	-95	-93.2	-92	TDD
	42 (Note 19)	-	-	-99.7	-96.7	-94.9	-93.7	
	46	-	-	-	-	-	-81.5	
CA_46A-66A	46	-	-	-	-	-	-88.5	TDD
	66	-	-	-98.8	-95.8	-94.0	-92.8	FDD
CA_46A-70A	46	-	-	-	-	-	-88.5	TDD
	70	-	-	-99.3	-96.3	-94.5	-	FDD

Note 1: The transmitter shall be set to maximum output power level (Table 7.3A.3.5-2)
Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1.
Note 3: The signal power is specified per port
Note 4: Reference sensitivity for the high band for which the 3rd harmonic of the low band is within transmission bandwidth, as specified Note 5 in Table 7.3A.0-0a.
Note 5: [5] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
Note 6: Reference sensitivity for the case that the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz
Note 7: Reference sensitivity for the high band for which the 2nd harmonic of the low band is within transmission bandwidth, as specified Note 9 and 10 in Table 7.3A.0-0a.
Note 8: Reference sensitivity for the high band for which the 2nd harmonic of the low band is within transmission bandwidth, as specified Note 11 in Table 7.3A.0-0a.
Note 9: These requirements apply when the uplink is active in Band 19 and the downlink channels in Band 28 are allocated at the middle of the restricted frequency range specified for this CA configuration (Table 5.2A-2). For each channel bandwidth in Band 28, the requirement applies regardless of channel bandwidth in Band 19.
Note 10: The B41 requirements are modified by -0.5dB when carrier frequency of the assigned E-UTRA channel bandwidth is within 2545-2690 MHz.
Note 11: These requirements apply when the uplink is active in Band 41.
Note 12: These requirements apply when the uplink is active in Band 3.
Note 13: Reference sensitivity for the high band for which the 5th harmonic of the low band is within transmission bandwidth, as specified Note 15 and 16 in Table 7.3A.0-0a.
Note 14: These requirements apply when the uplink is active in Band 1.
Note 15: These requirements apply when the uplink is active in Band 40.
Note 16: Reference sensitivity for the high band for which the 4th harmonic of the low band is within transmission bandwidth, as specified Note 12 and 13 in Table 7.3A.0-0a.
Note 17: The requirements do not apply when there is at least one individual RE within the uplink transmission bandwidth of the lower band for which the transmitter harmonic is within the downlink transmission bandwidth of the higher band and a range ΔF_{HD} from lower and higher frequency of the uplink transmission bandwidth multiplied by the harmonic order. Negative ΔF_{HD} reduces the REFSENS exclusion range while positive ΔF_{HD} extends the range. ΔF_{HD} = [30] MHz for the E-UTRA configuration which has 2nd harmonic issue. ΔF_{HD} = 15 MHz for the E-UTRA configuration which has 3rd harmonic issue. ΔF_{HD} = [10] MHz for the E-UTRA configuration which has 4th harmonic issue. ΔF_{HD} = [-20] MHz for the E-UTRA configuration which has 6th harmonic issue. ΔF_{HD} = [-30] MHz for the E-UTRA configuration which has 7th harmonic issue. ΔF_{HD} = [-40] MHz for the E-UTRA configuration which has for 8th harmonic issue. For band combinations including more than one licensed band with band 46, the value ΔF_{HD} depends on which licensed band is used for uplink transmission.
Note 18: The value ΔF_{HD} in Note 17 shall be scaled as ΔF_{HD} *(N_{RB}/100) according to the uplink configuration defined in Table 7.3A.3.5-2.
Note 19: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
Note 20: These requirements apply when the uplink is active in Band 28.
Note 21: These requirements apply when the uplink is active in Band 7.
Note 22: These requirements apply when the uplink is active in Band 42.
Note 23: These requirements apply when the uplink is active in Band 8.

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

In case the UE supports more than one of the inter-band carrier aggregation configurations and a E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is $\leq$ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating

band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL (i.e. bands listed in Table 7.3A.0-0a), then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 7.3.3-1A that would apply for that operating band among the supported CA configurations

The reference receive sensitivity (REFSENS) requirement for inter-band specified in Table 7.3A.3.5-1 shall be met for an uplink CA configurations than or equal to that specified in Table 7.3A.3.5-2.

NOTE: Table 7.3A.3.5-2 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3A.3.5-2: Inter-band CA uplink configuration for reference sensitivity, L_{CRB} @ RB_{start} format

Channel bandwidth								
CA Configuration	**E-UTRA Band**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex Mode**
CA_1A-3A	1	-	-	25@0[5]	25@0[5]	25@0[5]	25@0[5]	FDD
	1			25@0[6]	45@0[6]	45@0[6]	45@0[6]	
	3	-	-	25@0	50@0	50@25	50@50	
CA_1A-5A	1	-	-	-	50@0	-	-	FDD
	5	-	-	-	25@25	-	-	
CA_1A-7A	1	-	-	25@0	50@0	75@0	100@0	FDD
	7	-	-	-	50@0	75@0	75@25	
CA_1A-8A	1	-	-	25@0	50@0	75@0	100@0	FDD
	8	-	-	25@0	25@25	-	-	
CA_1A-11A	1	-	-	25@0	50@0	75@0	100@0	FDD
	11	-	-	25@0	25@25	-	-	
CA_1A-18A	1	-	-	25@0	50@0	75@0	100@0	FDD
	18	-	-	25@0	25@25	25@50	-	
CA_1A-19A	1	-	-	25@0	50@0	75@0	100@0	FDD
	19	-	-	25@0	25@25	25@50	-	
CA_1A-20A	1	-	-	25@0	50@0	75@0	100@0	FDD
	20	-	-	25@0	20@0	20@11	20@16	
CA_1A-21A	1	-	-	25@0	50@0	75@0	100@0	FDD
	21	-	-	25@0	25@25	25@50	-	
CA_1A-26A	1	-	-	25@0	50@0	75@0	100@0	FDD
	26	-	-	25@0	25@25	25@50	-	
CA_1A-28A	1	-	-	25@0	50@0	75@0	100@0	FDD
	28	-	-	25@0	25@25	25@50	25@75	
	28			8@9[2]	16@17[2]	25@24[2]	25@38[2]	
CA_1A-40A	1	-	-	25@0	50@0	75@0	100@0	FDD
	40	-	-	25@0	50@0	75@0	100@0	TDD

CA_1A-41A	1	-	-	25@0	50@0	75@0	100@0	FDD
	41	-	-	-	-	-	-	TDD
CA_1A-42A	1	-	-	25@0	50@0	75@0	100@0	FDD
	42	-	-	25@0	50@0	75@0	100@0	TDD
CA_1A-46A	1	-	-	25@0	50@0	75@0	100@0	FDD
	46	-	-	-	-	-	-	TDD
CA_2A-4A	2	6@0	15@0	25@0	50@0	50@25	50@50	FDD
	4	-	-	25@0	50@0	75@0	100@0	
CA_2A-5A	2	-	-	25@0	50@0	50@25	50@50	FDD
	5	-	-	25@0	25@25	-	-	
CA_2A-7A	2	-	-	25@0	50@0	50@25	50@50	FDD
	7	-	-	25@0	50@0	75@0	75@25	
CA_2A-12A	2	-	-	25@0	50@0	50@25	50@50	FDD
	12	-	15@0	20@5	20@30	-	-	
CA_2A-13A	2	-	-	-	50@0	50@25	50@50	FDD
	13	-	-	-	20@0	-	-	
CA_2A-17A	2	-	-	25@0	50@0	-	-	FDD
	17	-	-	20@5	20@30	-	-	
CA_2A-28A	2	-	-	25@0	50@0	50@25	50@50	FDD
	28	-	-	25@0	25@25	25@50	25@75	
CA_2A-29A	2	-	-	25@0	50@0	50@25	50@50	FDD
	29	-	-	-	-	-	-	
CA_2A-30A	2	-	-	25@0	50@0	50@25	50@50	FDD
	30	-	-	25@0	25@25	-	-	
CA_2A-46A	2	-	-	25@0	50@0	50@25	50@50	FDD
	46	-	-	-	-	-	-	TDD
CA_2A-66A	2	6@0	15@0	25@0	50@0	50@25	50@50	FDD
	66	-	-	25@0	50@0	75@0	100@0	
CA_3A-5A	3	-	-	25@0	50@0	50@25	50@50	FDD
	5	-	15@0	25@0	25@25	-	-	
CA_3A-7A	3	-	-	25@0	50@0	50@25	50@50	FDD
	7	-	-	-	50@0	75@0	75@25	
CA_3A-8A	3	-	-	25@0	50@0	50@25	50@50	FDD
	8	-	-	25@0	25@25	-	-	
CA_3A-11A	3	-	-	25@0	50@0	50@25	50@50	FDD
	11	-	-	25@0	25@25	-	-	
CA_3A-19A	3	-	-	25@0	50@0	50@25	50@50	FDD
	19	-	-	25@0	25@25	25@50	-	
CA_3A-20A	3	-	-	25@0	50@0	50@25	50@50	FDD
	20	-	-	25@0	20@0	-	-	
CA_3A-26A	3	-	-	25@0	50@0	50@25	50@50	FDD
	26	-	-	25@0	25@25	25@50	-	
CA_3A-27A	3	-	-	25@0	50@0	50@25	50@50	FDD
	27	-	-	25@0	25@25	-	-	
CA_3A-28A	3	-	-	25@0	50@0	50@25	50@50	FDD
	28	-	-	25@0	25@25	25@50	25@75	
CA_3A-38A	3	-	-	25@0	50@0	50@25	50@50	FDD
	38	-	-	25@0	50@0	75@0	100@0	TDD
CA_3A-40A	3	-	-	25@0	50@0	50@25	50@50	FDD
	40	-	-	25@0	50@0	75@0	100@0	TDD
CA_3A-41A	3	-	-	25@0	50@0	50@25	50@50	FDD
	41	-	-	25@0	50@0	75@0	100@0	TDD
CA_3A-42A	3	-	-	12@7[9]	25@13[9]	36@20[9]	50@25[9]	FDD
	42	-	-	25@0	50@0	75@0	100@0	TDD
CA_3A-46A	3	-	-	25@0	50@0	50@25	50@50	FDD
	46	-	-	-	-	-	-	TDD
CA_4A-5A	4	-	-	25@0	50@0	-	-	FDD
	5	-	-	25@0	25@25	-	-	
CA_4A-7A	4	-	-	25@0	50@0	-	-	FDD
	7	-	-	25@0	50@0	75@0	75@25	
CA_4A-12A	4	6@0	15@0	25@0	50@0	75@0	100@0	FDD
	12	-	-	20@5	20@30	-	-	
	12	2@2[2]	5@5[2]	8@9[2]	16@17[2]	-	-	
CA_4A-13A	4	-	-	25@0	50@0	75@0	100@0	FDD
	13	-	-	-	20@0	-	-	

CA_4A-17A	4	-	-	25@0	50@0	-	-	FDD
	17	-	-	20@5	20@30	-	-	
	17	-	-	8@9[2]	16@17[2]	-	-	
CA_4A-27A	4	-	-	25@0	50@0	75@0	100@0	FDD
	27	-	15@0	25@0	25@25	-	-	
CA_4A-28A	4	-	-	25@0	50@0	75@0	100@0	FDD
	28	-	-	25@0	25@25	25@50	25@75	
	28	-	-	8@9[2]	16@17[2]	25@24[2]	25@38[2]	
CA_4A-29A	4	-	-	25@0	50@0	-	-	FDD
	29	-	-	-	-	-	-	
CA_4A-46A	4	-	-	25@0	50@0	75@0	100@0	FDD
	46	-	-	-	-	-	-	TDD
CA_5A-7A	5	6@0	15@0	25@0	25@25	-	-	FDD
	7	-	-	-	50@0	75@0	75@25	
CA_5A-12A	5	-	-	25@0	25@25	-	*	FDD
	12	-	-	20@5	20@30	-	-	
CA_5A-13A	5	-	-	25@0	25@25	-	-	FDD
	13	-	-	-	20@0	-	-	
CA_5A-25A	5	-	-	25@0	25@25	-	-	FDD
	25	-	-	25@0	50@0	50@25	50@50	
CA_5A-30A	5	-	-	25@0	25@25	-	-	FDD
	30	-	-	25@0	25@25	-	-	
CA_5A-46A	5	-	-	25@0	25@25	-	-	FDD
	46	-	-	-	-	-	-	TDD
CA_5A-66A	5	-	-	25@0	25@25	-	-	FDD
	66	-	-	25@0	50@0	75@0	100@0	
CA_7A-8A	7	-	-	25@0	50@0	75@0	75@25	FDD
	8	-	15@0	25@0	25@25	-	-	
	8[2,10]	-	-	-	8@21, 16@17, 25@12,	-	-	
CA_7A-20A	7	-	-	-	50@0	75@0	75@25	FDD
	20	-	-	25@0	20@0	-	-	
CA_7A-46A	7	-	-	25@0	50@0	75@0	75@25	FDD
	46	-	-	-	-	-	-	TDD
CA_7A-28A	7	-	-	25@0	50@0	75@0	75@25	FDD
	28	-	-	25@0	25@25	25@50	-	
CA_7A-42A	7	-	-	25@0	50@0	75@0	75@25	FDD
	42	-	-	25@0	50@0	75@0	100@0	TDD
CA_8A-11A	8	-	-	25@0	25@25	-	-	FDD
	11	-	-	25@0	25@25	-	-	
CA_8A-28A	8	-	15@0	25@0	25@0	-	-	FDD
	28	-	-	-	-	-	-	
CA_8A-40A	8	-	15@0	25@0	25@25	-	-	FDD
	40	-	-	25@0	50@0	75@0	100@0	TDD
CA_8A-42A	8	6@0	15@0	25@0	25@25			FDD
	42			25@0	50@0	75@0	100@0	TDD
CA_8A-46A	8	6@0	15@0	25@0	25@25	-	-	FDD
	46	-	-	-	-	-	-	TDD
CA_11A-18A	11	-	-	25@0	25@25	-	-	FDD
	18	-	-	25@0	25@25	25@50	-	

CA_11A-28A	11	-	-	25@0	25@25			FDD
	28			25@0	25@25	25@50	25@75	
	28[9]	-	-	12@12	25@0	-	-	
CA_11A-46A	11	-	-	25@0	25@25	-	-	FDD
	46	-	-	-	-	-	-	TDD
CA_12A-25A	12	-	-	20@5	20@30	-	-	FDD
	25	-	-	25@0	50@0	50@25	50@50	
CA_12A-30A	12	-	-	20@5	20@30	-	-	FDD
	30	-	-	25@0	25@25	-	-	
CA_12A-66A	12	-	-	20@5	20@30	-	-	FDD
	66	-	-	25@0	50@0	75@0	100@0	
CA_13A-46A	13	-	-	20@0	20@0	-	-	FDD
	46	-	-	-	-	-	-	TDD
CA_13A-66A	13	-	-	20@0	20@0	-	-	FDD
	66	-	-	25@0	50@0	75@0	100@0	
CA_18A-28A	18	-	-	25@0	25@25	25@50	-	FDD
	28	-	-	25@0	25@25	-	-	
CA_19A-21A	19	-	-	25@0	25@25	25@50	-	FDD
	21	-	-	25@0	25@25	25@50	-	
CA_19A-28A	19	-	-	18@0	18@0	18@0	-	FDD
	28	-	-	25@0	25@50	-	-	
CA_19A-42A	19	-	-	25@0	25@25	25@50	-	FDD
	42	-	-	25@0	50@0	75@0	100@0	TDD
CA_19A-46A	19	-	-	25@0	25@25	25@50	-	FDD
	46	-	-	-	-	-	-	TDD
CA_20A-31A	20	-	-	25@0	20@0	20@11	20@16	FDD
	31	-	5@9	5@10	-	-	-	
CA_20A-32A	20	-	-	25@0	20@0			FDD
	32	-	-	N/A	N/A	N/A	N/A	
CA_20A-42A	20	-	-	25@0	20@0	20@11	20@16	FDD
	42	-	-	25@0	50@0	75@0	100@0	
CA_21A-46A	21	-	-	25@0	25@25	25@50	-	FDD
	46	-	-	-	-	-	-	TDD
CA_20A-67A	20	-	-	25@0	20@0	20@11	20@16	FDD
	67	-	-	N/A	N/A	N/A	N/A	
CA_21A-42A	21	-	-	25@0	25@25	25@50	-	FDD
	42	-	-	25@0	50@0	75@0	100@0	TDD
CA_23A-29A	23	-	-	25@0	50@0	75@0	100@0	FDD
	29	-	-	-	-	-	-	
CA_26A-41A	26	-	-	25@0	25@25	25@50	-	FDD
	41	-	-	25@0	50@0	75@0	100@0	TDD
CA_26A_46A	26	-	15@0	25@0	25@25	-	-	FDD
	46	-	-	-	-	-	-	TDD
CA_28A-40A	28	-	-	25@0	25@25	25@50	25@75	FDD
	40	-	-	25@0	50@0	75@0	100@0	TDD
CA_28A-41A	28	-	-	25@0	25@25	-	-	FDD
	41	-	-	25@0	50@0	75@0	100@0	TDD
CA_28A-42A	28	-	-	25@0	25@25	25@50	25@75	FDD
	42	-	-	25@0	50@0	75@0	100@0	TDD

CA_28A-46A	28	-	-	25@0	25@25	25@50	25@75	FDD
	46	-	-	-	-	-	-	TDD
CA_29A-66A	29	-	-	-	-	-	-	FDD
	66	-	-	25@0	50@0	75@0	100@0	
CA_29A-70A	29	-	-	-	-	-	-	FDD
	70	-	-	25@0	50@0	75@0	-	
CA_30A-66A	30	-	-	25@0	25@25	-	-	FDD
	66	-	-	25@0	50@0	75@0	100@0	
CA_39A-41A	39	-	-	25@0	50@0	75@0	100@0	TDD
	41	-	-	25@0	50@0	75@0	100@0	
CA_39A-46A	39	-	-	25@0	50@0	75@0	100@0	TDD
	46	-	-	-	-	-	-	
CA_40A-46A	40	-	-	25@0	50@0	75@0	100@0	TDD
	46	-	-	-	-	-	-	
CA_41A-42A	41	-	-	-	50@0	75@0	100@0	TDD
	42	-	-	-	50@0	75@0	100@0	
CA_41A-46A	41	-	-	25@0	50@0	75@0	100@0	TDD
	46	-	-	-	-	-	-	
CA_42A-46A	42	-	-	25@0	50@0	75@0	100@0	TDD
	46	-	-	-	-	-	-	
CA_46A-66A	46	-	-	-	-	-	-	TDD
	66	-	-	25@0	50@0	75@0	100@0	FDD
CA_46A-70A	46	-	-	-	-	-	-	TDD
	70	-	-	25@0	50@0	75@0	-	FDD

Note 1: Void
Note 2: Configuration for the low band for which the 3rd harmonic is within transmission bandwidth of the high band, as specified in Table 7.3A.0-0a Note 5.
Note 3: Void
Note 4: Void
Note 5: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz.
Note 6: UL allocation when the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz.
Note 7: Void
Note 8: Void
Note 9: Configuration for the low band for which the 2nd harmonic is within transmission bandwidth of the high band, as specified in Table 7.3A.0-0a Note 9 or Note 11.
Note 10: This configuration is used for testing the 3rd harmonic interfered high band only. It is for low band with multiple choices of RB number corresponding to different high band bandwidth as indicated in Table 7.3A.0-0aa: Uplink configuration for the low band (exceptions). Only one bandwidth option was used for simplicity.

7.3A.4 Reference sensitivity level for CA (intra-band non-contiguous DL CA without UL CA)

7.3A.4.1 Test purpose

Same as in clause 7.3A.1.1.

7.3A.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA but no UL CA.

7.3A.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.4.4 Test description

7.3A.4.4.1 Initial conditions

Same as in clause 7.3A.1.4.1 with the following exceptions:

- Instead of Table 7.3A.1.4.1-1→ use Table 7.3A.4.4.1-1.
- Instead of clause 7.3A.1.4.3 use clause 7.3A.3.4.3.

Table 7.3A.4.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			NC, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2.			A: N/A (Range is not relevant)				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.			Refer to test point				
Test Parameters for CA Configurations							
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC RB allocation (L_{CRB} @ RB_{start})**
Test Parameters for CA_2A-2A Configurations							
1[5]	100	25	35	QPSK	100+25	QPSK	P_16@57
2[6]	100	25	35	QPSK	100+25	QPSK	P_16@39
3	100	100	20	QPSK	100+100	QPSK	P_16@57
Test Parameters for CA_3A-3A Configurations							
1[10]	100	25	50	QPSK	100+25	QPSK	P_16@50
2[10]	100	25	15	QPSK	100+25	QPSK	P_32@68
3[10]	100	100	35	QPSK	100+100	QPSK	P_16@50
4[10]	100	50	45	QPSK	100+50	QPSK	P_16@50
5[10]	100	50	10	QPSK	100+50	QPSK	P_32@68
Test Parameters for CA_4A-4A Configurations							
1	50	25	30	QPSK	50+25	QPSK	P_50@0
2[4]	50	50	25	QPSK	50+50	QPSK	P_50@0
3[3]	100	25	20	QPSK	100+25	QPSK	P_100@0
4[3]	100	100	5	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_5A-5A Configurations							
1	50	25	10	QPSK	50+25	QPSK	P_12@38
2	50	50	5	QPSK	50+50	QPSK	P_12@38
Test Parameters for CA_7A-7A Configurations							
1[11]	100	75	35	QPSK	100+75	QPSK	P_36@64
2[11]	100	75	15	QPSK	100+75	QPSK	P_50@50
3[11]	100	100	30	QPSK	100+100	QPSK	P_32@68
4[11]	100	100	15	QPSK	100+100	QPSK	P_45@55
5[11]	100	25	45	QPSK	100+25	QPSK	P_32@68
6[11]	100	25	25	QPSK	100+25	QPSK	P_45@55
7[11]	100	50	40	QPSK	100+50	QPSK	P_32@68
8[11]	100	50	20	QPSK	100+50	QPSK	P_45@55
9[11]	50	100	40	QPSK	50+100	QPSK	P_32@18
10[11]	50	100	15	QPSK	50+100	QPSK	P_50@0
11[11]	50	25	55	QPSK	50+25	QPSK	P_32@18
12[11]	50	25	30	QPSK	50+25	QPSK	P_50@0
Test Parameters for CA_23A-23A Configurations							

1	50	25	5	QPSK	50+25	QPSK	P_50@0
Test Parameters for CA_25A-25A Configurations							
1	50	25	50	QPSK	50+25	QPSK	P_10@33
2	50	25	15	QPSK	50+25	QPSK	P_32@18
3[3]	50	50	45	QPSK	50+50	QPSK	P_10@33
4[3]	50	50	10	QPSK	50+50	QPSK	P_32@18
5[4]	100	25	40	QPSK	100+25	QPSK	P_12@62
6[4]	100	100	25	QPSK	100+100	QPSK	P_12@62
Test Parameters for CA_41A-41A Configurations							
1[4]	100	25	169	QPSK	100+25	QPSK	P_100@0
2[3]	100	50	164	QPSK	100+50	QPSK	P_100@0
3	100	100	154	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_42A-42A Configurations							
1	100	25	175	QPSK	100+25	QPSK	P_100@0
2	100	100	160	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_66A-66A Configurations							
1	100	25	65	QPSK	100+25	QPSK	P_100@0
2	100	100	50	QPSK	100+100	QPSK	P_100@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.
Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.
Note 3: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration.
Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration.
Note 5: Not applicable if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
Note 6: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
Note 7: Applicable if only Bandwidth Combination Set 1 is supported by the UE for the CA Configuration.
Note 8: Void
Note 9: Void
Note 10: Applicable test configuratons are specified in Table 7.3A.4.4.1-1a.
Note 11: Applicable test configurations are specified in Table 7.3A.4.4.1-1b.

Table 7.3A.4.4.1-1a: Test Configuration Applicability for CA_3A-3A

	Supported BCS		
ID	**0**	**1**	**0,1**
1	x	x	x
2	x	x	x
3	x	-	x
4	-	x	-
5	-	x	-

Table 7.3A.4.4.1-1b: Test Configuration Applicability for CA_7A-7A

	Supported BCS														
ID	**0**	**1**	**2**	**3**	**0,1**	**0,2**	**0,3**	**1,2**	**1,3**	**2,3**	**0,1,2**	**0,1,3**	**0,2,3**	**1,2,3**	**0,1,2,3**
1	x	-	-	-	-	x	-	-	-	-	-	-	-	-	-
2	x	-	-	-	-	x	-	-	-	-	-	-	-	-	-
3	x	x	-	x	x	x	x	x	x	x	x	x	x	x	x
4	x	x	-	x	x	x	x	x	x	x	x	x	x	x	x
5	-	x	-	-	x	-	-	x	x	-	x	x	-	x	x

6	-	x	-	-	x	-	-	x	x	-	x	x	-	x	x
7	-	-	-	x	-	-	x	-	-	x	-	-	x	-	-
8	-	-	-	x	-	-	x	-	-	x	-	-	x	-	-
9	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-

7.3A.4.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A4.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.3A.4.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.4.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCC to the appropriate REFSENS value defined in Table 7.3A.4.5-1. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.
7. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

7.3A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

7.3A.4.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 36.508 [7] subclause 4.6 can be used without exceptions.

7.3A.4.4.3.2 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3A.4.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

7.3A.4.5 Test requirement

For intra-band non-contiguous carrier aggregation with one uplink carrier on the PCC, the throughput of each downlink component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.3.2 with parameters specified in Table 7.3A.4.5-1.

Table 7.3A.4.5-1: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band Non-contiguous

ID/ CA configuration / $P_{REFSENS}$			
ID	**CA configuration**	**PCC (dBm)**	**SCC (dBm)**
1	CA_2A-2A	-91.3	-90.1
2		-94.0	-90.1
3		-91.3	-86.7
		-94.0[4]	
1	CA_3A-3A	-90.3	-89.8
		-93.04	
2		-90.3	-96.3
		-93.04	-99.04
3		-90.3	-86.2
		-93.04	
4		-90.3	-88.2
5		-90.3	-93.3
1	CA_4A-4A	-96.3	-99.3
2		-96.3	-96.3
3		-93.3	-99.3
4		-93.3	-93.3
1	CA_5A-5A	-94.3	-91.4
2		-94.3	-89.7
1	CA_7A-7A	-91.3	-92.5
		-94.04	-95.24
2		-91.3	-92.5
		-94.04	-95.24
3		-91.3	-91.3
		-94.04	-94.04
4		-91.3	-91.3
		-94.04	-94.04
5		-91.3	-97.3
6		-91.3	-97.3
7		-91.3	-94.3
8		-91.3	-94.3
9		-94.3	-91.3
10		-94.3	-91.3
11		-94.3	-97.3
12		-94.3	-97.3
1	CA_23A-23A	-96.3	-99.3
1	CA_25A-25A	-92.8	-90.3
		-95.5[4]	-93.0[4]
2		-92.8	-95.8
		-95.5[4]	-98.5[4]
3		-92.8	-87.8
		-95.5[4]	-90.5[4]
4		-92.8	-92.8
		-95.5[4]	-95.5[4]
5		-89.8	-87.8
		-92.5[4]	-90.5[4]
6		-89.8	-84.1
		-92.5[4]	-86.8[4]

1	CA_41A-41A	-91.3	-97.3
		-94.0[4]	-100.0[4]
2		-91.3	-94.3
		-94.0[4]	-97.0[4]
3		-91.3	-91.3
		-94.0[4]	-94.0[4]
1	CA_42A-42A	-92	-98
		-94.2[4]	-100.2[4]
2		-92	-92
		-94.2[4]	-94.2[4]
1	CA_66A-66A	-92.8	-98.8
2		-92.8	-92.8
Note 1: The transmitter shall be set to maximum output power level. Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. Note 3: The signal power is specified per port. Note 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.			

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

In case the UE supports more than one of the inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL (i.e. bands listed in Table 7.3A.0-0a), then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 7.3.3-1A that would apply for that operating band among the supported CA configurations

The reference receive sensitivity (REFSENS) requirement for intra-band non-contiguous specified in Table 7.3A.4.5-1 shall be met for an uplink CA configurations equal to that specified in Table 7.3A.4.4.1-1.

NOTE: Table 7.3A.4.4.1-1 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3A.4.5-2: Void

7.3A.5 Reference sensitivity level for 3DL CA

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- TR 36.905 test point analysis for CA_28A-40C is missing, meaning it is not yet determined if testing of fallback configuration CA_28A_40A can be skipped.- TR 36.905 test point analysis for CA_7A-42A-42A is missing, meaning it is not yet determined if testing of fallback configuration CA_7A_42A can be skipped.

7.3A.5.1 Test purpose

Same as in clause 7.3A.1.1.

7.3A.5.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support 3DL with Intra-band contiguous CA, or 3DL with Inter-band CA, or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 3DL with FDD-TDD CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 3DL CA involving Band 46.

7.3A.5.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.5.4 Test description

7.3A.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3A.5.4.1-1 through table 7.3A.5.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3A.5.4.1-1: Test Configuration Table

Initial Conditions													
Test Environment as specified in TS 36.508[7] subclause 4.1					NC, TL/VL, TL/VH, TH/VL, TH/VH								
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.					For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns								
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Refer to “PCC N_{RB}” and “SCCs N_{RB} ” columns								
Network signalling value					NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band								
Test Parameters for CA Configurations													
ID	**PCC**				**SCC1**				**SCC2**				
	Band	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**		
	UL MOD	**DL MOD**	**ULalloc (Note 2,3,4)**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	
Default Test Settings for a CA_XD Configuration (Intra-band contiguous)													
1	X	Low/CC1	REFSENS	All RBs	X	Low/CC2	N/A	All RBs	X	Low/CC3	N/A	All RBs	
	QPSK	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB_agg	
2	X	Low/CC1	REFSENS	All RBs	X	Low/CC2	N/A	All RBs	X	Low/CC3	N/A	All RBs	
	QPSK	QPSK		Lowest NRB_agg	N/A	QPSK		Lowest NRB_agg	N/A	QPSK		Lowest NRB_agg	
3	X	High/CC1	REFSENS	All RBs	X	High/CC2	N/A	All RBs	X	High/CC3	N/A	All RBs	
	QPSK	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB_agg	
4	X	High/CC1	REFSENS	All RBs	X	High/CC2	N/A	All RBs	X	High/CC3	N/A	All RBs	
	QPSK	QPSK		Lowest NRB_agg	N/A	QPSK		Lowest NRB_agg	N/A	QPSK		Lowest NRB_agg	
Default Test Settings for a CA_XA-YA-ZA Configuration (Inter-band)													
1	X	Mid	REFSENS	All RBs	Y	Mid	N/A	All RBs	Z	Mid	N/A	All RBs	
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	
2	Y	Mid	REFSENS	All RBs	Z	Mid	N/A	All RBs	X	Mid	N/A	All RBs	
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	
3	Z	Mid	REFSENS	All RBs	Y	Mid	N/A	All RBs	X	Mid	N/A	All RBs	
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	
Test Settings for CA_1A-3A-5A Configuration													

1[13]	1	Low	25@0	All RBs	3	High	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
2[13]	1	Low	25@0	All RBs	3	High	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	1	Mid	45@0	All RBs	3	High	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
4	3	High	50@50	All RBs	1	Low	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	5	Mid	25@25	All RBs	1	Mid	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-3A-7A Configuration												
1	1	Low	25@0	All RBs	3	High	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
2	1	Low	25@0	All RBs	3	High	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
3	1	Low	25@0	All RBs	3	High	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	1	Mid	45@0	All RBs	3	High	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	3	High	50@50	All RBs	1	Low	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	3	Mid	50@50	All RBs	1	Mid	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	7	Mid	75@25	All RBs	1	Mid	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-3A-8A Configuration												
1[13]	1	Low	25@0	All RBs	3	High	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
2[13]	1	Low	25@0	All RBs	3	High	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	1	Mid	45@0	All RBs	3	High	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
4	3	High	50@50	All RBs	1	Low	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	3	Mid	50@0	All RBs	1	Mid	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
6	8	High	25@25	All RBs	1	Mid	N/A	All RBs	3	Mid	N/A	All RBs

	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-3A-11A Configuration												
1	1	Low	25@0	All RBs	3	High	N/A	All RBs	11	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
2	1	Low	25@0	All RBs	3	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		50
3	1	Low	25@0	All RBs	3	High	N/A	All RBs	11	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
4	1	Mid	45@0	All RBs	3	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	3	High	50@50	All RBs	1	Low	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
6[31]	3	Mid	50@25	All RBs	1	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50
7[32]	11	Low	25@25	All RBs	1	High	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75
8	11	High	25@25	All RBs	1	Low	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75
Test Settings for CA_1A-3A-19A Configuration												
1	1	Mid	45@0	All RBs	3	High	N/A	All RBs	19	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50
2	1	Mid	45@0	All RBs	3	High	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75
3[13]	1	Low	25@0	All RBs	3	High	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75
4	1	Mid	45@0	All RBs	3	High	N/A	All RBs	19	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	1	Mid	45@0	All RBs	3	High	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
6	3	High	50@50	All RBs	1	Mid	N/A	All RBs	19	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		50
7	3	High	50@50	All RBs	1	Mid	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
8	3	High	50@50	All RBs	1	Mid	N/A	All RBs	19	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
9	3	High	50@50	All RBs	1	Mid	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75

10	19	High	25@25	All RBs	1	Mid	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
11	19	High	25@25	All RBs	1	Mid	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
12	19	Mid	25@50	All RBs	1	Mid	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
13	19	Mid	25@50	All RBs	1	Mid	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-3A-20A Configuration												
1	1	Low	25@0	All RBs	3	High	N/A	All RBs	20	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
2	1	Low	25@0	All RBs	3	High	N/A	All RBs	20	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
3	1	Low	25@0	All RBs	3	High	N/A	All RBs	20	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	1	Mid	45@0	All RBs	3	High	N/A	All RBs	20	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	1	Mid	100@0	All RBs	3	Mid	N/A	All RBs	20	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	3	High	50@50	All RBs	1	Low	N/A	All RBs	20	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	3	Mid	50@0	All RBs	1	Mid	N/A	All RBs	20	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
8	20	Mid	20@16	All RBs	1	Mid	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-3A-28A Configuration												
1	1	Low	25@0	All RBs	3	High	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
2	1	Low	25@0	All RBs	3	High	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
3	1	Low	25@0	All RBs	3	High	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	1	Low	100@0	All RBs	3	High	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	1	Mid	45@0	All RBs	3	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	1	High	100@0	All RBs	3	High	N/A	All RBs	28	High	N/A	All RBs

	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	3	Low	50@50	All RBs	1	Low	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
8	3	High	50@50	All RBs	1	Low	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
9	28	Mid	25@0	All RBs	1	High	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		25	N/A	QPSK		100
10	28	Low	25@75	All RBs	1	Low	N/A	All RBs	3	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
11	28	Low	25@38	All RBs	1	Low	N/A	All RBs	3	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
12	28	High	25@75	All RBs	1	High	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100

Test Settings for CA_1A-3A-40A Configuration												
1[13]	1	Low	25@0	All RBs	3	High	N/A	All RBs	40	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
2[13]	1	Low	25@0	All RBs	3	High	N/A	All RBs	40	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	1	Mid	45@0	All RBs	3	High	N/A	All RBs	40	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	3	High	50@50	All RBs	1	Low	N/A	All RBs	40	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	40	Mid	100@0	All RBs	1	Mid	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-3A-41A Configuration												
1	1	Low	25@0	All RBs	3	High	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
2	1	Low	25@0	All RBs	3	High	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
3	1	Low	25@0	All RBs	3	High	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	1	Mid	45@0	All RBs	3	High	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	1	Low	100@0	All RBs	3	High	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	1	High	100@0	All RBs	3	Mid	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	3	High	50@50	All RBs	1	Low	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
8	3	Mid	50@50	All RBs	1	Mid	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-3A-42A Configuration												
1	1	Low	25@0	All RBs	3	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
2	1	Low	25@0	All RBs	3	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	1	Mid	45@0	All RBs	3	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4[14]	1	Mid	100@0	All RBs	3	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100

5[15]	3	High	50@50	All RBs	1	Low	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	3	Low[16]	50@25	All RBs	1	Mid	N/A	All RBs	42	Low[16]	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
7	3	High[17]	50@25	All RBs	1	Mid	N/A	All RBs	42	Mid[17]	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
8	42	Mid	100@0	All RBs	1	Mid	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
9	42	Low	100@0	All RBs	1	Mid	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
10	42	High	100@0	All RBs	1	Mid	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-5A-7A Configuration												
1	1	Low	50@0	All RBs	5	High	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
2	1	Low	100@0	All RBs	5	High	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
3	5	High	25@25	All RBs	1	Low	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
4	5	High	25@25	All RBs	1	Low	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
5	7	Mid	75@25	All RBs	1	Low	N/A	All RBs	5	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
6	7	Mid	75@25	All RBs	1	Low	N/A	All RBs	5	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_1A-8A-11A Configuration												
1	1	High	100@0	All RBs	8	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	8	High	25@25	All RBs	1	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
3	11	Low	25@25	All RBs	1	High	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_1A-8A-28A Configuration												
1	1	Low	100@0	All RBs	8	Low	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
2	1	High	100@0	All RBs	8	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100

3	8	Low	25@0	All RBs	1	Mid	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
4	8	Low	25@0	All RBs	1	Mid	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
5	8	High	25@0	All RBs	1	Mid	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
6	8	High	25@0	All RBs	1	Mid	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_1A-11A-18A Configuration												
1	1	Low	100@0	All RBs	11	High	N/A	All RBs	18	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	1	High	100@0	All RBs	11	Low	N/A	All RBs	18	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		75
3	1	Low	50@0	All RBs	11	Low	N/A	All RBs	18	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		75
4	1	Low	75@0	All RBs	11	Low	N/A	All RBs	18	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		75
5	11	High	25@25	All RBs	1	Low	N/A	All RBs	18	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
6	11	High	25@25	All RBs	1	Low	N/A	All RBs	18	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75
7	11	Low	25@25	All RBs	1	High	N/A	All RBs	18	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75
8	18	Low	25@25	All RBs	1	Low	N/A	All RBs	11	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
9	18	Mid	25@25	All RBs	1	Low	N/A	All RBs	11	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50
10	18	Mid	25@25	All RBs	1	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50
11	18	Mid	25@25	All RBs	1	Low	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		50
12	18	Mid	25@25	All RBs	1	Low	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		50
Test Settings for CA_1A-11A-28A Configuration												

1	1	Low	100@0	All RBs	11	High	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
2	1	High	100@0	All RBs	11	Low	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
3	11	Low	25@25	All RBs	1	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
4	11	High	25@25	All RBs	1	Low	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
5[26]	28	Mid	8@9	All RBs	1	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		25	N/A	QPSK		50
6[27]	28	High	25@0	All RBs	1	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
7[28]	28	Mid	25@25	All RBs	1	Low	N/A	All RBs	11	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
8	28	Low	25@75	All RBs	1	Low	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
9	28	High	25@75	All RBs	1	High	N/A	All RBs	11	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_1A-18A-28A Configuration												
1	1	Low	50@0	All RBs	18	Low	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
2	1	Low	75@0	All RBs	18	Low	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		50
3	1	Low	100@0	All RBs	18	Low	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
4	1	Low	100@0	All RBs	18	Mid	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		50
5	18	Low	25@25	All RBs	1	Low	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
6	18	Low	25@25	All RBs	1	Low	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		50
7	18	Low	25@25	All RBs	1	Low	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
8	18	Mid	25@50	All RBs	1	Low	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		25
9	18	Mid	25@50	All RBs	1	Low	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50

10	28	High	25@0	All RBs	1	Low	N/A	All RBs	18	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		75
11	28	Mid	25@25	All RBs	1	Low	N/A	All RBs	18	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
12	28	High	25@25	All RBs	1	High	N/A	All RBs	18	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75
Test Settings for CA_1A-18A-28A 3DL CA with UL CA Configuration												
1	1	Mid	25@0	All RBs	8	Mid	25@0	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		25	QPSK	QPSK		25	N/A	QPSK		25
2	1	Mid	100@0	All RBs	18	Mid	25@50	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		75	N/A	QPSK		50
3	18	Mid	25@0	All RBs	28	Mid	25@0	All RBs	1	Mid	N/A	All RBs
	QPSK	QPSK		25	QPSK	QPSK		25	N/A	QPSK		25
4	18	Mid	25@50	All RBs	28	Mid	25@25	All RBs	1	Mid	N/A	All RBs
	QPSK	QPSK		75	QPSK	QPSK		50	N/A	QPSK		100
Test Settings for CA_1A-19A-21A Configuration												
1	1	Mid	75@0	All RBs	19	High	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		75
2	1	Mid	75@0	All RBs	19	Mid	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75
3	1	Mid	100@0	All RBs	19	High	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		75
4	1	Mid	100@0	All RBs	19	Mid	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
5	19	High	25@25	All RBs	1	Mid	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		75
6	19	High	25@25	All RBs	1	Mid	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75
7	19	Mid	25@50	All RBs	1	Mid	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75
8	19	Mid	25@50	All RBs	1	Mid	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75
9	21	Mid	25@50	All RBs	1	Mid	N/A	All RBs	19	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		50
10	21	Mid	25@50	All RBs	1	Mid	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75
11	21	Mid	25@50	All RBs	1	Mid	N/A	All RBs	19	High	N/A	All RBs

	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50
12	21	Mid	25@50	All RBs	1	Mid	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75
Test Settings for CA_1A-19A-28A Configuration (Note 18)												
1	1	Mid	100@0	All RBs	19	Mid	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		50
2[19]	19	Mid	25@50	All RBs	1	Mid	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50
3	19	Mid	18@0	All RBs	1	Mid	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50
4	28	Mid	25@25	All RBs	1	Mid	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75
Test Settings for CA_1A-19A-42A Configuration												
1	1	Mid	50@0	All RBs	19	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
2	1	Mid	75@0	All RBs	19	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100
3	1	Mid	100@0	All RBs	19	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
4	19	Mid	25@50	All RBs	1	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100
5	19	High	25@25	All RBs	1	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
6	19	Mid	25@50	All RBs	1	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
7	42	Mid	100@0	All RBs	1	Mid	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
Test Settings for CA_1A-21A-42A Configuration												
1	1	Mid	75@0	All RBs	21	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100
2	1	Mid	75@0	All RBs	21	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
3	1	Mid	100@0	All RBs	21	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
4	21	High	25@25	All RBs	1	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
5	21	Mid	25@50	All RBs	1	Mid	N/A	All RBs	42	Mid	N/A	All RBs

	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
6	21	Mid	25@50	All RBs	1	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
7	42	Mid	100@0	All RBs	1	Mid	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
Test Settings for CA_1A-41A-42A Configuration												
1	1	Low	100@0	All RBs	41	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	1	Mid	100@0	All RBs	41	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	1	High	100@0	All RBs	41	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	42	Mid	100@0	All RBs	41	Mid	N/A	All RBs	1	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_2A-4A-5A Configuration												
1	2	Mid	50@50	All RBs	4	Mid	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
2	4	Mid	50@0	All RBs	2	Mid	N/A	All RBs	5	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
3	4	Mid	50@0	All RBs	2	Mid	N/A	All RBs	5	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
4	5	Low	25@25	All RBs	2	Mid	N/A	All RBs	4	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
5	5	High	25@25	All RBs	2	Mid	N/A	All RBs	4	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_2A-4A-7A with UL CA Configuration												

1	2	Low	50@0	All RBs	4	High	25@0	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		25	N/A	QPSK		100
2	4	Mid[33]	25@0	All RBs	2	Mid[33]	25@0	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		25	QPSK	QPSK		25	N/A	QPSK		100
Test Settings for CA_2A-4A-12A Configuration												
1	2	Mid	50@50	All RBs	4	Mid	N/A	All RBs	12	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
2	4	Mid	100@0	All RBs	2	Mid	N/A	All RBs	12	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	4	Mid	100@0	All RBs	2	Mid	N/A	All RBs	12	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
4	12	Low[10]	16@17	All RBs	2	Mid	N/A	All RBs	4	Low[10]	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
5	12	High[11]	16@17	All RBs	2	Mid	N/A	All RBs	4	High[11]	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_2A-4A-13A Configuration												
1	2	Mid	50@50	All RBs	4	Mid	N/A	All RBs	13	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
2	4	Mid	100@0	All RBs	2	Mid	N/A	All RBs	13	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	13	Mid	20@0	All RBs	2	Low	N/A	All RBs	4	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
4	13	Mid	20@0	All RBs	2	Mid	N/A	All RBs	4	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		75
5	13	Mid	20@0	All RBs	2	High	N/A	All RBs	4	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_2A-4A-29A Configuration												
1	2	Mid	50@50	All RBs	4	Mid	N/A	All RBs	29	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
2	4	Mid	100@0	All RBs	2	Mid	N/A	All RBs	29	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_2A-4A-30A Configuration												
1	2	Mid	50@50	All RBs	4	Mid	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
2	4	Mid	100@0	All RBs	2	Mid	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	30	Mid	25@25	All RBs	2	Low	N/A	All RBs	4	Low	N/A	All RBs

	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_2A-5A-13A Configuration												
1	2	Mid	50@50	All RBs	5	Mid	N/A	All RBs	13	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	5	Mid	25@25	All RBs	2	Mid	N/A	All RBs	13	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
3	13	Mid	20@0	All RBs	2	Low	N/A	All RBs	5	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
4	13	Mid	20@0	All RBs	2	Mid	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		50
5	13	Mid	20@0	All RBs	2	High	N/A	All RBs	5	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
	Test Settings for CA_2A-12A-66A Configuration											
	2	Mid	50@50	All RBs	12	Mid	N/A	All RBs	66	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
	12	Low[28]	20@5	All RBs	2	Mid	N/A	All RBs	66	Low[28]	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		25
	12	Mid[29]	20@5	All RBs	2	Mid	N/A	All RBs	66	Low[29]	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		50
	12	Low[30]	20@30	All RBs	2	Mid	N/A	All RBs	66	Low[30]	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75
	12	Mid	20@30	All RBs	2	Mid	N/A	All RBs	66	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_3A-7A-8A Configuration												
1	3	Mid	50@0	All RBs	7	Mid	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
2	3	Mid	50@25	All RBs	7	Mid	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		25
3	3	Mid	50@50	All RBs	7	Mid	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		25
4	3	Mid	50@50	All RBs	7	Mid	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	3	Mid	50@50	All RBs	7	Mid	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
6	7	Mid	75@25	All RBs	3	Mid	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
7	8	Mid	16@17	All RBs	3	Mid	N/A	All RBs	7	Mid	N/A	All RBs

	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
8	8	High	16@17	All RBs	3	Mid	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
9	8	High	25@0	All RBs	3	Mid	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		75	N/A	QPSK		100
10	8	High	25@0	All RBs	3	Mid	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
11	8	High	16@17	All RBs	3	Mid	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_3A-8A-11A Configuration												
1	3	Mid	50@0	All RBs	8	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
2[31]	3	Mid	50@25	All RBs	8	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		25	N/A	QPSK		50
3	3	Mid	50@50	All RBs	8	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
4	3	Mid	50@50	All RBs	8	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
5	8	High	25@25	All RBs	3	Mid	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
6	8	High	25@0	All RBs	3	Mid	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		75	N/A	QPSK		50
7	8	High	25@0	All RBs	3	Mid	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		50
8	8	High	25@25	All RBs	3	Mid	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
9[32]	11	Low	25@25	All RBs	3	Mid	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		50
Test Settings for CA_3A-8A-28A Configuration												
1	3	Mid	50@0	All RBs	8	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
2	3	Mid	50@25	All RBs	8	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		25	N/A	QPSK		100
3	3	Mid	50@50	All RBs	8	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
4	3	Mid	50@50	All RBs	8	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100

5	8	High	25@25	All RBs	3	Mid	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
6	8	High	25@0	All RBs	3	Mid	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		75	N/A	QPSK		100
7	8	High	25@0	All RBs	3	Mid	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
8	8	High	25@25	All RBs	3	Mid	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
9	8	Low	25@0	All RBs	3	Mid	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
10	8	Low	25@0	All RBs	3	Mid	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_3A-8A-40A Configuration												
1	3	Mid	50@50	All RBs	8	High	N/A	All RBs	40	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
2	8	High	25@25	All RBs	3	Mid	N/A	All RBs	40	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
3	40	Mid	100@0	All RBs	3	Mid	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_3A-11A-28A Configuration												
1[31]	3	Mid	50@25	All RBs	11	Low	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100
2	3	Low	50@50	All RBs	11	Low	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
3	3	High	50@50	All RBs	11	Low	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
4[32]	11	Low	25@25	All RBs	3	Mid	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		50
5	11	High	25@25	All RBs	3	Low	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
6	28	High	25@0	All RBs	3	High	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
7	28	Low	25@75	All RBs	3	Low	N/A	All RBs	11	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
8	28	Mid	25@25	All RBs	3	High	N/A	All RBs	11	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_3A-19A-42A Configuration												

1	3	Low[16]	50@25	All RBs	19	Mid	N/A	All RBs	42	Low[16]	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
2	3	High[17]	50@25	All RBs	19	Mid	N/A	All RBs	42	Mid[17]	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
3	19	Mid	25@50	All RBs	3	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
4	42	Low	100@0	All RBs	3	Mid	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
5	42	High	100@0	All RBs	3	Mid	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
6	42	Mid	100@0	All RBs	3	High	N/A	All RBs	19	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
Test Settings for CA_3A-28A-41A Configuration												

1	3	Low	50@50	All RBs	28	Low	N/A	All RBs	41	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
2	3	Mid	50@50	All RBs	28	High	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
3	3	High	50@50	All RBs	28	High	N/A	All RBs	41	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
4	28	Low	25@25	All RBs	3	Low	N/A	All RBs	41	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
5	28	High	25@25	All RBs	3	Mid	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
6	28	High	25@25	All RBs	3	High	N/A	All RBs	41	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
7	41	Low	100@0	All RBs	3	Low	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
8	41	Mid	100@0	All RBs	3	Mid	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
9	41	High	100@0	All RBs	3	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_3A-41A-42A Configuration												
1	3	Mid	50@50	All RBs	41	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	3	Low[16]	50@25	All RBs	41	Mid	N/A	All RBs	42	Low[16]	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	3	High[17]	50@25	All RBs	41	High	N/A	All RBs	42	Mid[17]	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	41	Mid	100@0	All RBs	3	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	42	Low	100@0	All RBs	3	Mid	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	42	Mid	100@0	All RBs	3	Mid	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	42	High	100@0	All RBs	3	Mid	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_4A-5A-13A Configuration												
1	4	Mid	50@0	All RBs	5	Mid	N/A	All RBs	13	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
2	5	Low	25@25	All RBs	4	Mid	N/A	All RBs	13	Mid	N/A	All RBs

	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
3	5	Mid	25@25	All RBs	4	Mid	N/A	All RBs	13	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
4	5	High	25@25	All RBs	4	Mid	N/A	All RBs	13	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
5	13	Mid	20@0	All RBs	4	Low	N/A	All RBs	5	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
6	13	Mid	20@0	All RBs	4	Mid	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		50
7	13	Mid	20@0	All RBs	4	High	N/A	All RBs	5	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
	Test Settings for CA_4A-7A-12A_BCS1 Configuration											
	4	Mid	100@0	All RBs	7	Mid	N/A	All RBs	12	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
	4	Low	100@0	All RBs	7	Mid	N/A	All RBs	12	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
	7	Mid	75@25	All RBs	4	Mid	N/A	All RBs	12	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
	12	Low[10]	16@17	All RBs	4	Low[10]	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
	12	High[11]	16@17	All RBs	4	High[11]	N/A	All RBs	7	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
Test Settings for CA_4A-12A-30A Configuration												
1	4	Mid	100@0	All RBs	12	Low	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	4	Mid	100@0	All RBs	12	High	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
3	12	Low[10]	16@17	All RBs	4	Low[10]	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
4	12	High[11]	16@17	All RBs	4	High[11]	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
5	30	Mid	25@25	All RBs	4	Mid	N/A	All RBs	12	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_8A-11A-28A Configuration												

1	8	Low	25@0	All RBs	11	Low	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
2	8	Low	25@0	All RBs	11	Low	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
3	8	High	25@0	All RBs	11	Low	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
4	8	High	25@0	All RBs	11	Low	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
5	11	Low	25@25	All RBs	8	High	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
6	11	High	25@25	All RBs	8	Low	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
Test Settings for CA_12A-30A-66A Configuration												
1	12	Mid	20@30	All RBs	30	Mid	N/A	All RBs	66	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
2	12	Low	20@5	All RBs	30	Mid	N/A	All RBs	66	Low	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		50	N/A	QPSK		25
3	12	Mid	20@5	All RBs	30	Mid	N/A	All RBs	66	Low	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		50	N/A	QPSK		50
4	12	Mid	20@30	All RBs	30	Mid	N/A	All RBs	66	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
5	30	Mid	25@25	All RBs	12	Mid	N/A	All RBs	66	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
6	66	Mid	50@0	All RBs	12	Mid	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
7	66	Mid	100@0	All RBs	12	Mid	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
Test Settings for CA_19A-21A-42A Configuration												
1	19	High	25@25	All RBs	21	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
2	19	Mid	25@50	All RBs	21	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100
3	19	Mid	25@50	All RBs	21	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
4	21	Mid	25@25	All RBs	19	High	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100
5	21	High	25@50	All RBs	19	Mid	N/A	All RBs	42	Mid	N/A	All RBs

	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
6	21	Mid	25@50	All RBs	19	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
7	42	Mid	100@0	All RBs	19	Mid	N/A	All RBs	21	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
Default Test Settings for a CA_XC-YA and CA_XB-YA Configurations (Intra-band contiguous + Inter-band)												
1	X	Low/CC1	REFSENS	All RBs	X	Low/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB	N/A	QPSK		Highest NRB
2	X	Low/CC1	REFSENS	All RBs	X	Low/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Lowest NRB_agg	N/A	QPSK		Highest NRB	N/A	QPSK		Highest NRB
3	X	High/CC1	REFSENS	All RBs	X	High/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Lowest NRB_agg	N/A	QPSK		Highest NRB	N/A	QPSK		Highest NRB
4	X	High/CC1	REFSENS	All RBs	X	High/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Lowest NRB_agg	N/A	QPSK		Highest NRB	N/A	QPSK		Highest NRB
5	Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB_agg
Default Test Settings for CA_XA-YC and CA_XA-YB Configurations												
1	Y	Low/CC1	REFSENS	All RBs	Y	Low/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB	N/A	QPSK		Highest NRB
2	Y	Low/CC1	REFSENS	All RBs	Y	Low/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Lowest NRB_agg	N/A	QPSK		Highest NRB	N/A	QPSK		Highest NRB
3	Y	High/CC1	REFSENS	All RBs	Y	High/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB	N/A	QPSK		Highest NRB
4	Y	High/CC1	REFSENS	All RBs	Y	High/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Lowest NRB_agg	N/A	QPSK		Highest NRB	N/A	QPSK		Highest NRB
5	X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest NRB	N/A	QPSK		Highest NRB_agg	N/A	QPSK		Highest NRB_agg
Test Settings for a CA_1A-41C Configuration												
1	1	Low	100@0	All RBs	41	Mid/CC1	N/A	All RBs	41	Mid/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	1	High	100@0	All RBs	41	Mid/CC1	N/A	All RBs	41	Mid/CC2	N/A	All RBs

	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for a CA_1A-3C Configuration												
1	1	Low	25@0	All RBs	3	High/CC1	N/A	All RBs	3	High/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
2	1	Low	25@0	All RBs	3	High/CC1	N/A	All RBs	3	High/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
3	1	Low	25@0	All RBs	3	High/CC1	N/A	All RBs	3	High/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	1	Mid	45@0	All RBs	3	High/CC1	N/A	All RBs	3	High/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	3	High/CC1	50@50	All RBs	3	High/CC2	N/A	All RBs	1	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	3	High/CC1	50@50	All RBs	3	High/CC2	N/A	All RBs	1	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
Test Settings for a CA_1C-3A Configuration												
1	1	Low/CC1	25@0	All RBs	1	Low/CC2	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		25
2	1	Low/CC1	25@0	All RBs	1	Low/CC2	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
3	1	Low/CC1	25@0	All RBs	1	Low/CC2	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	1	Mid/CC1	45@0	All RBs	1	Mid/CC2	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	1	Low/CC1	75@0	All RBs	1	Low/CC2	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
6	1	Low/CC1	100@0	All RBs	1	Low/CC2	N/A	All RBs	3	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	3	High	50@50	All RBs	1	Low/CC1	N/A	All RBs	1	Low/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for a CA_2C-30A Configuration												
1	2	High/CC2	50@50	All RBs	2	High/CC1	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
2	2	Low/CC2	50@50	All RBs	2	Low/CC1	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	2	High/CC2	50@50	All RBs	2	High/CC1	N/A	All RBs	30	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
4	2	Low/CC2	50@50	All RBs	2	Low/CC1	N/A	All RBs	30	Mid	N/A	All RBs

	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
5	30	Mid	25@25	All RBs	2	Mid/CC2	N/A	All RBs	2	Mid/CC1	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings for a CA_3C-8A Configuration												
1	3	High/CC1	50@50	All RBs	3	High/CC2	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	QPSK	QPSK		50
2	3	Low/CC1	50@50	All RBs	3	Low/CC2	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	QPSK	QPSK		50
3	3	High/CC1	50@50	All RBs	3	High/CC2	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	QPSK	QPSK		50
4	3	Low/CC1	50@50	All RBs	3	Low/CC2	N/A	All RBs	8	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	QPSK	QPSK		50
5	8	High	25@25	All RBs	3	Mid/CC1	N/A	All RBs	3	Mid/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		25
Test Settings for CA_3A-42C Configuration (Note 21, Note 22)												
1	3	Low	50@25	All RBs	42	Low[21]	N/A	All RBs	42	Low[21]	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	3	High	50@25	All RBs	42	Mid[22]	N/A	All RBs	42	Mid[22]	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	42	Low/CC1	100@0	All RBs	42	Low/CC2	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	42	High/CC1	100@0	All RBs	42	High/CC2	N/A	All RBs	3	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_5A-12B Configuration												
1	5	Mid	25@25	All RBs	12	Mid/CC1	N/A	All RBs	12	Mid/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		25	N/A	QPSK		50
2	12	Mid/CC1	20@30	All RBs	12	Mid/CC2	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		25	N/A	QPSK		50
3	12	Low/CC1	20@5	All RBs	12	Low/CC2	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		25	N/A	QPSK		50
4	12	Low/CC1	20@5	All RBs	12	Low/CC2	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		50	N/A	QPSK		50
5	12	High/CC1	20@5	All RBs	12	High/CC2	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		25	N/A	QPSK		50
6	12	High/CC1	20@5	All RBs	12	High/CC2	N/A	All RBs	5	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		50	N/A	QPSK		50
Test Settings for CA_8A-41C Configuration												

1	8	Mid	25@0	All RBs	41	High/CC1	N/A	All RBs	41	High/CC2	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		50	N/A	QPSK		100
2	8	Mid	25@25	All RBs	41	High/CC1	N/A	All RBs	41	High/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
3	41	Mid/CC1	100@0	All RBs	41	Mid/CC2	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
4	41	Low/CC1	100@0	All RBs	41	Low/CC2	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
5	41	Low/CC1	100@0	All RBs	41	Low/CC2	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
6	41	High/CC1	100@0	All RBs	41	High/CC2	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
7	41	High/CC1	100@0	All RBs	41	High/CC2	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_8A-42C Configuration												
1	8	Mid	25@25	All RBs	42	Mid/CC1	N/A	All RBs	42	Mid/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
2[25]	8	Mid	25@0	All RBs	42	High/CC1	N/A	All RBs	42	High/CC2	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
3	42	Low/CC1	100@0	All RBs	42	Low/CC2	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
4	42	High/CC1	100@0	All RBs	42	High/CC2	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	42	High/CC1	100@0	All RBs	42	High/CC2	N/A	All RBs	8	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
Test Settings for CA_26A-41C Configuration												
1	26	Low	25@25	All RBs	41	Mid/CC1	N/A	All RBs	41	Mid/CC2	N/A	All RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
2	41	Low/CC1	100@0	All RBs	41	Low/CC2	N/A	All RBs	26	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		75
3	41	Low/CC1	100@0	All RBs	41	Low/CC2	N/A	All RBs	26	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
4	41	High/CC1	100@0	All RBs	41	High/CC2	N/A	All RBs	26	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		75
5	41	High/CC1	100@0	All RBs	41	High/CC2	N/A	All RBs	26	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
Test Settings for CA_28A-40C Configuration												

1	28	Mid	25@75	All RBs	40	Mid/CC1	N/A	All RBs	40	Mid/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	40	Low/CC1	100@0	All RBs	40	Low/CC2	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
3	40	Low/CC1	100@0	All RBs	40	Low/CC2	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_28A-41C Configuration												
1	28	Low	25@25	All RBs	41	Low/CC1	N/A	All RBs	41	Low/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
2	28	Mid	25@25	All RBs	41	Mid/CC1	N/A	All RBs	41	Mid/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
3	28	High	25@25	All RBs	41	Mid/CC1	N/A	All RBs	41	Mid/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
4	28	High	25@25	All RBs	41	High/CC1	N/A	All RBs	41	High/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
5	41	Low/CC1	100@0	All RBs	41	Low/CC2	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
6	41	Low/CC1	100@0	All RBs	41	Low/CC2	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
7	41	Mid/CC1	100@0	All RBs	41	Mid/CC2	N/A	All RBs	28	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
8	41	Mid/CC1	100@0	All RBs	41	Mid/CC2	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
9	41	High/CC1	100@0	All RBs	41	High/CC2	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
10	41	High/CC1	100@0	All RBs	41	High/CC2	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_28A-42C Configuration												
1[24]	28	Low	25@0	All RBs	42	Mid	N/A	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		25
2[23]	28	Mid	25@0	All RBs	42	High	N/A	All RBs	42	High	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		25
3	28	Low	25@75	All RBs	42	Low/CC1	N/A	All RBs	42	Low/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	28	High	25@75	All RBs	42	High/CC1	N/A	All RBs	42	High/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	42	Low/CC1	100@0	All RBs	42	Low/CC2	N/A	All RBs	28	Low	N/A	All RBs

	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
6	42	Low/CC1	100@0	All RBs	42	Low/CC2	N/A	All RBs	28	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	42	High/CC1	100@0	All RBs	42	High/CC2	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100
8	42	High/CC1	100@0	All RBs	42	High/CC2	N/A	All RBs	28	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_29A-66C Configuration												
1	66	Low/CC1	100@0	All RBs	66	Low/CC2	N/A	All RBs	29	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
2	66	High/CC1	100@0	All RBs	66	High/CC2	N/A	All RBs	29	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	66	Low/CC1	100@0	All RBs	66	Low/CC2	N/A	All RBs	29	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
4	66	High/CC1	100@0	All RBs	66	High/CC2	N/A	All RBs	29	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
Test Settings for CA_39C-41A Configuration												
1	39	Low/CC1	100@0	All RBs	39	Low/CC2	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
2	39	Low/CC1	25@0	All RBs	39	Low/CC2	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
3	39	High/CC1	100@0	All RBs	39	High/CC2	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
4	39	High/CC1	25@0	All RBs	39	High/CC2	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
5	39	Mid/CC1	25@0	All RBs	39	Mid/CC2	N/A	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
6	41	Mid	100@0	All RBs	39	Low/CC1	N/A	All RBs	39	Low/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
7	41	Mid	100@0	All RBs	39	High/CC1	N/A	All RBs	39	High/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_39A-41C Configuration												
1	39	Low	100@0	All RBs	41	Mid/CC1	N/A	All RBs	41	Mid/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	39	High	50@0	All RBs	41	Mid/CC1	N/A	All RBs	41	Mid/CC2	N/A	All RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
3	41	Mid/CC1	100@0	All RBs	41	Mid/CC2	N/A	All RBs	39	Low	N/A	All RBs

	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	41	Mid/CC1	100@0	All RBs	41	Mid/CC2	N/A	All RBs	39	Low	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	41	Mid/CC1	100@0	All RBs	41	Mid/CC2	N/A	All RBs	39	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	41	Mid/CC1	100@0	All RBs	41	Mid/CC2	N/A	All RBs	39	High	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_41A-42C with UL CA Configuration												
1	41	Mid	50@0	All RBs	42	Mid/CC1	50@0	All RBs	42	Mid/CC2	N/A	All RBs
	QPSK	QPSK		50	QPSK	QPSK		50	QPSK	QPSK		100
2	41	Mid	100@0	All RBs	42	Mid/CC1	100@0	All RBs	42	Mid/CC2	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		100	QPSK	QPSK		100
3	42	Low/CC1	100@0	All RBs	42	Low/CC2	50@0	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		50	QPSK	QPSK		100
4	42	High/CC1	100@0	All RBs	42	High/CC2	50@0	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		50	QPSK	QPSK		100
5	42	Low/CC1	100@0	All RBs	42	Low/CC2	100@0	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		100	QPSK	QPSK		100
6	42	High/CC1	100@0	All RBs	42	High/CC2	100@0	All RBs	41	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		100	QPSK	QPSK		100
Test Settings for CA_41C-42A with UL CA Configuration												
1	41	Low/CC1	100@0	All RBs	41	Low/CC1	50@0	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		50	QPSK	QPSK		100
2	41	High/CC1	100@0	All RBs	41	High/CC1	50@0	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		50	QPSK	QPSK		100
3	41	Low/CC1	100@0	All RBs	41	Low/CC2	100@0	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		100	QPSK	QPSK		100
4	41	High/CC1	100@0	All RBs	41	High/CC2	100@0	All RBs	42	Mid	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		100	QPSK	QPSK		100
5	41	Mid/CC1	50@0	All RBs	42	Mid	50@0	All RBs	41	Mid/CC2	N/A	All RBs
	QPSK	QPSK		50	QPSK	QPSK		100	QPSK	QPSK		100
6	41	Mid/CC2	100@0	All RBs	42	Mid	100@0	All RBs	41	Mid/CC2	N/A	All RBs
	QPSK	QPSK		100	QPSK	QPSK		100	QPSK	QPSK		100
Test Settings for CA_46C-66A Configuration												
1	66	Low	100@0	All RBs	46	Mid/CC1	N/A	All RBs	46	Mid/CC2	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	66	High	100@0	All RBs	46	Mid/CC1	N/A	All RBs	46	Mid/CC2	N/A	All RBs

	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings for CA_46A-66C Configuration												
1	66	Low/CC1	100@0	All RBs	66	Mid/CC2	N/A	All RBs	46	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	66	High/CC1	100@0	All RBs	66	High/CC2	N/A	All RBs	46	Mid	N/A	All RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41D, X=41
Note 6: **Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-19A,X=1,Y=3,Z=19
Note 7: **Intra-band contiguous + Inter-band:** X,Y correspond to the different bands in the CA Configuration, e.g. for CA_1C-3A, X=1,Y=3, for CA_1A_42C, X=1,Y=42.
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}
Note 10: Band 12: f_{UL} = 706.7 MHz (N_{UL} = 23087), f_{DL} = 736.7 MHz (N_{DL} = 5087)
Band 4: f_{DL} = 2120.1 MHz (N_{DL} = 2051)
Note 11: Band 12: f_{UL} = 710.9 MHz (N_{UL} = 23129), f_{DL} = 740.9 MHz (N_{DL} = 5129)
Band 4: f_{DL} = 2132.7 MHz (N_{DL} = 2177)
Note 12: N/A
Note 13: Test points that fulfil criteria of Note 4 in Table 7.3A.5.5-3
Note 14: Only Band 1 and Band 42 need to be tested and Band 3 does not need to be tested
Note 15: Only Band 1 and Band 3 need to be tested and Band 42 does not need to be tested
Note 16: Band 3: fUL = 1720MHz (NUL = 19300), fDL = 1815MHz (NDL = 1300)
Band 42: fUL/DL = 3440MHz (NUL/DL = 41990)
Note 17: Band 3: fUL = 1775MHz (NUL = 19850), fDL = 1870MHz (NDL = 1850)
Band 42: fUL/DL = 3520MHz (NDL = 42790)
Note 18: N/A
Note 19: Only Band 1 and Band 19 need to be tested and Band 28 does not need to be tested
Note 20: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 21: Band 42: $f_{UL/DL}$ for SCC1 = 3430.2MHz ($N_{UL/DL}$ = 41892), $f_{UL/DL}$ for SCC2 = 3450MHz ($N_{UL/DL}$ = 42090)
Note 22: Band 42: $f_{UL/DL}$ for SCC1 = 3500.2MHz ($N_{UL/DL}$ = 42592), $f_{UL/DL}$ for SCC2 = 3520MHz ($N_{UL/DL}$ = 42790).
Note 23: Band 28: f_{UL} = 719.3MHz (N_{UL} = 27373), f_{DL} = 774.3MHz (N_{DL} = 9373).
Note 24: Band 42: $f_{UL/DL}$ for SCC1 = 3515.8MHz (N_{UL} = 42748), $f_{UL/DL}$ for SCC2 = 3527.5MHz (N_{DL} = 42865).
Note 25: Band 8: f_{UL} = 897.5MHz (N_{UL} = 21625), f_{DL} = 942.5MHz (N_{DL} = 3625), Band 42: $f_{UL/DL}$ = 3590MHz ($N_{UL/DL}$ = 43490).
Note 26: Band 28: f_{UL} = 722.5 MHz (N_{UL} = 27405), f_{DL} = 777.5 MHz (N_{DL} = 9405), Band 1: f_{DL} = 2167.5 MHz (N_{DL} = 575).
Note 27: Band 28: f_{UL} = 743 MHz (N_{UL} = 27610), f_{DL} = 798 MHz (N_{DL} = 9610). Band 11: f_{DL} = 1480.9 MHz (N_{DL} = 4800).

Note 28:	Band 12:	f_{UL} = 704MHz (N_{UL} = 23060), f_{DL} = 734MHz (N_{DL} = 5060)
	Band 66:	f_{UL} = 1712.5MHz (N_{UL} = 131997), f_{DL} = 2112.5MHz (N_{DL} = 66461)
Note 29:	Band 12:	f_{UL} = 707.5MHz (N_{UL} = 23095), f_{DL} = 737.5MHz (N_{DL} = 5095)
	Band 66:	f_{UL} = 1720MHz (N_{UL} = 132072), f_{DL} = 2120MHz (N_{DL} = 66536)
Note 30:	Band 12:	f_{UL} = 711MHz (N_{UL} = 23130), f_{DL} = 741MHz (N_{DL} = 5130)
	Band 66:	f_{UL} = 1717.5MHz (N_{UL} = 132047), f_{DL} = 2117.5MHz (N_{DL} = 66511).
Note 31:	Band 3:	f_{UL} = 1757.4MHz (N_{UL} = 19674), f_{DL} = 1852.4MHz (N_{DL} = 1674),
	Band 11:	f_{DL} = 1480.9MHz (N_{DL} = 4800).
Note 32:	Band 3:	f_{DL} = 1852.4MHz (N_{DL} = 1674),
	Band 11:	f_{UL} = 1432.9MHz (N_{UL} = 22800), f_{DL} = 1480.9MHz (N_{DL} = 4800).
Note 33:	Band 2:	f_{UL} = 1868.3MHz (N_{UL} = 18783), f_{DL} = 1948.3MHz (N_{DL} = 783).
	Band 4:	f_{UL} = 1735MHz (N_{UL} = 20200), f_{DL} = 2135MHz (N_{DL} = 2200).
Note 34:	The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.	

Table 7.3A.5.4.1-2: Test Configuration Table W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC N_{RB}" and “SCCs N_{RB} ” columns
Network signalling value	NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	UL alloc (Note 2,3,4)	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Group Test Settings for CA_2A-2A-XA or CA_XA-2A-2A Configurations (Intra-band non-contiguous + Inter-band)														
1[10]	2	CC2	16@57	All RBs	35	2	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
2[11]	2	CC2	16@39	All RBs	20	2	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
3	2	CC2	16@57	All RBs	20	2	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
4	X	Mid	REFSENS	All RBs	-	2	CC2	N/A	All RBs	20	2	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
Group Test Settings for CA_3A-3A-XA or CA_XA-3A-3A Configurations														
1[18]	3	CC2	16@50	All RBs	50	3	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
2[18]	3	CC2	32@68	All RBs	15	3	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
3[18]	3	CC2	16@50	All RBs	35	3	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
4[18]	3	CC2	16@50	All RBs	45	3	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		Highest

														NRB
5[18]	3	CC2	32@68	All RBs	10	3	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		Highest NRB
6[18]	X	Mid	REFSENS	All RBs	-	3	CC2	N/A	All RBs	35	3	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
7[18]	X	Mid	REFSENS	All RBs	-	3	CC2	N/A	All RBs	10	3	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		50
Group Test Settings for CA_4A-4A-XA or CA_XA-4A-4A Configurations														
1	4	CC2	100@0	All RBs	20	4	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
2	4	CC2	100@0	All RBs	5	4	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
3	X	Mid	REFSENS	All RBs	-	4	CC2	N/A	All RBs	5	4	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
Test Settings for CA_4A-4A-12A Configuration														
1	4	CC2	100@0	All RBs	20	4	CC1	N/A	All RBs	-	12	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50
2	4	CC2	100@0	All RBs	20	4	CC1	N/A	All RBs	-	12	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
3	12	Mid	20@30	All RBs	-	4	CC2	N/A	All RBs	20	4	CC1	N/A	All RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		25
4	12	Mid	8@42[7]	All RBs	-	4	CC2	N/A	All RBs	5	4	CC1	N/A	All RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100
Test Settings for CA_4A-4A-13A Configuration														
1	4	CC2	100@0	All RBs	20	4	CC1	N/A	All RBs	-	13	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
2	4	CC2	100@0	All RBs	5	4	CC1	N/A	All RBs	-	13	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
3	13	Mid	REFSENS	All RBs	-	4	CC2	N/A	All RBs	5	4	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
4	4	CC1	50@0	All RBs	10	4	CC2	N/A	All RBs	-	13	Mid	N/A	All RBs

	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		Highest NRB
Group Test Settings for CA_7A-7A-XA or CA_XA-7A-7A Configurations														
1[19]	7	CC2	32@68	All RBs	45	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
2[19]	7	CC2	45@55	All RBs	25	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
3[19]	7	CC2	32@68	All RBs	40	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		Highest NRB
4[19]	7	CC2	45@55	All RBs	20	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		Highest NRB
5[19]	7	CC2	36@64	All RBs	35	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		75		N/A	QPSK		Highest NRB
6[19]	7	CC2	50@50	All RBs	15	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		75		N/A	QPSK		Highest NRB
7[19]	7	CC2	32@68	All RBs	30	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
8[19]	7	CC2	45@55	All RBs	15	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
9[19]	7	CC2	32@18	All RBs	40	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		Highest NRB
10[19]	7	CC2	50@0	All RBs	15	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		Highest NRB
11[19]	7	CC2	32@18	All RBs	55	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		50		N/A	QPSK		25		N/A	QPSK		Highest NRB
12[19]	7	CC2	50@0	All RBs	30	7	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		50		N/A	QPSK		25		N/A	QPSK		Highest NRB
13[19]	X	Mid	REFSENS	All RBs	-	7	CC2	N/A	All RBs	40	7	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		QPSK	QPSK		50		N/A	QPSK		50

14[19]	X	Mid	REFSENS	All RBs	-	7	CC2	N/A	All RBs	30	7	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		QPSK	QPSK		50		N/A	QPSK		100
Test Settings for CA_12A-66A-66A Configuration														
1	66	CC2	100@0	All RBs	65	66	CC1	N/A	All RBs	-	12	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50
2	66	CC2	100@0	All RBs	50	66	CC1	N/A	All RBs	-	12	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
3	12	Low	20@5	All RBs	-	66	CC2	N/A	All RBs	65	66	CC1	N/A	All RBs
	QPSK	QPSK		25		N/A	QPSK		100		N/A	QPSK		25
4	12	Mid	20@5	All RBs	-	66	CC2	N/A	All RBs	60	66	CC1	N/A	All RBs
	QPSK	QPSK		25		N/A	QPSK		100		N/A	QPSK		50
5	12	High	20@30	All RBs	-	66	CC2	N/A	All RBs	75	66	CC1	N/A	All RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		75
6	12	Mid	20@30	All RBs	-	66	CC2	N/A	All RBs	50	66	CC1	N/A	All RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100
Test Settings for CA_29A-66A-66A Configurations														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	29	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
2	66	CC1	100@0	All RBs	65	66	CC2	N/A	All RBs	-	29	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50
Group Test Settings for CA_66A-66A-XA or CA_XA-66A-66A Configurations														
1	66	CC1	100@0	All RBs	65	66	CC2	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
2	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
3	X	Mid	REFSENS	All RBs	-	66	CC1	N/A	All RBs	50	66	CC2	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
1	42	CC2	100@0	All RBs	175	42	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
2	42	CC2	100@0	All RBs	160	42	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
3	X	Mid	REFSENS	All RBs	-	42	CC2	N/A	All RBs	160	42	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100

Test Settings for CA_7A-42A-42A Configurations														
1	42	CC2	100@0	All RBs	175	42	CC1	N/A	All RBs	-	7	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		Highest NRB
2	42	CC2	100@0	All RBs	160	42	CC1	N/A	All RBs	-	7	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
3	7	Mid	75@25	All RBs	-	42	CC2	N/A	All RBs	160	42	CC1	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_41C-41A Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	41	CC3	100@0	All RBs	149	41	CC2	N/A	All RBs	-	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		25
2	41	CC3	100@0	All RBs	134.2	41	CC2	N/A	All RBs	-	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_41A-41C Configuration														
1	41	CC3	100@0	All RBs	-	41	CC2	N/A	All RBs	149	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		25
2	41	CC3	100@0	All RBs	-	41	CC2	N/A	All RBs	134.2	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for CA_46A-46A-66A Configuration														
1	66	Low	100@0	All RBs	-	46	CC1	N/A	All RBs	725	46	CC2	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
2	66	High	100@0	All RBs	-	46	CC1	N/A	All RBs	725	46	CC2	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Test Settings for a CA_66A-66C Configuration														
1	66	CC1	100@0	All RBs	45	66	CC2	N/A	All RBs	-	66	CC3	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		25
2	66	CC1	100@0	All RBs	30.2	66	CC2	N/A	All RBs	-	66	CC3	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band non-contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: **Intra-band non-contiguous + Intra-band contiguous:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band non-contiguous + Inter-band:** X and Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A,X=2,Y=5 or Y=5, X =2
Note 6: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A,X=41.

Note 7:	REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8:	**Intra-band non-contiguous + Inter-band:** Configuration for the low band for which the 3rd harmonic is within transmission bandwidth of the high band, as specified in Table 7.3A.0-0a Note 5.
Note 9:	**Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 10:	Not applicable if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
Note 11:	Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
Note 12:	Void
Note 13:	Void
Note 14:	Void
Note 15:	Void
Note 16:	Void
Note 17	Void
Note 18:	Applicable test configuratons are specified in Table 7.3A.5.4.1-2a.
Note 19:	Applicable test configurations are specified in Table 7.3A.5.4.1-2b.
Note 20:	The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.3A.5.4.1-2a: Test Configuration Applicability for CA_3A-3A-XA or CA_XA-3A-3A

ID	Supported BCS		
	0	1	0,1
	Associated CA_3A-3A BCS(Note1)		
	0	1	0,1
1	x	x	x
2	x	x	x
3	x	-	x
4	-	x	-
5	-	x	-
6	x	-	x
7	-	x	-
Note 1: Associated CA_3A-3A BCS for each BCS of CA_3A-3A-XA or CA_XA-3A-3A is specified in Table 5.4.2A.1-1 to Table 5.4.2A.1-3.			

Table 7.3A.5.4.1-2b: Test Configuration Applicability for CA_7A-7A-XA or CA_XA-7A-7A

ID	Supported BCS						
	0			1			0,1
	Associated CA_7A-7A BCS(Note1)						
	1	2	3	1	2	3	1,2
1	x	-	-	x	-	-	x
2	x	-	-	x	-	-	x
3	-	-	x	-	-	x	-
4	-	-	x	-	-	x	-
5	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-
7	x	-	x	x	-	x	x
8	x	-	x	x	-	x	x
9	-	x	-	-	x	-	-
10	-	x	-	-	x	-	-
11	-	x	-	-	x	-	-
12	-	x	-	-	x	-	-
13	-	x	-	-	x	-	-
14	x	-	x	x	-	x	x
Note 1: Associated CA_7A-7A BCS for each BCS of CA_7A-7A-XA or CA_XA-7A-7A is specified in Table 5.4.2A.1-1 to Table 5.4.2A.1-3.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.55 if the UE supports 2 Rx antennas or Figure A.80 if the UE supports 4 Rx antennas in at least one band within the CA configuration.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and DL Reference Measurement channels are set according to Table 7.3A.5.4.1-1 through Table7.3A.5.4.1-2 as appropriate.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3A.5.4.3.

7.3A.5.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A.5.4.3

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3A.5.4.1-1 through Table7.3A.5.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.5.4.1-1 through Table7.3A.5.4.1-2 as appropriate on PCC and SCCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCCs to the appropriate REFSENS value defined in Table 7.3A.5.5-1 through Table7.3A.5.5-7. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.3A.5.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

7.3A.5.5 Test requirement

For intra-band contiguous carrier aggregation the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.5.5-1. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.5.5-1: Reference sensitivity QPSK $P_{REFSENS}$ for Intra-band contiguous

		Channel bandwidth						
CA Configuration	**E-UTRA Band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
CA_40D	40	-	-	-	-96.3	-94.5	-93.3	TDD
		-	-	-	-99.0[4]	-97.2[4]	-96.0[4]	
CA_41D	41	-	-	-	-94.3	-92.5	-91.3	TDD
		-	-	-	-97.0[4]	-95.2[4]	-94.0[4]	
Note 1: The transmitter shall be set to maximum output power level (Table 7.3A.5.5-2)								
Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1								
Note 3: The signal power is specified per port								
Note 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.								

Table 7.3A.5.5-2: Void

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.5.5-3 (originated from single carrier Tables 7.3.5-1). The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.5.5-3: Reference sensitivity QPSK $P_{REFSENS}$ for inter-band

Channel bandwidth								
CA Configuration	**E-UTRA Band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
CA_1A-3A-5A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	5	-	-	-97.3	-94.3	-	-	
CA_1A-3A-7A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	7	-	-	-	-94.3	-92.5	-91.3	
		-	-	-	-97.0[20]	-95.2[20]	-94.0[20]	
CA_1A-3A-8A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	8	-	-98.5	-96.3	-93.3	-	-	
CA_1A-3A-11A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.020	-99.020	-97.220	-96.020	
	3 (Note 5)	-	-	-96.3	-93.3	-91.5	-90.3	
		-	-	-99.020	-96.020	-94.220	-93.020	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	11	-	-	-99.3	-96.3	-	-	
CA_1A-3A-19A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	19	-	-	-99.3	-96.3	-94.5	-	
CA_1A-3A-41A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	3(Note 12)	-	-	-93.7	-90.8	-89.7	-88.3	
	3(Note 13)			-96.3	-93.3	-91.5	-90.3	
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	41(Note 14)	-	-	-92.6	-90	-88.5	-91.3	TDD
CA_1A-3A-42A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	42	-	-	-98	-95	-93.2	-92	TDD
				-100.2[20]	-97.2[20]	-95.4[20]	-94.2[20]	
	42 (Note 9)	-	-	-71.2	-71.2	-71.2	-71.2	
	42 (Note 10)	-	-	-96.6	-94.2	-92.7	-92	
CA_1A-3A-20A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	20	-	-	-96.3	-93.3	-90.5	-89.3	
		-	-	-99.0[20]	-96.0[20]	-93.2[20]	-92.0[20]	
CA_1A-3A-	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD

26A		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	3	-	-	-96.3	-93.3	-91.5	-90.3	
		-	-	-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	26	-	-	-96.8[6]	-93.8[6]			
CA_1A-3A-28A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	1(Note 21)	-	-	-89.1	-88.7	-88.3	-88.0	
	3(Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	3(Note 5)	-	-	-96.3	-93.3	-91.5	-90.3	
		-	-	-99[20]	-96[20]	-94.2[20]	-93[20]	
	3(Note 21)	-	-	-96.3	-93.3	-91.5	-90.3	
		-	-	-99[20]	-96[20]	-94.2[20]	-93.0[20]	
	28	-	-	-97.6	-94.6	-92.8	-90.1	
CA_1A-3A-40A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	1(NOTE 25)	-	-	-91.0	[-88.8]	[-87.2]	[-86.2]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	3 (Note 4)	-	-	-93.3	-90.8	-89.3	-88.3	
	3(NOTE 25)	-	-	-93.5	-90.5	-88.8	-87.6	
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	40(Note 19)			-99.3	-92.2	-90.6	-89.5	
	40(Note 26)	-	-	[-92.6]	-90.6	-89.3	-88.2	
		-	-	[-95.3][20]	-93.3[20]	-92.0[20]	-90.9[20]	
CA_1A-5A-7A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	5	-	-	-97.3	-94.3	-	-	
	7	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[20]	-97.0[20]	-97.2[20]	-93.0[20]	
CA_1A-7A-20A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	7	-	-	-	-94.3	-92.5	-91.3	
		-	-	-	-97.0[20]	-97.2[20]	-93.0[20]	
	20	-	-	-96.3	-93.3	-	-	
		-	-	-99[20]	-96[20]	-	-	
CA_1A-8A-11A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	8	-	-	-96.3	-93.3	-	-	
	11	-	-	-99.3	-96.3	-	-	
CA_1A-8A-28A (Note 15)	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	8	-	-98.5	-96.3	-93.3	-	-	
	28	-	-	-97.6	-94.6	-92.8	-90.1	
CA_1A-8A-40A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	1(Note 25)	-	-	-91.0	[-88.8]	[-87.2]	[-86.2]	
	8	-	-98.5	-96.3	-93.3	-	-	
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	40(Note 26)	-	-	[-92.7]	-91.2	-89.7	-88.7	
CA_1A-11A-18A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	11	-	-	-99.3	-96.3	-	-	
	18	-	-	-99.3	-96.3	-94.5	-	
CA_1A-11A-28A	1	-	-	-99.3	-96.3	-94.5	-93.7	FDD
	1(Note 8)	-	-	-89.1	-87.7	-88.3	-88	
	11	-		-99.3	-96.3	-	-	

	11(Note 9)	-	-	-74.5	-74.5	-	-	
	28	-	-	-97.6	-94.6	-92.8	-90.1	
CA_1A-18A-28A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	18	-	-	-99.3	-96.3	-94.5	-	
	28	-	-	-97.8	-94.8	-	-	
	28 (Note 7)	-	-	-93.3	-91.8	-	-	

CA_1A-19A-21A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	19	-	-	-99.3	-96.3	-94.5	-	
	21	-	-	-99.3	-96.3	-94.5	-	
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-	
CA_1A-19A-28A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	19	-	-	-99.3	-96.3	-94.5	-	
	28	-	-	-97.8	-94.8	-	-	
	28 (Note 11)	-	-	-93.3	-91.3	-	-	
CA_1A-19A-42A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	19	-	-	-99.3	-96.3	-94.5	-	
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[20]	-97.2[20]	-95.4[20]	-94.2[20]	
CA_1A-21A-42A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	21	-	-	-99.3	-96.3	-94.5	-	
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-	
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[20]	-97.2[20]	-95.4[20]	-94.2[20]	
CA_1A-41A-42A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	41	-	-	-	-94.3	-92.5	-91.3	TDD
		-	-	-	-97.0[20]	-95.2[20]	-94.0[20]	
	42	-	-	-	-95.0	-93.2	-92.0	
		-	-	-	-97.2[20]	-95.4[20]	-94.2[20]	
CA_2A-4A-5A	2	-	-	-97,3	-94,3	-92.5	-91,3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	4	-	-	-99.3	-96.3	-94.5	-93.3	
	5	-	-	-97.3	-94.3	-	-	
CA_2A-4A-7A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
	4	-	-	-99.3	-96.3	-94.5	-93.3	
	7	-	-	-97.3	-94.3	-92.5	-91.3	
CA_2A-4A-7A (Note 24)	2	-	-	-	-	-	-86.3	FDD
	2	-	-	-	-	-	-83.620	
	4	-	-	-99.3	-	-	-	
	7	-	-	-	-	-	-91.3	
	2	-	-	-97.3	-	-	-	FDD
	4	-	-	-94.3	-	-	-	
	7	-	-	-	-	-	-91.3	
CA_2A-4A-12A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	2 (Note 8)	-	-	-97	-94	-92.2	-91	
				-99.7[20]	-96.7[20]	-94.9[20]	-93.7[20]	
	4	-	-	-99.3	-96.3	-94.5	-93.3	
	4 (Note 8)	-	-	-89.3	-88.8	-88.3	-87.8	
	12	-	-	-96.3	-93.3	-	-	
	12 (Note8)	-	-	-95.8	-92.8	-	-	
CA_2A-4A-13A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	4	-	-	-99.3	-96.3	-94.5	-93.3	
	13	-	-	-	-93.3	-	-	
CA_2A-4A-29A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	4	-	-	-99.3	-96.3	-94.5	-93.3	
	29	-	-	-96.3	-93.3	-	-	
CA_2A-4A-30A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	4	-	-	-99.3	-96.3	-94.5	-93.3	
	30	-	-	-98.3	-95.3	-	-	
CA_2A-5A-	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD

12A		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	5	-	-	-97.3	-94.3	-	-	
	12	-	-	-96.3	-93.3	-	-	
CA_2A-5A-13A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	5	-	-	-97.3	-94.3	-	-	
	13	-	-	-	-93.3	-	-	
CA_2A-5A-30A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	5	-	-	-97.3	-94.3	-	-	
	30	-	-	-98.3	-95.3	-	-	
CA_2A-5A-66A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	5	-	-	-97.3	-94.3	-	-	
	66	-	-	-98.8	-95.8	-94	-92.8	
CA_2A-7A-12A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	7	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	12	-	-	-96.3	-93.3	-	-	
CA_2A-12A-30A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	12	-	-	-96.3	-93.3	-	-	
	30	-	-	-98.3	-95.3	-	-	
CA_2A-12A-66A	2	-	-	-97.0	-94.0	-92.2	-91.0	FDD
		-	-	-99.7[20]	-96.7[20]	-94.9[20]	-93.7[20]	
	12	-	-	-95.8	-92.8	-	-	
	66	-	-	-88.8	-88.3	-87.8	-87.3	
CA_2A-13A-66A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	13	-	-	-	-93.3	-	-	
	66	-	-	-98.8	-95.8	-94	-92.8	
CA_2A-29A-30A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	29	-	-	-96.3	-93.3	-	-	
	30	-	-	-98.3	-95.3	-	-	
CA_2A-30A-66A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	30	-	-	-98.3	-95.3	-	-	
	66	-	-	-98.8	-95.8	-94.0	-92.8	
CA_3A-7A-8A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	7	-	-	-	-94.3	-92.5	-91.3	
	7 (Note8)	-	-	-	-86.7	-86.3	-86	
	8	-	-	-96.3	-93.3	-	-	
	8 (Note8)	-	-	-96.1	-93.1	-	-	
CA_3A-7A-20A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	7	-	-	-	-94.3	-92.5	-91.3	
		-	-	-	-97.0[20]	-95.2[20]	-94.0[20]	
	20	-	-	-96.3	-93.3	-90.5	-89.3	
		-	-	-99.0[20]	-96.0[20]	-93.2[20]	-92.0[20]	
CA_3A-8A-11A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	8	-	-	-96.3	-93.3	-	-	
	11	-	-	-99.3	-96.3	-	-	
CA_3A-8A-28A (Note 16)	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	8	-	-98.5	-96.3	-93.3	-	-	
	28	-	-	-97.8	-94.8	-93	-90.3	
CA_3A-8A-40A	3			-96.3	-93.3	-91.5	-90.3	FDD
				-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	

	3(Note 25)	-	-	-93.5	-90.5	-88.8	-87.6	
	8	-	-98.5	-96.3	-93.3	-	-	
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-96.0[20]	
	40(Note 19)	-	-	-94.7	-92.2	-90.6	-89.5	
CA_3A-11A-28A	3	-	-	-96.0	-93.0	-91.2	-90.0	FDD
		-	-	-98.7[20]	-95.7[20]	-93.9[20]	-92.7[20]	
	11	-	-	-98.8	-95.8	-	-	
	11 (Note 9)	-	-	-74.5	-74.5	-	-	
	28	-	-	-97.6	-94.6	-92.8	-90.1	
CA_3A-19A-42A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	19	-	-	-99.3	-96.3	-94.5	-	
	42	-	-	-98	-95	-93.2	-92	TDD
		-	-	-102.2[20]	-97.2[20]	-95.4[20]	-95.2[20]	
	42 (Note 9)	-	-	-71.2	-71.2	-71.2	-71.2	
	42 (Note 10)	-	-	-96.6	-94.2	-92.7	-92	
CA_3A-20A-32A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
	20	-	-	-96.3	-93.3	-90.5	-89.3	
	32	-	-	-98.8	-95.8	-94.0	-92.8	
CA_3A-28A-41A (Note 18)	3	-	-	[-93.3]	[-90.3]	[-88.5]	[-87.2]	FDD
	28	-	-	-97.8	-94.8	-	-	
	41	-	-	-96.8[17]	-93.8[17]	-92[17]	-90.8[17]	TDD
		-	-	-99.5[17,20]	-96.5[17,20]	-94.7[17,20]	-93.5[17,20]	
CA_3A-28A-41A (Note 19)	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[20]	-96.0[20]	-94.2[20]	-93.0[20]	
	28	-	-	-97.8	-94.8	-	-	
	41	-	-	[-92.6][17]	[-90][17]	[-88.5][17]	[-87.4][17]	TDD
CA_3A-41A-42A (Note 19)	3	-	-	-95.8	-92.8	-91	-89.8	FDD
	41 (Note 17)	-	-	[-92.6]	[90.0]	[-88.5]	[-87.4]	TDD
	42			-97.5	-94.5	-92.7	-91.5	
	42 (Note 9)			-70.7	-70.7	-70.7	-70.7	
	42 (Note 10)			-96.1	-93.7	-92.2	-91.5	
CA_3A-41A-42A (Note 18, Note 23)	3			[-92.8]	[-89.8]	[-88]	[-86.7]	FDD
	41 (Note 17)			-96.8	-93.8	-92.0	-90.8	TDD
	42			-97.5	-94.5	-92.7	-91.5	
CA_3A-41A-42A (Note 22, Note 23)	3			-95.8	-92.8	-91	-89.8	FDD
	41 (Note 17)			-96.8	-93.8	-92.0	-90.8	TDD
	42			-97.5	-94.5	-92.7	-91.5	
CA_4A-5A-12A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	5	-	-	-97.3	-94.3	-	-	
	12	-	-	-96.3	-93.3	-	-	
CA_4A-5A-13A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	5	-	-	-97.3	-94.3	-	-	
	13	-	-	-	-93.3	-	-	
CA_4A-5A-29A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	5	-	-	-97.3	-94.3	-	-	
	29	-	-	-96.3	-93.3	-	-	
CA_4A-5A-30A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	5	-	-	-97.3	-94.3	-	-	
	30	-	-	-98.3	-95.3	-	-	
CA_4A-7A-12A	4	-	-	[-90.5]	[-90.0]	[-89.5]	[-89.0]	FDD
	7	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[20]	-97.0[20]	-95.2[20]	-94.0[20]	
	12	-	-	-96.3	-93.3	-	-	

CA_4A-12A-30A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	4 (Note 8)	-	-	-89.7	-89.2	-88.7	-88.2	
	12	-	-	-96.3	-93.3	-	-	
	30	-	-	-98.3	-95.3	-	-	
CA_4A-29A-30A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	29	-	-	-96.3	-93.3	-	-	
	30	-	-	-98.3	-95.3	-	-	
CA_5A-30A-66A	5	-	-	-97.3	-94.3	-	-	FDD
	30	-	-	-98.3	-95.3	-	-	
	66	-	-	-98.8	-95.8	-94.0	-92.8	
CA_7A-8A-20A	7	-	-	-	-94.3	-92.5	-91.3	FDD
	8	-	-98.5	-96.3	-93.3	-	-	
	20	-	-	[-96.3]	[-93.3]	-	-	
		-	-	[-99.0][20]	[-96.0][20]	-	-	
CA_8A-11A-28A	8	-	-	-96.1	-93.1	-	-	FDD
	11	-	-	-99.3	-96.3	-	-	
	28	-	-	-97.6	-94.6	-92.8	-90.1	
CA_12A-30A-66A	12	-	-	-95.8	-92.8	-	-	FDD
	30	-	-	-97.8	-94.8	-	-	
	66	-	-	-88.8	-88.3	-87.8	-87.3	
CA_19A-21A-42A	19	-	-	-99.3	-96.3	-94.5	-	FDD
	21	-	-	-99.3	-96.3	-94.5	-	
		-	-	-102.0[20]	-99.0[20]	-97.2[20]	-	
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-102.2[20]	-97.2[20]	-95.4[20]	-94.2[20]	
CA_29A-46A-66A	29	-	-	-96.3	-93.3	-	-	FDD
	46	-	-	-	-	-	-88.5	TDD
	66	-	-	-98.8	-95.8	-94.0	-92.8	FDD

Note 1: The transmitter shall be set to maximum output power level (Table 7.3A.5.5-4)
Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
Note 3: The signal power is specified per port
Note 4: Reference sensitivity for the case that the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz.
Note 5: Reference sensitivity for the case that the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz.
Note 6: [6] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
Note 7: These requirements apply when the uplink is active in Band 18 and the downlink channels in Band 28 are confined within the restricted frequency range specified for this CA configuration (Table 5.2A-2).
Note 8: Reference sensitivity for the high band for which the 3rd harmonic of the low band is within transmission bandwidth, as specified Note 5 and 6 in Table 7.3A.0-0a.
Note 9: Reference sensitivity for the high band for which the 2nd harmonic of the low band is within transmission bandwidth, as specified Note 9 and 10 in Table 7.3A.0-0a.
Note 10: Reference sensitivity for the high band for which the 2nd harmonic of the low band is within transmission bandwidth, as specified Note 11 in Table 7.3A.0-0a.
Note 11: These requirements apply when the uplink is active in Band 19 and the downlink channels in Band 28 are allocated at the middle of the restricted frequency range specified for this CA configuration (Table 5.2A-2). For each channel bandwidth in Band 28, the requirement applies regardless of channel bandwidth in Band 19.
NOTE 12: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in Band 3 and Band 41, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 13: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in Band 3 and Band 41, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 14: The B41 requirements also apply to the supported CA_1A-41A.
NOTE 15: These requirements apply when the uplink is active in Band 1 or Band 8.
NOTE 16: These requirements apply when the uplink is active in Band 3 or Band 8.
NOTE 17: The B41 requirements are modified by -0.5dB when carrier frequency of the assigned E-UTRA channel bandwidth is within 2545-2690MHz.
NOTE 18: These requirements apply when the uplink is active in Band 41.
NOTE 19: These requirements apply when the uplink is active in Band 3.
NOTE 20: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 21: These requirements apply when the uplink is active in a lower-frequency band and is within a specified

frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band.
NOTE 22: These requirements apply when the uplink is active in Band 42.
NOTE 23: Only applicable for UE supporting inter-band carrier aggregation with uplink in one E-UTRA band and without simultaneous Rx/Tx.
NOTE 24: These requirements apply when UL CA is configured and the uplink is active in Band 2 and Band 4.
NOTE 25: These requirements apply when the uplink is active in Band 40.
NOTE 26: These requirements apply when the uplink is active in Band 1.

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

Unless otherwise specified, in case the UE supports more than one of the above 3DL inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one 3DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 3DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 3DL carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 3DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 3DL CA configurations

The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.

The reference receive sensitivity (REFSENS) requirement for inter-band specified in Table 7.3A.5.5-3 shall be met for an uplink CA configurations than or equal to that specified in Table 7.3.5-2.

NOTE: Table 7.3A.5.5-4 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3A.5.5-4: Void

For combinations of intra-band contiguous and inter-band carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.5.5-5. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.5.5-5: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band contiguous + inter-band

Channel bandwidth								
CA Configuration	**E-UTRA Band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
CA_1A-3C (Note 9)	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[16]	-99.0[16]	-97.2[16]	-96.0[16]	
	3	-	-	-93.3	-90.8	-89.3	-88.3	
CA_1A-3C (Note 10)	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[16]	-99.0[16]	-97.2[16]	-96.0[16]	
	3	-	-	-96.3	-93.3	-91.5	-90.3	
		-	-	-99.0[16]	-96.0[16]	-94.2[16]	-93.0[16]	
CA_1A-3C (Note 9)	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[16]	-99.0[16]	-97.2[16]	-96.0[16]	
	3	-	-	-93.3	-90.8	-89.3	-88.3	
CA_1A-3C (Note 10)	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[16]	-99.0[16]	-97.2[16]	-96.0[16]	
	3	-	-	-96.3	-93.3	-91.5	-90.3	
		-	-	-99.0[16]	-96.0[16]	-94.2[16]	-93.0[16]	
CA_1A-41C	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[16]	-99.0[16]	-97.2[16]	-96.0[16]	
	41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
CA_1A-42C	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[16]	-99.0[16]	-97.2[16]	-96.0[16]	
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[16]	-97.2[16]	-95.4[16]	-94.2[16]	
CA_2C-5A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
	5	-	-	-97.3	-94.3	-	-	
CA_2C-29A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
	29	-	-	-96.3	-93.3	-	-	
CA_2C-30A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
	30	-	-	-98.3	-95.3	-	-	
CA_3C-5A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[16]	-96.0[16]	-94.2[16]	-93.0[16]	
	5	-	-	-97.3	-94.3	-	-	
CA_3C-8A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
	8	-	-98.5	-96.3	-93.3	-	-	
CA_3A-7C	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[16]	-96.0[16]	-94.2[16]	-93.0[16]	
	7	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
CA_5A-12B	5	-	-	-97.3	-94.3	-	-	FDD
	12	-	-	-96.3	-93.3	-	-	
CA_8A-42C	8	-101.3	-98.3	-96.1	-93.1	-	-	FDD
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[16]	-97.2[16]	-95.4[16]	-94.2[16]	
	42 (Note 8)	-	-	-83.8	-83.7	-83.6	-83.5	
CA_3A-40C (Note 12)	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[16]	-96.0[16]	-94.2[16]	-93.0[16]	
	40	-	-	-94.7	-92.2	-90.6	-89.5	TDD
CA_3A-40C (Note 13)	3	-	-	-93.5	-90.5	-88.8	-87.6	FDD
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
CA_3A-41C (Note 12)	3	-	-	[-93.3]	[-90.3]	[-88.5]	[-87.2]	FDD
	41	-	-	-96.8[11]	-93.8[11]	-92[11]	-90.8[11]	TDD
		-	-	-99.5[11,16]	-96.5[11,16]	-94.7[11,16]	-93.5[11,16]	
CA_3A-41C (Note 14)	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[16]	-96.0[16]	-94.2[16]	-93.0[16]	
	41	-	-	[-92.6][11]	[-90][11]	[-88.5][11]	[-87.4][11]	TDD

CA_3A-42C	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[16]	-96.0[16]	-94.2[16]	-93.0[16]	
	42	-	-	-98	-95	-93.2	-92.0	TDD
		-	-	-100.2[16]	-97.2[16]	-95.4[16]	-94.2[16]	
	42 (Note 4)	-	-	-71.2	-71.2	-71.2	-71.2	
	42 (Note 5)	-	-	-96.6	-94.2	-92.7	-92.0	
CA_3C-7A	3	-	-	-96.3	-93.3	-91.5	-90.3	FDD
		-	-	-99.0[16]	-96.0[16]	-94.2[16]	-93.0[16]	
	7	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
CA_19A-42C	19	-	-	-99.3	-96.3	-94.5	-	FDD
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[16]	-97.2[16]	-95.4[16]	-94.2[16]	
CA_21A-42C	21	-	-	-99.3	-96.3	-94.5	-	FDD
		-	-	-102.0[16]	-99.0[16]	-97.2[16]	-	
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[16]	-97.2[16]	-95.4[16]	-94.2[16]	
CA_25A-41C	25	-	-	-95.8	-92.8	-91.0	-89.8	FDD
		-	-	-98.5[16]	-95.5[16]	-93.7[16]	-92.5[16]	
	41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
CA_26A-41C	26	-	-	-96.8[6]	-93.8[6]	-92[6]	-	FDD
	41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
CA_28A-40C (Note 15)	28	-	-	-97.8	-94.8	-93	-90.3	FDD
	40	-	-	-94.4	-92.2	-90.7	-89.8	TDD
CA_28A-40C (Note 13)	28	-	-	-96.1	-93.4	-91.8	-89.1	FDD
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
CA_28A-41C	28	-	-	-97.8	-94.8	-	-	FDD
	41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
CA_28A-42C	28	-	-	-97.3	-94.3	-92.5	-89.8	FDD
	42	-	-	-96.5	-93.5	-91.7	-90.5	TDD
	42 (Note 7)	-	-	-84.9	-84.6	-84.3	-84.1	
CA_29A-66C	29	-	-	-96.3	-93.3	-	-	FDD
	66	-	-	-98.8	-95.8	-94	-92.8	

CA_39A-41C	39	-	-	-	-96.3	-94.5	-93.3	TDD
		-	-	-	-99.0[16]	-97.2[16]	-96.0[16]	
	41	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[16]	-97.0[16]	-95.2[16]	-94.0[16]	
CA_39C-41A	39	-	-	-99.3	-96.3	-94.5	-93.3	TDD
		-	-	-102.0[16]	-99.0[16]	-97.2[16]	-96.0[16]	
	41	-	-	-	-	-	-91.3	
		-	-	-	-	-	-94.0[16]	
CA_41A-42C	41	-	-	-	-93.9	-92.1	-90.9	TDD
		-	-	-	-96.6[16]	-94.8[16]	-93.6[16]	
	42	-	-	-97.5	-94.5	-92.7	-91.5	
		-	-	-99.7[16]	-96.7[16]	-94.9[16]	-93.7[16]	
CA_41C-42A	41	-	-	-	-93.9	-92.1	-90.9	TDD
		-	-	-	-96.6[16]	-94.8[16]	-93.6[16]	
	42	-	-	-97.5	-94.5	-92.7	-91.5	
		-	-	-99.7[16]	-96.7[16]	-94.9[16]	-93.7[16]	
CA_46C-66A	46	-	-	-	-	-	-88.5	TDD
	66	-	-	-98.8	-95.8	-94	-92.8	FDD
CA_46A-66C	46	-	-	-	-	-	-88.5	TDD
	66	-	-	-98.8	-95.8	-94	-92.8	FDD

Note 1: The transmitter shall be set to maximum output power level (Table 7.3A.5.5-4)
Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
Note 3: The signal power is specified per port
Note 4: Reference sensitivity for the high band for which the 2nd harmonic of the low band is within transmission bandwidth, as specified Note 9 and 10 in Table 7.3A.0-0a.
Note 5: Reference sensitivity for the high band for which the 2nd harmonic of the low band is within transmission bandwidth, as specified Note 11 in Table 7.3A.0-0a.
Note 6: [6]indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
Note 7: Reference sensitivity for the high band for which the 5th harmonic of the low band is within transmission bandwidth, as specified Note 15 and 16 in Table 7.3A.0-0a.
Note 8: Reference sensitivity for the high band for which the 4th harmonic of the low band is within transmission bandwidth, as specified Note 12 and 13 in Table 7.3A.0-0a.
Note 9: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in Band 3, the requirement applies regardless of channel bandwidth in Band 1.
Note 10: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in Band 3, the requirement applies regardless of channel bandwidth in Band 1.
Note 11: The B41 requirements are modified by -0.5dB when carrier frequency of the assigned E-UTRA channel bandwidth is within 2545-2690 MHz.
Note 12: These requirements apply when the uplink is active in Band 3.
Note 13: These requirements apply when the uplink is active in Band 40.
Note 14: These requirements apply when the uplink is active in Band 41.
Note 15: These requirements apply when the uplink is active in Band 28.
Note 16: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

For combinations of intra-band non-contiguous and inter-band carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.5.5-6. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.5.5-6: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band non-contiguous + inter-band

CA Configuration	Testpoint ID	PCC			SCC1			SCC2		
		Band	N_{RB}	Requirement (dBm)	Band	N_{RB}	Requirement (dBm)	Band	N_{RB}	Requirement (dBm)
CA_2A-2A-XA or CA_XA-2A-2A	1	2	100	-91.3	2	25	-90.1[1]	X	Highest N_{RB}	$P_{REFSENS}$
	2	2	100	-94.0	2	25	-90.1[1]	X	Highest N_{RB}	$P_{REFSENS}$
	3	2	100	-91.3 -94.0[8]	2	100	-86.7[1]	X	Highest N_{RB}	$P_{REFSENS}$
	4	X	Highest N_{RB}	$P_{REFSENS}$	2	100	-91.3	2	100	-91.3
CA_3A-3A-XA or CA_XA-3A-3A	1	3	100	-90.3 -93.0[8]	3	25	-89.8[1]	X	Highest N_{RB}	$P_{REFSENS}$
	2	3	100	-90.3 -93.0[8]	3	25	-96.3	X	Highest N_{RB}	$P_{REFSENS}$
	3	3	100	-90.3 -93.0[8]	3	100	-86.2[6]	X	Highest N_{RB}	$P_{REFSENS}$
	4	3	100	-90.3	3	50	-88.2[1]	X	Highest N_{RB}	$P_{REFSENS}$
	5	3	100	-90.3	3	50	-93.3	X	Highest N_{RB}	$P_{REFSENS}$
	6	X	Highest N_{RB}	$P_{REFSENS}$	3	100	-90.3 -93.0[8]	3	100	-90.3 -93.0[8]
	7	X	Highest N_{RB}	$P_{REFSENS}$	3	100	-90.3	3	50	-93.3
CA_4A-4A-XA or CA_XA-4A-4A	1	4	100	-93.3	4	25	-99.3	X	Highest NRB	PREFSENS
	2	4	100	-93.3	4	100	-93.3	X	Highest NRB	PREFSENS
	3	X	Highest NRB	PREFSENS	4	100	-93.3	4	100	-93.3
CA_4A-4A-12A	1	4	100	-93.3	4	25	-99.3	12	50	-93.5
	2	4	100	-93.3	4	100	-93.3	12	50	-93.5
	3	12	50	-93.5	4	100	-93.3	4	25	-99.3
	4	12	50	-93.5	4	100	-87.8[7]	4	100	-87.8[7]
CA_4A-4A-13A	1	4	100	-93.3	4	25	-99.3	13	50	-93.3
	2	4	100	-93.3	4	100	-93.3	13	50	-93.3
	3	13	50	-93.3	4	100	-93.3	4	100	-93.3
	4	4	50	-96.3	4	100	-93.3	13	50	-93.3
CA_7A-7A-XA or CA_XA-7A-7A	1	7	100	-91.3	7	25	-97.3	X	Highest NRB	$P_{REFSENS}$
	2	7	100	-91.3	7	25	-97.3	X	Highest NRB	$P_{REFSENS}$
	3	7	100	-91.3	7	50	-94.3	X	Highest NRB	$P_{REFSENS}$
	4	7	100	-91.3	7	50	-94.3	X	Highest NRB	$P_{REFSENS}$
	5	7	100	-91.3	7	75	-92.5	X	Highest NRB	$P_{REFSENS}$
	6	7	100	-91.3	7	75	-92.5	X	Highest NRB	$P_{REFSENS}$
	7	7	100	-91.3	7	100	-91.3	X	Highest NRB	$P_{REFSENS}$
	8	7	100	-91.3	7	100	-91.3	X	Highest NRB	$P_{REFSENS}$
	9	7	50	-94.3	7	100	-91.3	X	Highest NRB	$P_{REFSENS}$
	10	7	50	-94.3	7	100	-91.3	X	Highest NRB	$P_{REFSENS}$

	11	7	50	-94.3	7	25	-97.3	X	Highest NRB	$P_{REFSENS}$
	12	7	50	-94.3	7	25	-97.3	X	Highest NRB	$P_{REFSENS}$
	13	X	Highest NRB	PREFSENS	7	50	-94.3	7	100	-91.3
	14	X	Highest NRB	PREFSENS	7	100	-91.3	7	100	-91.3
CA_7A-42A-42A	1	42	100	-91.5 -93.7[8]	42	25	-97.5 -99.7[8]	7	100	-89.6
	2	42	100	-91.5 -93.7[8]	42	100	-91.5 -93.7[8]	7	100	-89.6
	3	7	100	-91.3	42	100	-89.4	42	100	-89.4
CA_12A-66A-66A	1	66	100	-92.8	66	25	-98.8	12	50	-93.5
	2	66	100	-92.8	66	100	-92.8	12	50	-93.5
	3	12	25	-96.5	66	100	-92.8	66	25	-98.8
	4	12	25	-96.5	66	100	-92.8	66	50	-95.8
	5	12	50	-93.5	66	100	-92.8	66	75	-94.0
	6	12	50	-93.5	66	100	-87.3[7]	66	100	-87.3[7]
CA_29A-66A-66A	1	66	100	-92.8	66	100	-92.8	29	50	-93.3
	2	66	100	-92.8	66	25	-98.8	29	50	-93.3
CA_42A-42A-XA or CA_XA-42A-42A	1	42	100	-92 -94.2[8]	42	25	-98 -100.2[8]	X	Highest NRB	PREFSENS
	2	42	100	-92 -94.2[8]	42	100	-92 -94.2[8]	X	Highest NRB	PREFSENS
	3	X	Highest NRB	PREFSENS	42	100	-92 -94.2[8]	42	100	-92 -94.2[8]
CA_46A-46A-66A	1	66	100	-92.8	46	100	-88.5	46	100	-88.5
	2	66	100	-92.8	46	100	-88.5	46	100	-88.5
CA_66A-66A-XA or CA_XA-66A-66A	1	66	100	-92.8	66	25	-98.8	X	Highest NRB	PREFSENS
	2	66	100	-92.8	66	100	-92.8	X	Highest NRB	PREFSENS
	3	X	Highest NRB	PREFSENS	66	100	-92.8	66	100	-92.8

Note 1: Requirements with additional relaxation (ΔR_{IBNC}) as per Table 7.3A.0-3.
Note 2: "Testpoint ID" refers to IDs in Table 7.3A.5.4.1-4.
Note 3: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 4: The signal power is specified per port.
Note 5: $P_{REFSENS}$ refers to the PCC band's single carrier reference sensitivity according to table 7.3.5-1.
Note 6: Void
Note 7: Reference sensitivity for the high band for which the 3rd harmonic of the low band is within transmission bandwidth, as specified Note 5 in Table 7.3A.0-0a.
Note 8: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

For combinations of intra-band non-contiguous and intra-band contiguous carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.5.5-7. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.5.5-7: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band non-contiguous + intra-band contiguous

CA Configuration	Testpoint ID	PCC		SCC1		SCC2	
		N_{RB}	Requirement (dBm)	N_{RB}	Requirement (dBm)	N_{RB}	Requirement (dBm)
CA_41A-41C	1	100	-91.3	100	-91.3	25	-97.3
			94.0[6]		94.0[6]		100.0[6]
	2	100	-91.3	100	-91.3	100	-91.3
			94.0[6]		94.0[6]		94.0[6]
CA_41C-41A	1	100	-91.3	100	-91.3	25	-97.3
			94.0[6]		94.0[6]		100.0[6]
	2	100	-91.3	100	-91.3	100	-91.3
			94.0[6]		94.0[6]		94.0[6]
CA_66A-66C	1	100	-92.8	100	-92.8	25	-98.8
	2	100	-92.8	100	-92.8	100	-92.8

Note 1: Requirements with additional relaxation (ΔR_{IBNC}) as per Table 7.3A.0-3.
Note 2: "Testpoint ID" refers to IDs in Table 7.3A.5.4.1-5.
Note 3: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 4: The signal power is specified per port.
Note 5: $P_{REFSENS}$ refers to the PCC band's single carrier reference sensitivity according to table 7.3.5-1.
Note 6: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

7.3A.6 Reference sensitivity level for CA (inter-band DL CA and UL CA)

7.3A.6.1 Test purpose

Same as in clause 7.3A.1.1.

7.3A.6.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support inter-band DL CA and UL CA.

7.3A.6.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.6.4 Test description

7.3A.6.4.1 Initial conditions

Same as in clause 7.3A.1.4.1 with the following exceptions:

- Instead of Table 7.3A.1.4.1-1→ use Table 7.3A.6.4.1-1.
- Instead of clause 7.3A.1.4.3 use clause 7.3A.6.4.3.

Table 7.3A.6.4.1-1: Test Configuration Table

Initial Conditions												
Test Environment as specified in TS 36.508[7] subclause 4.1					NC, TL/VL, TL/VH, TH/VL, TH/VH							
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.					For test frequencies refer to “Range” columns.							
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Refer to “PCC N_{RB}”and “SCC N_{RB} ” columns							
Network signalling value					NS_01 Unless given by Table 7.3.3-3 for the band with active uplink carrier							
Test Parameters for CA Configurations												
ID	**CA Configuration / N_{RB_agg}**						**DL Allocation**			**UL Allocation (Note 2,3)**		
	CA Configuration				**PCC N_{RB}**	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
	PCC		**SCC**					**PCC**	**SCC**			
	Band	**Range**	**Band**	**Range**								
Default Test Settings for a CA_XA-YA Configuration												
1	X	Mid	Y	Mid	Lowest N_{RB}	Lowest N_{RB}	QPSK	All RBs		QPSK	REFSENS	REFSENS
2	X	Mid	Y	Mid	Highest N_{RB}	Highest N_{RB}	QPSK	All RBs		QPSK	REFSENS	REFSENS
Test Settings for CA_1A-3A Configuration												
1	1	Note 5	3	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
Test Settings for CA_1A-8A Configuration												
1	1	Note 5	8	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
Test Settings for CA_2A-4A Configuration												
1	2	Note 5,6	4	Note 5	100	25	QPSK	All RBs		QPSK	50@0	25@0
2	2	Note 5	4	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
Test Settings for CA_3A-5A Configuration												
1	3	Note 5	5	Note 5	50	25	QPSK	All RBs		QPSK	50@0	25@0
Test Settings for CA_3A-7A Configuration												
1	3	Note 5	7	Note 5	25	50	QPSK	All RBs		QPSK	25@0	50@0
Test Settings for CA_3A-8A Configuration												
1	3	Note 5	8	Note 5	50	25	QPSK	All RBs		QPSK	50@0	25@0
Test Settings for CA_3A-19A Configuration												
1	3	Note 5	19	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
2	3	Note 5	19	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
Test Settings for CA_3A-20A Configuration												
1	3	Note 5	20	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
2	3	Note 5	20	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
Test Settings for CA_3A-26A Configuration												
1	3	Note 5	26	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
2	3	Note 5	26	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
Test Settings for CA_4A-5A Configuration												
1	4	Note 5	5	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
Test Settings for CA_4A-7A Configuration												
1	4	Note 5	7	Note 5	25	25	QPSK	All RBs		QPSK	25@0	25@0
Test Settings for CA_5A-7A Configuration												

1	5	Note 5	7	Note 5	25	50	QPSK	All RBs	QPSK	25@0	50@0
Test Settings for CA_7A-20A Configuration											
1	7	Note 5	20	Note 5	50	25	QPSK	All RBs	QPSK	50@0	25@0

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 3: X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A,X=1,Y=3.
Note 4: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 5: Test frequency for each CA configuration shall follow Table 7.3A.0-0f. If test configurations of each ID in a CA configuration are same, test frequency shall follow the order of Table 7.3A.0-0f.
Note 6: Not applicable if the UE only supports Bandwidth Combination Set 1.

7.3A.6.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.3A.6.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.6.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the appropriate REFSENS value defined in Table 7.3A.6.5-1. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.3A.6.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

7.3A.6.5 Test requirement

For inter-band carrier aggregation with uplink assigned to two E-UTRA bands the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.3A.6.5-1 (originated from single carrier Tables 7.3.5-1). The reference sensitivity is defined to be met with both downlink component carriers active and both of the uplink component carriers active.

Table 7.3A.6.5-1: Reference sensitivity QPSK PREFSENS

		Channel bandwidth						
CA Configuration	**E-UTRA Band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
CA_1A-3A	1	-	-	-76.3	-	-	-	FDD
	3	-	-	-96.3	-	-	-	
CA_1A-5A	1	-	-	-	-96.3	-	-	FDD
		-	-	-	-99.0[6]	-	-	
	5	-	-	-	-94.3	-	-	

CA_1A-7A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-96.0[6]	
	7	-	-	-	-94.3	-92.5	-91.3	
		-	-	-	-97.0[6]	-95.2[6]	-93.0[6]	
CA_1A-8A	1	-	-	-93.3	-	-	-	FDD
	8	-	-	-96.3	-	-	-	
CA_1A-18A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-96.0[6]	
	18	-	-	-99.3	-96.3	-94.5	-	
CA_1A-19A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-96.0[6]	
	19	-	-	-99.3	-96.3	-94.5	-	
CA_1A-21A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-96.0[6]	
	21	-	-	-99.3	-96.3	-94.5	-	
CA_1A-26A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-96.0[6]	
	26	-	-	-96.8[5]	-93.8[5]	-92[5]	-	
CA_1A-28A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-96.0[6]	
	1 (Note 4)	-	-	-89.1	-88.7	-88.3	-88.0	
	28	-	-	-97.6	-94.6	-92.8	-90.1	
CA_1A-42A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-96.0[6]	
	42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
		-	-	-100.2[6]	-97.2[6]	-95.4[6]	-94.2[6]	
CA_2A-4A	2	-	-	-	-	-	-86.3	FDD
	4	-	-	-99.3	-	-	-	
	2	-	-	-97.3	-	-	-	FDD
		-	-	-100.0[6]	-	-	-	
	4	-	-	-94.3	-	-	-	
CA_2A-5A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100[6]	97[6]	-95.2[6]	92[6]	
	5	-	-	-97.3	-94.3	-	-	
CA_2A-7A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100[6]	97[6]	-95.2[6]	92[6]	
	7	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100[6]	97[6]	-95.2[6]	92[6]	
CA_2A-12A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100[6]	97[6]	-95.2[6]	92[6]	
	12	-	-98	-96.3	-93.3	-	-	
CA_2A-13A	2	-	-	-	-94.3	-92.5	-91.3	FDD
		-	-	-	-97.0[6]	-95.2[6]	-94.0[6]	
	13	-	-	-	-93.3	-	-	
CA_2A-30A	2	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100[6]	97[6]	-95.2[6]	92[6]	
	30	-	-	-98.3	-95.3	-	-	
CA_2A-66A	2	-101.7	-98.7	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100[6]	97[6]	-95.2[6]	92[6]	
	66	-	-	-98.8	-95.8	-94	-92.8	
CA_3A-5A	3	-	-	-	-93.3	-	-	FDD
		-	-	-	-96.0[6]	-	-	
	5	-	-	-73.3	-	-	-	
CA_3A-7A	3	-	-	-96.3	-	-	-	FDD
		-	-	-99.0[6]	-	-	-	
	7	-	-	-	-81.3	-	-	
CA_3A-8A	3	-	-	-	-93.3	-	-	FDD
					-96.0[6]			
	8	-	-	-88.3	-	-	-	
CA_3A-19A	3	-	-	-92.3	-	-	-	FDD
	19	-	-	-99.3	-	-	-	
	3	-	-	-96.3	-	-	-	FDD
				-99.0[6]				

	19	-	-	-72.3	-	-	-	
CA_3A-20A	3	-	-	-92.3	-	-	-	FDD
	20	-	-	-96.3	-	-	-	
		-	-	-99.0[6]	-	-	-	
	3	-	-	-96.3	-	-	-	FDD
		-	-	-99.0[6]	-	-	-	
	20	-	-	-87.3	-	-	-	
CA_3A-26A	3	-	-	-92.3	-	-	-	FDD
	26	-	-	-96.8[5]	-	-	-	
	3	-	-	-96.3	-	-	-	FDD
		-	-	-99.0[6]	-	-	-	
	26	-	-	-70.8[5]	-	-	-	
CA_4A-5A	4	-	-	-99.3	-	-	-	FDD
	5	-	-	-71.3	-	-	-	
CA_4A-7A	4	-	-	-99.3	-	-	-	FDD
	7	-	-	-82.3	-	-	-	
CA_4A-12A	4	-104	-101	-99.3	-96.3	-94.5	-93.3	FDD
	4 (Note 4)	-88.5	-88.5	-89.3	-88.8	-88.3	-87.8	
	12	-	-	-96.3	-93.3	-	-	
CA_4A-13A	4	-	-	-99.3	-96.3	-94.5	-93.3	FDD
	13	-	-	-	-93.3	-	-	
CA_4A-17A	4	-	-	-99.3	-96.3	-	-	FDD
	4 (Note 4)	-	-	-89.3	-88.8	-	-	
	17	-	-	-96.3	-93.3	-	-	
CA_5A-7A	5	-	-	-85.3	-	-	-	FDD
	7	-	-	-	-94.3	-	-	
		-	-	-	-97.0[6]	-	-	
CA_5A-30A	5	-	-	-97.3	-94.3	-	-	FDD
	30	-	-	-98.3	-95.3	-	-	
CA_5A-66A	5	-	-	-97.3	-94.3	-	-	FDD
	66	-	-	-98.8	-95.8	-94	-92.8	
CA_7A-20A	7	-	-	-	-94.3	-	-	FDD
		-	-	-	-97.0	-	-	
	20	-	-	-85.0[6]	-	-	-	
CA_7A-28A	7	-	-	-97.3	-94.3	-92.5	-91.3	FDD
		-	-	-100.0[6]	-97.0[6]	-95.2[6]	-94.0[6]	
	28	-	-	-98.5	-95.5	-93.7	-	
CA_12A-30A	12	-	-	-96.3	-93.3	-	-	FDD
	30	-	-	-98.3	-95.3	-	-	
CA_18A-28A	18	-	-	-99.3	-96.3	-94.5	-	FDD
	28	-	-	-97.8	-94.8	-	-	
CA_19A-21A	19	-	-	-99.3	-96.3	-94.5	-	FDD
	21	-	-	-99.3	-96.3	-94.5	-	
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-	
CA_39A-41A	39	-	-	-99.3	-96.3	-94.5	-93.3	TDD
		-	-	-102.0[6]	-99.0[6]	-97.2[6]	-96.0[6]	
	41	-	-	-97.3	-94.3	-92.5	-91.3	
		-	-	-100.0[6]	-97.0[6]	-95.2[6]	-94.0[6]	
CA_41A-42A	41	-	-	-	-94.3	-92.5	-91.3	TDD
	42	-	-	-	-94.8	-93	-91.8	

Note 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX_L,c}$) as defined in subclause 6.2.5A
Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
Note 3: The signal power is specified per port
Note 4: Reference sensitivity for the high band for which the 3rd harmonic of the low band is within transmission bandwidth, as specified Note 5 in Table 7.3A.0-0a.
Note 5: [5] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
Note 6: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

7.3A.7 Reference sensitivity level for CA (intra-band non-contiguous DL CA and UL CA)

7.3A.7.1 Test purpose

Same as in clause 7.3A.1.1.

7.3A.7.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA and UL CA.

7.3A.7.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.7.4 Test description

7.3A.7.4.1 Initial conditions

Same as in clause 7.3A.1.4.1 with the following exceptions:

- Instead of Table 7.3A.1.4.1-1→ use Table 7.3A.7.4.1-1.
- Instead of clause 7.3A.1.4.3 use clause 7.3A.7.4.3.

Table 7.3A.7.4.1-1: Test Configuration Table

Initial Conditions										
Test Environment as specified in TS 36.508[7] subclause 4.1				NC, TL/VL, TL/VH, TH/VL, TH/VH						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2.				A: N/A (Range is not relevant)						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.				Refer to test point						
Test Parameters for CA Configurations										
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**				
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	**CC MOD**	**SCC N_{RB_alloc} (L_{CRB} @ RB_{start})**	
Test Parameters for CA_4A-4A Configurations										
1	100	25	35	QPSK	100+25	QPSK	100@0	QPSK	25@0	
2	100	100	20	QPSK	100+100	QPSK	100@0	QPSK	100@0	
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3. Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.										

7.3A.7.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A7.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.3A.7.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.7.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the appropriate REFSENS value defined in Table 7.3A.7.5-1. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.3A.7.4.3 Message contents

Same as in clause 7.3A.4.4.3.

7.3A.7.5 Test requirement

For intra-band non-contiguous carrier aggregation with two uplink carriers, the throughput of each downlink component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.3.2 with parameters specified in Table 7.3A.7.5-1.

Table 7.3A.7.5-1: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band Non-contiguous

ID/ CA configuration / $P_{REFSENS}$			
ID	**CA configuration**	**PCC measurement (dBm)**	**SCC measurement (dBm)**
1	CA_4A-4A	-93.3	-99.3
2		-93.3	-93.3
Note 1: The transmitter shall be set to maximum output power level Note 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 Note 3: The signal power is specified per port			

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

In case the UE supports more than one of the inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL (i.e. bands listed in Table 7.3A.0-0a), then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied.

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 7.3.3-1A that would apply for that operating band among the supported CA configurations.

7.3A.8

7.3A.9 Reference sensitivity level for 4DL CA

Editor's note: Following aspects missing or not yet determined:

- Reference sensitivity QPSK $P_{REFSENS}$ has defined and made for some CA bands, some of are incomplete.

7.3A.9.1 Test purpose

Same as in clause 7.3A.1.1.

7.3A.9.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 4DL with TDD Intra-band contiguous CA, or 4DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 4DL with Intra-band non-contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 4DL CA with FDD-TDD CA.

7.3A.9.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.9.4 Test description

7.3A.9.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3A.9.4.1-1 through table 7.3A.9.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3A.9.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	UL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for a CA_XE Configuration (Intra-band contiguous)																
1	X	Low/CC1	REFSENS	ALL RBs	X	Low/CC2	N/A	ALL RBs	X	Low/CC3	N/A	ALL RBs	X	Low/CC4	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Low/CC1	REFSENS	ALL RBs	X	Low/CC2	N/A	ALL RBs	X	Low/CC3	N/A	ALL RBs	X	Low/CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
3	X	High/CC1	REFSENS	ALL RBs	X	High/CC2	N/A	ALL RBs	X	High/CC3	N/A	ALL RBs	X	High/CC4	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
4	X	High/CC1	REFSENS	ALL RBs	X	High/CC2	N/A	ALL RBs	X	High/CC3	N/A	ALL RBs	X	High/CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA Configuration (Inter-band)																
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs

	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Test Settings for a CA_1A-3A-8A-40A Configuration																
1[11]	1	Low	25@0	ALL RBs	3	High	N/A	ALL RBs	8	Mid	N/A	ALL RBs	40	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50	N/A	QPSK		100
2[11]	1	Low	25@0	ALL RBs	3	High	N/A	ALL RBs	8	Mid	N/A	ALL RBs	40	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
3	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	8	Mid	N/A	ALL RBs	40	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
4	3	High	50@50	ALL RBs	1	Low	N/A	ALL RBs	8	High	N/A	ALL RBs	40	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
5	3	Mid	50@50	ALL RBs	1	Mid	N/A	ALL RBs	8	High	N/A	ALL RBs	40	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
6	8	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	40	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	40	Mid	100@0	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	8	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for a CA_1A-3A-19A-42A Configuration																
1	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
2	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
3[11]	1	Low	25@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75	N/A	QPSK		100
4	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
5	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
6	1	Low	25@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs

	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
7[12]	1	Mid	100@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
8	1	Mid	50@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
9	1	Mid	75@0	ALL RBs	3	High	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
10	3	High	50@50	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		50	N/A	QPSK		100
11	3	High	50@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
12	3	High	50@50	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
13	3	High	50@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
14[14]	3	High	50@50	ALL RBs	1	Low	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
15[13]	3	Low12	50@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Low12	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75	N/A	QPSK		100
16[15]	3	High13	50@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid13	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75	N/A	QPSK		100
17[13]	3	Low	50@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Low	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
18[15]	3	High	50@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
19	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
20	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs

	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
21	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
22	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
23	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
24	42	Mid	100@0	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
25	42	Low	100@0	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
26	42	High	100@0	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
27	42	Mid	100@0	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
Test Settings for a CA_1A-19A-21A-42A Configuration																
1	1	Mid	75@0	ALL RBs	19	High	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
2	1	Mid	75@0	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
3	1	Mid	100@0	ALL RBs	19	High	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
4	1	Mid	100@0	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
5	1	Mid	50@0	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
6	1	Mid	75@0	ALL RBs	19	Mid	N/A	ALL RBs	21	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		50	N/A	QPSK		100

7	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
8	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	21	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
9	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
10	19	Mid	50@50	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
11	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		75	N/A	QPSK		100
12	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	21	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
13	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		50	N/A	QPSK		100
14	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
15	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
16	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
17	21	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100
18	21	Mid	25@25	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
19	21	High	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100
20	42	Mid	100@0	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75

Test Settings for CA_2A-4A-5A-12A Configuration																
1	2	Mid	50@50	ALL RBs	4	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs	12	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	4	Mid	50@0	ALL RBs	2	Mid	N/A	ALL RBs	5	High	N/A	ALL RBs	12	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
3	4	Mid	50@0	ALL RBs	2	Mid	N/A	ALL RBs	5	Low	N/A	ALL RBs	12	Low	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
4	4	Mid	50@0	ALL RBs	2	Mid	N/A	ALL RBs	5	High	N/A	ALL RBs	12	Low	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
5	4	Mid	50@0	ALL RBs	2	Mid	N/A	ALL RBs	5	Low	N/A	ALL RBs	12	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
6	5	Low	25@25	ALL RBs	12	Mid	N/A	ALL RBs	2	Mid	N/A	ALL RBs	4	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
7	5	High	25@25	ALL RBs	12	Mid	N/A	ALL RBs	2	Mid	N/A	ALL RBs	4	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
8	12	Low[18]	20@30	ALL RBs	4	Low[18]	N/A	ALL RBs	2	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
9	12	High[19]	20@30	ALL RBs	4	High[19]	N/A	ALL RBs	2	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_2A-4A-5A-30A Configuration																
1	2	Mid	50@50	ALL RBs	4	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	4	Mid	50@0	ALL RBs	2	Mid	N/A	ALL RBs	5	Low	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
3	4	Mid	50@0	ALL RBs	2	Mid	N/A	ALL RBs	5	High	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
4	4	Mid	100@0	ALL RBs	2	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50

5	5	Low	25@25	ALL RBs	2	Mid	N/A	ALL RBs	4	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
6	5	High	25@25	ALL RBs	2	Mid	N/A	ALL RBs	4	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
7	5	Mid	25@25	ALL RBs	2	Mid	N/A	ALL RBs	4	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
8	30	Mid	25@25	ALL RBs	2	Mid	N/A	ALL RBs	4	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_2A-4A-7A-12A Configuration																
1	2	Mid	50@50	ALL RBs	4	Mid	N/A	ALL RBs	7	Mid	N/A	ALL RBs	12	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
2	4	Mid	100@0	ALL RBs	2	Mid	N/A	ALL RBs	7	Mid	N/A	ALL RBs	12	Low	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	4	Mid	100@0	ALL RBs	2	Mid	N/A	ALL RBs	7	Mid	N/A	ALL RBs	12	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
4	7	Mid	75@25	ALL RBs	4	Mid	N/A	ALL RBs	2	Mid	N/A	ALL RBs	12	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	12	Low10	16@17	ALL RBs	2	Mid	N/A	ALL RBs	4	Low10	N/A	ALL RBs	7	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
6	12	High11	16@17	ALL RBs	2	Mid	N/A	ALL RBs	4	High11	N/A	ALL RBs	7	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
Test Settings for CA_2A-4A-12A-30A Configuration																
1	2	Mid	50@50	ALL RBs	4	Mid	N/A	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	4	Mid	100@0	ALL RBs	2	Mid	N/A	ALL RBs	12	Low	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
3	4	Mid	100@0	ALL RBs	2	Mid	N/A	ALL RBs	12	High	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50

4	12	Low[18]	16@17	ALL RBs	2	Mid	N/A	ALL RBs	4	Low[18]	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	12	High[19]	16@17	ALL RBs	2	Mid	N/A	ALL RBs	4	High[19]	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
6	30	Mid	25@25	ALL RBs	2	Mid	N/A	ALL RBs	4	Mid	N/A	ALL RBs	12	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_2A-4A-29A-30A Configuration																
1	2	Mid	50@50	ALL RBs	4	Mid	N/A	ALL RBs	29	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	4	Mid	100@0	ALL RBs	2	Mid	N/A	ALL RBs	29	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
3	30	Mid	25@25	ALL RBs	2	Mid	N/A	ALL RBs	4	Mid	N/A	ALL RBs	29	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
Test Settings for CA_2A-12A-30A-66A Configuration																
1	2	Mid	50@50	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs	66	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50	N/A	QPSK		100
2	12	Mid	20@30	ALL RBs	2	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs	66	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
3	12	Low	20@5	ALL RBs	2	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs	66	Low	N/A	ALL RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		25
4	12	Mid	20@5	ALL RBs	2	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs	66	Low	N/A	ALL RBs
	QPSK	QPSK		25	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
5	12	High	20@30	ALL RBs	2	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs	66	Low	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		75
6	12	Low	20@30	ALL RBs	2	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs	66	Low	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
7	12	Mid	20@30	ALL RBs	2	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs	66	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50

8	30	Mid	25@25	ALL RBs	2	Mid	N/A	ALL RBs	12	Mid	N/A	ALL RBs	66	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100
9	66	Mid	100@0	ALL RBs	2	Mid	N/A	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
10	66	Mid	50@0	ALL RBs	2	Mid	N/A	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
Default Test Settings for CA_XB-YA-ZA and CA_XC-YA-ZA Configuration (Intra-band contiguous + Inter-band)																
1	X	Low/CC1	REFSENS	ALL RBs	X	Low/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Low/CC1	REFSENS	ALL RBs	X	Low/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	X	High/CC1	REFSENS	ALL RBs	X	High/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	X	High/CC1	REFSENS	ALL RBs	X	High/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
Default Test Settings CA_XA-ZA-YB and for CA_XA-ZA-YC Configuration (Intra-band contiguous + Inter-band)																
1	Y	Low/CC1	REFSENS	ALL RBs	Y	Low/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Low/CC1	REFSENS	ALL RBs	Y	Low/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	High/CC1	REFSENS	ALL RBs	Y	High/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

4	Y	High/CC1	REFSENS	ALL RBs	Y	High/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	X	Mid	REFSENS	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
Test Settings CA_1A-3C-8A Configuration																
1	1	Low	25@0	ALL RBs	3	High/CC1	N/A	ALL RBs	3	High/CC2	N/A	ALL RBs	8	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
2	1	Low	25@0	ALL RBs	3	High/CC1	N/A	ALL RBs	3	High/CC2	N/A	ALL RBs	8	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
3	1	Mid	45@0	ALL RBs	3	High/CC1	N/A	ALL RBs	3	High/CC2	N/A	ALL RBs	8	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
4	3	High/CC1	50@50	ALL RBs	1	Low	N/A	ALL RBs	3	High/CC2	N/A	ALL RBs	8	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
5	3	High/CC1	50@50	ALL RBs	1	Low	N/A	ALL RBs	3	High/CC2	N/A	ALL RBs	8	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
6	3	Low/CC1	50@50	ALL RBs	1	Low	N/A	ALL RBs	3	Low/CC2	N/A	ALL RBs	8	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		50
7	3	Low/CC1	50@50	ALL RBs	1	Low	N/A	ALL RBs	3	Low/CC2	N/A	ALL RBs	8	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
8	8	High	25@25	ALL RBs	1	Low	N/A	ALL RBs	3	Mid/CC1	N/A	ALL RBs	3	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings CA_1A-3A-42C Configuration																
1	1	Low	25@0	ALL RBs	3	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
2	1	Low	25@0	ALL RBs	3	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4[12]	1	Mid	100@0	ALL RBs	3	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	1	Mid	100@0	ALL RBs	3	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6[13]	3	High	50@50	ALL RBs	1	Low	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs

	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	3	Low[16]	50@25	ALL RBs	1	Mid	N/A	ALL RBs	42	Low[16]/CC1	N/A	ALL RBs	42	Low[16]/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
8	3	High[17]	50@25	ALL RBs	1	Mid	N/A	ALL RBs	42	Mid[17]/CC1	N/A	ALL RBs	42	Mid[17]/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
9	3	Low	50@25	ALL RBs	1	Mid	N/A	ALL RBs	42	Low[16]/CC1	N/A	ALL RBs	42	Low[16]/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
10	3	High	50@25	ALL RBs	1	Mid	N/A	ALL RBs	42	Mid[17]/CC1	N/A	ALL RBs	42	Mid[17]/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
11	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
12	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
13	42	Mid/CC1	100@0	ALL RBs	42	Mid/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
14	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
15	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings CA_1A-19A-42C Configuration																
1	1	Mid	50@0	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
2	1	Mid	75@0	ALL RBs	19	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
3	1	Mid	100@0	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
4	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
5	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
6	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	42	Mid/CC1	100@0	ALL RBs	42	Mid/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
8	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
9	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs

	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		75
10	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
11	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		75
Test Settings CA_1A-21A-42C Configuration																
1	1	Mid	75@0	ALL RBs	21	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
2	1	Mid	75@0	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
3	1	Mid	100@0	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
4	21	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
5	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
6	21	Mid	100@0	ALL RBs	1	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	42	Mid/CC1	100@0	ALL RBs	42	Mid/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
8	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
9	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		75
10	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
11	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		75
Test Settings for a CA_1A-41A-42C Configuration																
1	1	Low	100@0	ALL RBs	41	Mid	N/A	ALL RBs	42	Low/CC1	N/A	ALL RBs	42	Low/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	1	Mid	100@0	ALL RBs	41	Mid	N/A	ALL RBs	42	Low/CC1	N/A	ALL RBs	42	Low/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	1	High	100@0	ALL RBs	41	Mid	N/A	ALL RBs	42	Low/CC1	N/A	ALL RBs	42	Low/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	42	Mid/CC1	100@0	ALL RBs	42	Mid/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100

5	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
7	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
8	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
Test Settings for a CA_1A-41C-42A Configuration																
1	1	Low	100@0	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	1	Mid	100@0	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	1	High	100@0	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs	42	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	42	Mid	100@0	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings CA_2A-5A-12B Configuration																
1	2	Mid	50@50	ALL RBs	5	Mid	N/A	ALL RBs	12	Mid/CC1	N/A	ALL RBs	12	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		25	N/A	QPSK		50
2	5	Mid	25@25	ALL RBs	2	Mid	N/A	ALL RBs	12	Mid/CC1	N/A	ALL RBs	12	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		25	N/A	QPSK		50
3	12	Mid/CC1	20@30	ALL RBs	12	Mid/CC2	N/A	ALL RBs	2	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		50
4	12	Low/CC1	20@5	ALL RBs	12	Low/CC2	N/A	ALL RBs	2	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs
	QPSK	QPSK		25	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		50
5	12	Low/CC1	20@5	ALL RBs	12	Low/CC2	N/A	ALL RBs	2	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs
	QPSK	QPSK		25	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
6	12	High/CC1	20@5	ALL RBs	12	High/CC2	N/A	ALL RBs	2	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs
	QPSK	QPSK		25	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		50
7	12	High/CC1	20@5	ALL RBs	12	High/CC2	N/A	ALL RBs	2	Mid	N/A	ALL RBs	5	Mid	N/A	ALL RBs
	QPSK	QPSK		25	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		50
Test Settings CA_3A-19A-42C Configuration																
1	3	Low[16]	50@25	ALL RBs	19	Mid	N/A	ALL RBs	42	Low[16]/CC1	N/A	ALL RBs	42	Low[16]/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
2	3	High[17]	50@25	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid[17]/CC1	N/A	ALL RBs	42	Mid[17]/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
3	19	Mid	25@50	ALL RBs	3	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100

4	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
5	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		75
6	42	Mid/CC1	100@0	ALL RBs	42	Mid/CC2	N/A	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
7	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
8	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		75
Test Settings CA_19A-21A-42C Configuration																
1	19	High	25@25	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
2	19	Mid	25@50	ALL RBs	21	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
3	19	Mid	25@50	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
4	21	Mid	25@25	ALL RBs	19	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
5	21	High	25@50	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
6	21	Mid	25@50	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
7	42	Mid/CC1	100@0	ALL RBs	42	Mid/CC2	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
8	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
9	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75	N/A	QPSK		75
10	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
11	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75	N/A	QPSK		75
Test Settings CA_41C-42C Configuration																
1	41	Mid/CC1	100@0	ALL RBs	41	Mid/CC2	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	41	Low/CC1	100@0	ALL RBs	41	Low/CC2	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs

	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	41	Low/CC1	50@0	ALL RBs	41	Low/CC2	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	41	High/CC1	100@0	ALL RBs	41	High/CC2	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
5	41	High/CC1	50@0	ALL RBs	41	High/CC2	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
6	42	Low/CC1	100@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	42	Low/CC1	50@0	ALL RBs	42	Low/CC2	N/A	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
8	42	High/CC1	100@0	ALL RBs	42	High/CC2	N/A	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
9	42	High/CC1	50@0	ALL RBs	42	High/CC2	N/A	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
10	42	Mid/CC1	100@0	ALL RBs	42	Mid/CC2	N/A	ALL RBs	41	Mid/CC1	N/A	ALL RBs	41	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
Test Settings CA_2C-5A-30A Configuration																
1	2	Low/CC1	50@50	ALL RBs	2	Low/CC2	N/A	ALL RBs	5	Low	N/A	ALL RBs	30	Low	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	2	Low/CC1	50@50	ALL RBs	2	Low/CC2	N/A	ALL RBs	5	Low	N/A	ALL RBs	30	Low	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
3	2	Mid/CC1	50@50	ALL RBs	2	Mid/CC2	N/A	ALL RBs	5	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
4	2	High/CC1	50@50	ALL RBs	2	High/CC2	N/A	ALL RBs	5	High	N/A	ALL RBs	30	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
5	2	High/CC1	50@50	ALL RBs	2	High/CC2	N/A	ALL RBs	5	High	N/A	ALL RBs	30	High	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		50	N/A	QPSK		50
6	5	Low	25@25	ALL RBs	30	Low	N/A	ALL RBs	2	Low/CC1	N/A	ALL RBs	2	Low/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
7	5	Mid	25@25	ALL RBs	30	Mid	N/A	ALL RBs	2	Mid/CC1	N/A	ALL RBs	2	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
8	5	High	25@25	ALL RBs	30	Mid	N/A	ALL RBs	2	Mid/CC1	N/A	ALL RBs	2	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
9	5	High	25@25	ALL RBs	30	High	N/A	ALL RBs	2	High/CC1	N/A	ALL RBs	2	High/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
10	30	Low	25@25	ALL RBs	5	Low	N/A	ALL RBs	2	Low/CC1	N/A	ALL RBs	2	Low/CC2	N/A	ALL RBs

	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
11	30	Mid	25@25	ALL RBs	5	Mid	N/A	ALL RBs	2	Mid/CC1	N/A	ALL RBs	2	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
12	30	High	25@25	ALL RBs	5	Mid	N/A	ALL RBs	2	Mid/CC1	N/A	ALL RBs	2	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
13	30	High	25@25	ALL RBs	5	High	N/A	ALL RBs	2	High/CC1	N/A	ALL RBs	2	High/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings CA_2C-12A-30A Configuration																
1	2	Low/CC1	50@50	ALL RBs	2	Low/CC2	N/A	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	2	Low/CC1	50@50	ALL RBs	2	Low/CC2	N/A	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50	N/A	QPSK		50
3	2	High/CC1	50@50	ALL RBs	2	High/CC2	N/A	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
4	2	High/CC1	50@50	ALL RBs	2	High/CC2	N/A	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50	N/A	QPSK		50
5	2	Mid/CC1	50@50	ALL RBs	2	Mid/CC2	N/A	ALL RBs	12	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
6	12	Mid	20@30	ALL RBs	30	Mid	N/A	ALL RBs	2	Mid/CC1	N/A	ALL RBs	2	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
7	30	Mid	25@25	ALL RBs	12	Mid	N/A	ALL RBs	2	Mid/CC1	N/A	ALL RBs	2	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
Test Settings CA_2C-29A-30A Configuration																
1	2	Low/CC1	50@50	ALL RBs	2	Low/CC2	N/A	ALL RBs	29	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
2	2	Low/CC1	50@50	ALL RBs	2	Low/CC2	N/A	ALL RBs	29	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50	N/A	QPSK		50
3	2	High/CC1	50@50	ALL RBs	2	High/CC2	N/A	ALL RBs	29	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
4	2	High/CC1	50@50	ALL RBs	2	High/CC2	N/A	ALL RBs	29	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		50	N/A	QPSK		50
5	2	Mid/CC1	50@50	ALL RBs	2	Mid/CC2	N/A	ALL RBs	29	Mid	N/A	ALL RBs	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		50
6	30	Mid	25@25	ALL RBs	29	Mid	N/A	ALL RBs	2	Mid/CC1	N/A	ALL RBs	2	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41E, X=41.

Note 6: **Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-8A,X=1,Y=3,Z=7,R=8.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 11: Test points that fulfil criteria of Note 4 in Table 7.3A.5.5-3.
Note 12: Only Band 1 and Band 42 need to be tested and Band 3 does not need to be tested.
Note 13: Band 3: fUL = 1720MHz (NUL = 19300), fDL = 1815MHz (NDL = 1300)
Band 42: fUL/DL = 3440MHz (NUL/DL = 41990)
Note 14: Only Band 1 and Band 3 need to be tested and Band 42 does not need to be tested.
Note 15: Band 3: fUL = 1775MHz (NUL = 19850), fDL = 1870MHz (NDL = 1850)
Band 42: fUL/DL = 3520MHz (NDL = 42790)
Note 16: Band 42: $f_{UL/DL}$ for SCC1 = 3430.2MHz ($N_{UL/DL}$ = 41892), $f_{UL/DL}$ for SCC2 = 3450MHz ($N_{UL/DL}$ = 42090)
Note 17: Band 42: $f_{UL/DL}$ for SCC1 = 3500.2MHz ($N_{UL/DL}$ = 42592), $f_{UL/DL}$ for SCC2 = 3520MHz ($N_{UL/DL}$ = 42790)
Note 18: Band 12: f_{UL} = 706.7 MHz (N_{UL} = 23087), f_{DL} = 736.7 MHz (N_{DL} = 5087)
Band 4: f_{DL} = 2120.1 MHz (N_{DL} = 2051)
Note 19: Band 12: f_{UL} = 710.9 MHz (N_{UL} = 23129), f_{DL} = 740.9 MHz (N_{DL} = 5129)
Band 4: f_{DL} = 2132.7 MHz (N_{DL} = 2177)

Table 7.3A.9.4.1-2: Test Configuration Table with Wgap

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	UL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for a CA_CA_XA-XA-YA-ZA Configuration (Intra-band non-contiguous + Inter-band)																			
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Default Test Settings for a CA_XA-ZA-YA-YA Configuration																			
1	Y	CC2	REFSENS	ALL RBs	Max	Y	CC1	N/A	ALL RBs	-	X	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	X	Mid	REFSENS	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REFSENS	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs	-	X	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Test Settings for CA_2A-2A-4A-5A Configurations																			

1	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
2	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
3	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		50
4	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
5	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		50
6	4	Low, High	50@0	ALL RBs	-	5	Mid	N/A	ALL RBs	-	2	CC2	N/A	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		50
7	4	Low	100@0	ALL RBs	-	5	Mid	N/A	ALL RBs	-	2	CC2	N/A	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		100
8	5	Mid	25@25	ALL RBs	-	4	Low, High	N/A	ALL RBs	-	2	CC2	N/A	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		50
9	5	Low	25@25	ALL RBs	-	4	Mid	N/A	ALL RBs	-	2	CC2	N/A	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		100
Test Settings for CA_2A-2A-5A-12A Configurations																			
1	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
2	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
3	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50

4	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
5	5	Mid	25@25	ALL RBs	-	12	Mid	N/A	ALL RBs	-	2	CC2	Max	ALL RBs	-	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		100
6	12	Mid	25@25	ALL RBs	-	5	Mid	N/A	ALL RBs	-	2	CC2	Max	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		100
Test Settings for CA_2A-2A-12A-30A Configurations																			
1	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		50
2	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		50
3	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
4	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
5	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
6	12	Mid	20@30	ALL RBs	-	30	Mid	N/A	ALL RBs	-	2	CC2	N/A	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		QPSK	QPSK		100		N/A	QPSK		100
7	30	Mid	25@25	ALL RBs	-	12	Mid	N/A	ALL RBs	-	2	CC2	N/A	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		QPSK	QPSK		100		N/A	QPSK		100

Test Settings for CA_2A-4A-7A-7A Configurations																		
1	2	Mid	50@50	ALL RBs	-	4	Mid	N/A	ALL RBs	-	7	CC2	N/A	ALL RBs	30	7	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
2	4	Mid	100@0	ALL RBs	-	2	Mid	N/A	ALL RBs	-	7	CC2	N/A	ALL RBs	30	7	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
3	7	CC2	32@68	ALL RBs	45	7	CC1	N/A	ALL RBs	-	2	Mid	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		25
4	7	CC2	45@55	ALL RBs	25	7	CC1	N/A	ALL RBs	-	2	Mid	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		25
5	7	CC2	32@68	ALL RBs	30	7	CC1	N/A	ALL RBs	-	2	Mid	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
6	7	CC2	45@55	ALL RBs	15	7	CC1	N/A	ALL RBs	-	2	Mid	N/A	ALL RBs	-	4	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for CA_2A-4A-7A-7A with UL CA Configurations																			
1	2	Low	50@0	ALL RBs	-	4	High	25@0	ALL RBs	-	7	CC2	N/A	ALL RBs	30	7	CC1	N/A	ALL RBs
	QPSK	QPSK		100		QPSK	QPSK		25		N/A	QPSK		100		N/A	QPSK		100
2	4	Mid[16]	25@0	ALL RBs	-	2	Mid[16]	25@0	ALL RBs	-	7	CC2	N/A	ALL RBs	30	7	CC1	N/A	ALL RBs
	QPSK	QPSK		25		QPSK	QPSK		25		N/A	QPSK		100		N/A	QPSK		100

Default Test Settings for a CA_4A-4A-5A-30A Configuration																			
1	4	CC2	100@0	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		50
2	4	CC2	100@0	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
3	4	CC2	50@0	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	5	Low	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
4	4	CC2	50@0	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	5	High	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
5	5	Mid	50@0	ALL RBs	-	4	CC2	N/A	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
6	5	Low	25@25	ALL RBs	-	4	CC2	N/A	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
7	5	High	25@25	ALL RBs	-	4	CC2	N/A	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
8	30	Mid	50@0	ALL RBs	-	4	CC2	N/A	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
9	30	Mid	25@25	ALL RBs	-	4	CC2	N/A	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	5	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
Test Settings for a CA_4A-4A-12A-30A Configuration																			
1	4	CC2	100@0	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		50
2	4	CC2	100@0	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
3	4	CC2	100@0	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs

	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
4	12	Mid	50@0	ALL RBs	-	4	CC2	N/A	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
5	12	Mid	20@30	ALL RBs	-	4	CC2	N/A	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
6	30	Mid	50@0	ALL RBs	-	4	CC2	N/A	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
7	30	Mid	25@25	ALL RBs	-	4	CC2	N/A	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	12	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
Test Settings for a CA_4A-4A-29A-30A Configuration																			
1	4	CC2	100@0	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	29	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		50
2	4	CC2	100@0	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	29	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
3	4	CC2	50@0	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	29	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		50		N/A	QPSK		50		N/A	QPSK		50
4	4	CC2	100@0	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	29	Mid	N/A	ALL RBs	-	30	Mid	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		50
5	30	Mid	50@0	ALL RBs	-	4	CC2	N/A	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	29	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
6	30	Mid	25@25	ALL RBs	-	4	CC2	N/A	ALL RBs	Low	4	CC1	N/A	ALL RBs	-	29	Mid	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
Test Settings for a CA_2A-12A-66A-66A Configuration																			
1	2	Mid	50@50	ALL RBs	-	12	Mid	N/A	ALL RBs	-	66	CC2	N/A	ALL RBs	50	66	CC1	N/A	ALL RBs

	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		100
2	12	Low	20@5	ALL RBs	-	2	Mid	N/A	ALL RBs	-	66	CC2	N/A	ALL RBs	65	66	CC1	N/A	ALL RBs
	QPSK	QPSK		25		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		25
3	12	Mid	20@5	ALL RBs	-	2	Mid	N/A	ALL RBs	-	66	CC2	N/A	ALL RBs	60	66	CC1	N/A	ALL RBs
	QPSK	QPSK		25		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
4	12	High	20@30	ALL RBs	-	2	Mid	N/A	ALL RBs	-	66	CC2	N/A	ALL RBs	55	66	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		75
5	12	High	20@30	ALL RBs	-	2	Mid	N/A	ALL RBs	-	66	CC2	N/A	ALL RBs	50	66	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
6	12	Low	20@5	ALL RBs	-	2	Mid	N/A	ALL RBs	-	66	CC2	N/A	ALL RBs	65	66	CC1	N/A	ALL RBs
	QPSK	QPSK		25		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		25
7	12	Mid	20@5	ALL RBs	-	2	Mid	N/A	ALL RBs	-	66	CC2	N/A	ALL RBs	50	66	CC1	N/A	ALL RBs
	QPSK	QPSK		25		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Default Test Settings for a CA_XA-XD/XD-XA/XC-XC Configuration (Intra-band non-contiguous + Intra-band contiguous)

TBD

Test Settings for CA_2A-2A-12B Configurations

1	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid/CC1	N/A	ALL RBs	-	12	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		25
2	2	CC2	50@50	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid/CC1	N/A	ALL RBs	-	12	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		25
3	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid/CC1	N/A	ALL RBs	-	12	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50		N/A	QPSK		25
4	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	12	Mid/CC1	N/A	ALL RBs	-	12	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		50		N/A	QPSK		25

5	12	Low/CC1	20@5	ALL RBs	-	12	Low/CC2	N/A	ALL RBs	-	2	CC2	Max	ALL RBs	-	2	CC1	N/A	ALL RBs
	QPSK	QPSK		25		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		100
6	12	Low/CC1	20@30	ALL RBs	-	12	Low/CC2	N/A	ALL RBs	-	2	CC2	Max	ALL RBs	-	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		100
7	12	Mid/CC1	20@30	ALL RBs	-	12	Mid/CC2	N/A	ALL RBs	-	2	CC2	Max	ALL RBs	-	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		100
8	12	High/CC1	20@5	ALL RBs	-	12	High/CC2	N/A	ALL RBs	-	2	CC2	Max	ALL RBs	-	2	CC1	N/A	ALL RBs
	QPSK	QPSK		25		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		100
9	12	High/CC1	20@30	ALL RBs	-	12	High/CC2	N/A	ALL RBs	-	2	CC2	Max	ALL RBs	-	2	CC1	N/A	ALL RBs
	QPSK	QPSK		50		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		100

Default Test Settings for CA_XA-XA-YA-YA Configurations (Intra-band non-contiguous + Intra-band non-contiguous)																		
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}		QPSK	QPSK		Highest N_{RB_agg}		N/A	QPSK		Highest N_{RB_agg}		N/A	QPSK		Highest N_{RB_agg}
2	Y	CC2	REFSENS	ALL RBs	Max	Y	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}		QPSK	QPSK		Highest N_{RB_agg}		N/A	QPSK		Highest N_{RB_agg}		N/A	QPSK		Highest N_{RB_agg}
Test Settings for CA_2A-2A-4A-4A Configurations																			
1[14]	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	4	CC2	N/A	ALL RBs	Max	4	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		100
2[15]	2	CC4	16@39	ALL RBs	Max	2	CC3	N/A	ALL RBs	-	4	CC2	N/A	ALL RBs	Max	4	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		100
3	2	CC2	16@57	ALL RBs	Max	2	CC1	N/A	ALL RBs	-	4	CC2	N/A	ALL RBs	Max	4	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
4	4	CC2	100@0	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	2	CC2	N/A	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
5	4	CC2	100@0	ALL RBs	Max	4	CC1	N/A	ALL RBs	-	2	CC2	N/A	ALL RBs	Max	2	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		100
Test Settings for CA_3A-3A-7A-7A Configurations																			
1	3	CC2	16@50	ALL RBs	50	3	CC1	N/A	ALL RBs	-	7	CC2	N/A	ALL RBs	40	7	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		50
2	3	CC2	32@68	ALL RBs	15	3	CC1	N/A	ALL RBs	-	7	CC2	N/A	ALL RBs	40	7	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		50
3[13]	3	CC2	16@50	ALL RBs	35	3	CC1	N/A	ALL RBs	-	7	CC2	N/A	ALL RBs	40	7	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
4[11]	3	CC2	16@50	ALL RBs	45	3	CC1	N/A	ALL RBs	-	7	CC2	N/A	ALL RBs	40	7	CC1	N/A	ALL RBs

	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		50
5[11]	3	CC2	32@68	ALL RBs	10	3	CC1	N/A	ALL RBs	-	7	CC2	N/A	ALL RBs	40	7	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		50
6	7	CC2	32@68	ALL RBs	45	7	CC1	N/A	ALL RBs	-	3	CC2	N/A	ALL RBs	10	3	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		50
7	7	CC2	45@55	ALL RBs	25	7	CC1	N/A	ALL RBs	-	3	CC2	N/A	ALL RBs	10	3	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		25		N/A	QPSK		100		N/A	QPSK		50
8[11]	7	CC2	32@68	ALL RBs	40	7	CC1	N/A	ALL RBs	-	3	CC2	N/A	ALL RBs	10	3	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		50
9[11]	7	CC2	45@55	ALL RBs	20	7	CC1	N/A	ALL RBs	-	3	CC2	N/A	ALL RBs	10	3	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		50		N/A	QPSK		100		N/A	QPSK		50
10[13]	7	CC2	32@68	ALL RBs	30	7	CC1	N/A	ALL RBs	-	3	CC2	N/A	ALL RBs	35	3	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
11[13]	7	CC2	45@55	ALL RBs	15	7	CC1	N/A	ALL RBs	-	3	CC2	N/A	ALL RBs	35	3	CC1	N/A	ALL RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band non-contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: **Intra-band non-contiguous + Intra-band contiguous:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band non-contiguous + Inter-band:** X, Y, Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-12A,X=2,Y=4,Z=12.
Note 6: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A-41A,X=41.
Note 7: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-4A,X=2,Y=4.
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 10: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration. (This note is not applicable for any existing test point and only reserved for future use)
Note 11: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration.
Note 12: Applicable if only Bandwidth Combination Set 1 is supported by the UE for the CA Configuration. (This note is not applicable for any existing test point and only reserved for future use)
Note 13: Not applicable if only Bandwidth Combination Set 1 is supported by the UE for the CA Configuration.
Note 14: Not applicable if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
Note 15: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
Note 16: Band 2: f_{UL} = 1868.3MHz (N_{UL} = 18783), f_{DL} = 1948.3MHz (N_{DL} = 783).

Band 4: f_{UL} = 1735MHz (N_{UL} = 20200), f_{DL} = 2135MHz (N_{DL} = 2200).

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.55 if the UE supports 2 Rx antennas or Figure A.80 if the UE supports 4 Rx antennas in at least one band within the CA configuration..
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.3A.9.4.1-1 through Table7.3A.9.4.1-6 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3A.9.4.3.

7.3A.9.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A.9.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3A.9.4.1-1 through Table7.3A.9.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.9.4.1-1 through Table7.3A.9.4.1-2 as appropriate on PCC and SCCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCCs to the appropriate REFSENS value defined in Table 7.3A.9.5-1 through Table7.3A.9.5-7. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.
7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.3A.9.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

7.3A.9.5 Test requirement

For intra-band contiguous carrier aggregation the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.9.5-1. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.9.5-1: Reference sensitivity QPSK $P_{REFSENS}$ for Intra-band contiguous

[FFS]

Table 7.3A.9.5-2: FFS

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.9.5-3 (originated from single carrier

Tables 7.3.5-1). The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.9.5-3: Reference sensitivity QPSK $P_{REFSENS}$ for inter-band

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A-8A-40A	1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
		-	-	-102.0[4]	-99.0[4]	-97.2[4]	-96.0[4]	
	1[13]	-	-	-91.0	[-88.8]	[-87.2]	[-86.2]	
	3[8]			-93.3	-90.8	-89.3	-88.3	
	3[9]	-	-	-96.3	-93.3	-91.5	-90.3	
		-	-	-99.0[4]	-96.0[4]	-94.2[4]	-93.0[4]	
	3[13]	-	-	-93.5	-90.5	-88.8	-87.6	
	8	-	-98.5	-96.3	-93.3	-	-	
	40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
		-	-	-102.0[4]	-99.0[4]	-97.2[4]	-96.0[4]	
	40[14]	-	-	-94.7	-92.2	-90.6	-89.5	
	40[15]	-	-	[-92.7]	-91.2	-89.7	-88.7	
		-	-	[-95.4][4]	-93.9[4]	-92.4[4]	-91.4[4]	
CA_1A-3A-19A-42A[5,6]	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.2[4]	-96.0[4]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[4]	-96.0[4]	-94.2[4]	-93.0[4]	
	19			-99.3	-96.3	-94.5		
	42			-71.2	-71.2	-71.2	-71.2	TDD
CA_1A-3A-19A-42A[7]	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.2[4]	-96.0[4]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[4]	-96.0[4]	-94.2[4]	-93.0[4]	
	19			-99.3	-96.3	-94.5		
	42			-96.6	-94.2	-92.7	-92.0	TDD
CA_1A-3A-19A-42A	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.2[4]	-96.0[4]	
	3[8]			-93.3	-90.8	-89.3	-88.3	
	3[9]			-96.3	-93.3	-91.5	-90.3	
				-99.0[4]	-96.0[4]	-94.2[4]	-93.0[4]	
	19			-99.3	-96.3	-94.5		
	42			-98.0	-95.0	-93.2	-92.0	TDD
				-100.2[4]	-97.2[4]	-95.4[4]	-94.2[4]	
CA_1A-19A-21A-42A	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.2[4]	-96.0[4]	
	19			-99.3	-96.3	-94.5		
	21			-99.3	-96.3	-94.5		
				-102.0[4]	-99.0[4]	-97.2[4]		
	42			-98.0	-95.0	-93.2	-92.0	TDD
				-100.2[4]	-97.2[4]	-95.4[4]	-94.2[4]	
CA_2A-4A-5A-12A[11,12]	2			-97.0	-94.0	-92.2	-91.0	FDD
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	
	4			-89.3	-88.8	-88.3	-87.5	
	5			-96.8	-93.8			
	12			-95.8	-92.8			
CA_2A-4A-5A-29A	2			-97.0	-94.0	-92.2	-91.0	FDD
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	
	4			-99.0	-96.0	-94.2	-93.0	
	5			-97.3	-94.3			

	29			-96.3	-93.3			
CA_2A-4A-5A-30A	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.2[4]	-94.0[4]	
	4			-99.3	-96.3	-94.5	-93.3	
	5			-97.3	-94.3			
	30			-98.3	-95.3			
CA_2A-4A-12A-30A[10]	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.2[4]	-94.0[4]	
	2[10]			-96.9	-93.9	-92.1	-90.9	
				-99.6[4]	-96.6[4]	-94.8[4]	-93.6[4]	
	4			-99.3	-96.3	-94.5	-93.3	
	4[10]			-89.3	-88.8	-88.3	-87.8	
	12			-96.3	-93.3			
	12[10]			-95.8	-92.8			
	30			-98.3	-95.3			
	30[10]			-97.8	-94.8			
CA_2A-4A-29A-30A	2			-96.9	-93.9	-92.1	-90.9	FDD
				-99.6[4]	-96.6[4]	-94.8[4]	-93.6[4]	
	4			-98.9	-95.9	-94.1	-92.9	
	29			-96.3	-93.3			
	30			-97.8	-94.8			
CA_2A-5A-30A-66A	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.2[4]	-94.0[4]	
	5			-97.3	-94.3			
	30			-98.3	-95.3			
	66			-98.8	-95.8	-94.0	-92.8	
CA_2A-12A-30A-66A	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.2[4]	-94.0[4]	
	12			-96.3	-93.3			
	30			-98.3	-95.3			
	66			-98.8	-95.8	-94.0	-92.8	

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: The signal power is specified per port.
NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 5: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the E-UTRA configuration: ΔF_{HD} = 10 MHz for CA_3A-42A, CA_3A-42C, CA_1A-3A-42A, CA_1A-3A-42C, CA_3A-19A-42A, CA_3A-19A-42C, CA_1A-3A-19A-42A and CA_1A-3A-19A-42C.
NOTE 6: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.
NOTE 7: The requirements are only applicable to channel bandwidths with a carrier frequency at $\pm\left(20 + BW_{Channel}^{HB}/2\right)$ MHz offset from $2 f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.
NOTE 8: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in the bands other than Band 1, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 9: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60

MHz. For each channel bandwidth in the bands other than Band 1, the requirement applies regardless of channel bandwidth in Band 1.

NOTE 10: Reference sensitivity for the high band for which the 3rd harmonic of the low band is within transmission bandwidth, as specified Note 5 and 6 in Table 7.3A.0-0a.

NOTE 11: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band.

NOTE 12: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} the carrier frequency of a high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the low band.

NOTE 13: These requirements apply when the uplink is active in Band 40.

NOTE 14: These requirements apply when the uplink is active in Band 3.

NOTE 15: These requirements apply when the uplink is active in Band 1.

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

Unless otherwise specified, in case the UE supports more than one of the above 4DL inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one 4DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 4DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 4DL carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 4DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 4DL CA configurations

The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.

The reference receive sensitivity (REFSENS) requirement for inter-band specified in Table 7.3A.9.5-3 shall be met for an uplink CA configurations than or equal to that specified in Table 7.3.5-2.

NOTE: Table 7.3A.9.5-4 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3A.9.5-4: Void

For combinations of intra-band contiguous and inter-band carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.9.5-5. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.9.5-5: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band contiguous + inter-band

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A-42C[5]	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.5[4]	-96.0[4]	
	3			-93.3	-90.8	-89.3	-88.3	
	42			-98.0	-95.0	-93.2	-92.0	TDD
				-100.2[4]	-97.2[4]	-95.4[4]	-94.2[4]	
CA_1A-3A-42C[6]	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.5[4]	-96.0[4]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[4]	-96.0[4]	-94.2[4]	-93.0[4]	
	42			-98.0	-95.0	-93.2	-92.0	TDD
				-100.2[4]	-97.2[4]	-95.4[4]	-94.2[4]	
CA_1A-3A-42C[7,8]	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.5[4]	-96.0[4]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[4]	-96.0[4]	-94.2[4]	-93.0[4]	
	42			-71.2	-71.2	-71.2	-71.2	TDD
CA_1A-3A-42C[9]	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.5[4]	-96.0[4]	
	3			-96.3	-93.3	-91.5	-90.3	
				-99.0[4]	-96.0[4]	-94.2[4]	-93.0[4]	
	42			-96.6	-94.2	-92.7	-92.0	TDD
CA_1A-3C-8A[5]	1			-99.3	-96.3	-94.5	-93.3	FDD
	3			-93.3	-90.8	-89.3	-88.3	
	8		-98.5	-96.3	-93.3			
CA_1A-3C-8A[6]	1			-99.3	-96.3	-94.5	-93.3	FDD
	3			-96.3	-93.3	-91.5	-90.3	
	8		-98.5	-96.3	-93.3			
CA_1A-19A-42C	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.5[4]	-96.0[4]	
	19			-99.3	-96.3	-94.5		
	42			-98.0	-95.0	-93.2	-92.0	TDD
				-100.2[4]	-97.2[4]	-95.4[4]	-94.2[4]	
CA_1A-21A-42C	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102.0[4]	-99.0[4]	-97.5[4]	-96.0[4]	
	21			-99.3	-96.3	-94.5		
				-102.0[4]	-99.0[4]	-97.5[4]		
	42			-98.0	-95.0	-93.2	-92.0	TDD
				-100.2[4]	-97.2[4]	-95.4[4]	-94.2[4]	
CA_1A-41A-42C	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102[4]	-99[4]	-97.2[4]	-96[4]	
	41			-97.3	-94.3	-92.5	-91.3	TDD
				-100[4]	-97[4]	-95.2[4]	-94[4]	
	42			-97.5	-94.5	-92.7	-91.5	
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	
CA_1A-41C-42A	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102[4]	-99[4]	-97.2[4]	-96[4]	
	41			-97.3	-94.3	-92.5	-91.3	TDD
				-100[4]	-97[4]	-95.2[4]	-94[4]	

	42			-97.5	-94.5	-92.7	-91.5	
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	
CA_2A-5A-12B	2				-94.3	-92.5	-91.3	FDD
					-97.0[4]	-95.5[4]	-94.0[4]	
	5			-97.3	-94.3			
	12			-96.3	-93.3			
CA_2C-12A-30A	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.5[4]	-94.0[4]	
	12			-96.3	-93.3			
	30			-98.3	-95.3			
CA_2C-29A-30A	2			-96.9	-93.9	-92.1	-90.9	FDD
				-99.6[4]	-96.6[4]	-94.8[4]	-93.6[4]	
	29			-96.3	-93.3			
	30			-97.8	-94.8			
CA_3A-19A-42C[7,8]	3			-96.3	-93.3	-91.5	-90.3	FDD
				-99.0[4]	-96.0[4]	-94.2[4]	-93.0[4]	
	19			-99.3	-96.3	-94.5		
	42			-71.2	-71.2	-71.2	-71.2	TDD
CA_3A-19A-42C[9]	3			-96.3	-93.3	-91.5	-90.3	FDD
				[-99][4]	[-96][4]	[-94.2][4]	[-93][4]	
	19			-99.5	-96.5	-94.7		
	42			-96.6	-94.2	-92.7	-92.0	TDD
CA_19A-21A-42C	19			-99.3	-96.3	-94.5		FDD
	21			-99.3	-96.3	-94.5		
				-102.0[4]	-99.0[4]	-97.5[4]		
	42			-98.0	-95.0	-93.2	-92.0	TDD
				-100.2[4]	-97.2[4]	-95.4[4]	-94.2[4]	
CA_39A-41D	39				-96.3	-94.5	-93.3	TDD
					-99.0[4]	-97.2[4]	-96.0[4]	
	41						-91.3	
							-94.0[4]	
CA_39C-41C	39			-99.3	-96.3	-94.5	-93.3	TDD
				-102.0[4]	-99.0[4]	-97.2[4]	-96.0[4]	
	41						-91.3	
							-94.0[4]	
CA_41C-42C	41				-94.3	-92.5	-91.3	TDD
					-97.0[4]	-95.2[4]	-94.0[4]	
	42			-98.0	-95.0	-93.2	-92.0	
				-100.2[4]	-97.2[4]	-95.4[4]	-94.2[4]	

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: The signal power is specified per port.
NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 5: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in Band 3 and Band 5 or Band 8 or Band 19 or Band 20 or Band 26 or Band 28 or Band 42, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 6: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in Band 3 and Band 5 or Band 8 or Band 19 or Band 20 or Band 26 or Band 28 or Band 42, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 7: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the E-UTRA

configuration: ΔF_{HD} = 10 MHz for CA_3A-42C, CA_1A-3A-42C and CA_3A-19A-42C.

NOTE 8: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.

NOTE 9: The requirements are only applicable to channel bandwidths with a carrier frequency at $\pm(20 + BW_{Channel}^{HB}/2)$ MHz offset from $2 f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.

For combinations of intra-band non-contiguous and inter-band carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.9.5-6. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.9.5-6: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band non-contiguous + inter-band

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_2A-2A-12B	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.5[4]	-94.0[4]	
	12			-96.3	-93.3			
CA_2A-2A-4A-5A	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.5[4]	-94.0[4]	
	4			-99.3	-96.3	-94.5	-93.3	
	5			-97.3	-94.3			
CA_2A-2A-5A-12A	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.5[4]	-94.0[4]	
	5			-97.3	-94.3			
	12			-96.3	-93.3			
CA_2A-2A-5A-30A	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.2[4]	-94.0[4]	
	5			-97.3	-94.3			
	30			-98.3	-95.3			
CA_2A-2A-12A-30A	2			-97.3	-94.3	-92.5	-91.3	FDD
				-100.0[4]	-97.0[4]	-95.2[4]	-94.0[4]	
	12			-96.3	-93.3			
	30			-98.3	-95.3			
CA_2A-4A-7A-7A	2			-97.3	-94.3	-92.5	-91.3	FDD
	4			-99.3	-96.3	-94.2	-93.3	
	7			-97.3	-94.3	-92.5	-91.3	
CA_2A-4A-7A-7A (Note 8)	2	-	-	-	-	-	-86.3	FDD
	2	-	-	-	-	-	-83.6[20]	
	4	-	-	-99.3	-	-	-	
	7	-	-	-	-	-	-91.3	
	2	-	-	-97.3	-	-	-	FDD
	4	-	-	-94.3	-	-	-	
	7	-	-	-	-	-	-91.3	
CA_2A-12A-66A-66A[6,7]	2			-97.7	-94.7	-92.9	-91.7	FDD
	12			-96.5	-93.5			
	66			-89.5	-89.0	-88.5	-88.0	
CA_4A-4A-12A-30A[6,7]	4			-90	-89.5	-89	-88.5	FDD
	12			-96.5	-93.5			
	30			-98.5	-95.5			
CA_4A-4A-29A-30A	4			-99.6	-96.6	-94.8	-93.6	FDD
	29			-97	-94			
	30			-98.5	-95.5			

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: The signal power is specified per port
NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 5: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity is only verified when this is not the case (the requirements specified in clause 7.3.1 apply).
NOTE 6: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band.
NOTE 7: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} the carrier

frequency of a high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the low band.
NOTE 8: These requirements apply when UL CA is configured and the uplink is active in Band 2 and Band 4.

For combinations of intra-band non-contiguous and intra-band contiguous carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.9.5-7. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.9.5-7: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band non-contiguous + intra-band contiguous

TBD

For combinations of intra-band non-contiguous and intra-band non-contiguous carrier aggregation with four downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.9.5-8. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.9.5-8: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band non-contiguous + intra-band non-contiguous

CA Configuration	ID	PCC			SCC1			SCC2			SCC3		
		Band	N_{RB}	Req (dBm)	Band	N_{RB}	Req (dBm)	Band	N_{RB}	Req (dBm)	Band	N_{RB}	Req (dBm)
CA_2A-2A-4A-4A	1	2	100	-91.3	2	25	-90.1[1]	4	100	-93.3	4	100	-93.3
	2	2	100	-94.0	2	25	-90.1[1]	4	100	-93.3	4	100	-93.3
	3	2	100	-91.3	2	100	-86.7[1]	4	100	-93.3	4	100	-93.3
	4	4	100	-93.3	4	100	-93.3	2	100	-91.3 -94.0[5]	2	100	-91.3 -94.0[5]
	5	4	100	-93.3	4	25	-99.3[1]	2	100	-91.3 -94.0[5]	2	100	-91.3 -94.0[5]
CA_3A-3A-7A-7A	1	3	100	-90.3	3	25	-89.81	7	100	-91.3	7	50	-94.3
	2	3	100	-90.3	3	25	-96.3	7	100	-91.3	7	50	-94.3
	3	3	100	-90.3	3	100	-86.21	7	100	-91.3	7	50	-94.3
	4	3	100	-90.3	3	50	-88.21	7	100	-91.3	7	50	-94.3
	5	3	100	-90.3	3	50	-93.3	7	100	-91.3	7	50	-94.3
	6	7	100	-91.3	7	25	-97.3	3	100	-90.3	3	50	-93.3
	7	7	100	-91.3	7	25	-97.3	3	100	-90.3	3	50	-93.3
	8	7	100	-91.3	7	50	-94.3	3	100	-90.3	3	50	-93.3
	9	7	100	-91.3	7	50	-94.3	3	100	-90.3	3	50	-93.3
	10	7	100	-91.3	7	100	-91.3	3	100	-90.3	3	100	-90.3
	11	7	100	-91.3	7	100	-91.3	2	100	-90.3	2	100	-90.3

Note 1: Requirements with additional relaxation (ΔR_{IBNC}) as per Table 7.3A.0-3.
Note 2: "ID" refers to IDs in Table 7.3A.9.4.1-6.
Note 3: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 4: The signal power is specified per port.
Note 5: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

7.3A.10 Reference sensitivity level for 5DL CA

Editor's note: Following aspects missing or not yet determined:

-Test configuration table is under investigating

-Test requirement for some CA configuration is TBD

7.3A.10.1 Test purpose

Same as in clause 7.3A.1.1.

7.3A.10.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 5DL with Intra-band non-contiguous CA or 5DL with Intra-band contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA, or 5DL with Intra-band non-contiguous and Intra-band non-contiguous CA, or 5DL with Intra-band contiguous and Intra-band contiguous CA.

This test case applies to all types of E-UTRA UE release 12 and forward that support 5DL with TDD Intra-band contiguous CA, or 5DL with Inter-band CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 5DL CA with FDD-TDD.

7.3A.10.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3A.0.

7.3A.10.4 Test description

7.3A.10.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3A.10.4.1-1 through table 7.3A.10.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3A.10.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3				SCC4			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	UL MOD	DL MOD	ULalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for a CA_XF Configuration (Intra-band contiguous)																				
1	X	Low/CC1	REFSENS	ALL RBs	X	Low/CC2	N/A	ALL RBs	X	Low/CC3	N/A	ALL RBs	X	Low/CC4	N/A	ALL RBs	X	Low/CC5	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Low/CC1	REFSENS	ALL RBs	X	Low/CC2	N/A	ALL RBs	X	Low/CC3	N/A	ALL RBs	X	Low/CC4	N/A	ALL RBs	X	Low/CC5	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
3	X	High/CC1	REFSENS	ALL RBs	X	High/CC2	N/A	ALL RBs	X	High/CC3	N/A	ALL RBs	X	High/CC4	N/A	ALL RBs	X	High/CC5	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
4	X	High/CC1	REFSENS	ALL RBs	X	High/CC2	N/A	ALL RBs	X	High/CC3	N/A	ALL RBs	X	High/CC4	N/A	ALL RBs	X	High/CC5	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}

Default Test Settings for a CA_XA-YA-ZA-RA-SA Configuration (Inter-band)																				
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	S	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XC-YA-ZA-RA Configuration (Intra-band contiguous + Inter-band)																				
1	X	Low/CC1	REFSENS	ALL RBs	X	Low/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Low/CC1	REFSENS	ALL RBs	X	Low/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	X	High/CC1	REFSENS	ALL RBs	X	High/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	X	High/CC1	REFSENS	ALL RBs	X	High/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest	N/A	QPSK		Lowest	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

				N_{RB_agg}				N_{RB_agg}												
5	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
7	R	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XA-ZA-RA-YC Configuration (Intra-band contiguous + Inter-band)																				
1	Y	Low/CC1	REFSENS	ALL RBs	Y	Low/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Low/CC1	REFSENS	ALL RBs	Y	Low/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	High/CC1	REFSENS	ALL RBs	Y	High/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	High/CC1	REFSENS	ALL RBs	Y	High/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

5	X	Mid	REFSENS	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
7	R	Mid	REFSENS	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Test Settings for a CA_1A-3A-19A-42C Configuration																				
1[11]	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
2	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
3	1	Low	25@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
4	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
5	1	Mid	45@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
6	1	Low	25@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/CC1	N/A	ALL RBs	42	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
7[12]	1	Mid	100@0	ALL	3	High	N/A	ALL	19	Mid	N/A	ALL	42	Mid/C	N/A	ALL	42	Mid/C	N/A	ALL

				RBs				RBs				RBs		C1		RBs		C2		RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
8	1	Mid	50@0	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
9	1	Mid	75@0	ALL RBs	3	High	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
10	1	Mid	100@0	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
11	3	High	50@50	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
12	3	High	50@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
13	3	High	50@50	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
14	3	High	50@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
15[13]	3	High	50@50	ALL RBs	1	Low	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
16[14]	3	Low	50@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Low/C C1	N/A	ALL RBs	42	Low/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
17[15]	3	High	50@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
18	3	Low	50@25	ALL	1	Mid	N/A	ALL	19	Mid	N/A	ALL	42	Low/C	N/A	ALL	42	Low/C	N/A	ALL

[14]				RBs				RBs				RBs		C1		RBs		C2		RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
19 [15]	3	High	50@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
20	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
21	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
22	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
23	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
24	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
25	42	Mid/C C1	100@0	ALL RBs	42	Mid/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
26	42	Low/C C1	100@0	ALL RBs	42	Low/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
27	42	High/C C1	100@0	ALL RBs	42	High/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
28	42	Mid/C C1	100@0	ALL RBs	42	Mid/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	High	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
29	42	Low/C	100@0	ALL	42	Low/C	N/A	ALL	1	Mid	N/A	ALL	3	Mid	N/A	ALL	19	Mid	N/A	ALL

		C1		RBs		C2		RBs				RBs				RBs				RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
30	42	High/C C1	100@0	ALL RBs	42	High/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	3	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75
Test Settings for a CA_1A-19A-21A-42C Configuration																				
1	1	Mid	75@0	ALL RBs	19	High	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
2	1	Mid	75@0	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
3	1	Mid	100@0	ALL RBs	19	High	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
4	1	Mid	100@0	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
5	1	Mid	50@0	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
6	1	Mid	75@0	ALL RBs	19	Mid	N/A	ALL RBs	21	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
7	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
8	19	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
9	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100

10	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
11	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		50	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
12	19	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	21	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
13	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
14	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
15	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
16	21	Mid	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
17	21	High	25@25	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		75	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
18	21	Mid	25@25	ALL RBs	1	Mid	N/A	ALL RBs	19	High	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		75	N/A	QPSK		100	N/A	QPSK		50	N/A	QPSK		100	N/A	QPSK		100
19	21	High	25@50	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		100	N/A	QPSK		100
20	42	Mid/C C1	100@0	ALL RBs	42	Mid/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75

21	42	Low/C C1	100@0	ALL RBs	42	Low/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
22	42	Low/C C1	100@0	ALL RBs	42	Low/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
23	42	High/C C1	100@0	ALL RBs	42	High/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
24	42	High/C C2	100@0	ALL RBs	42	High/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	19	Mid	N/A	ALL RBs	21	Mid	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		75	N/A	QPSK		75
Test Settings for CA_1A-41C-42C Configuration																				
1	1	Low	100@0	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C2	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
2	1	Mid	100@0	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C2	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
3	1	High	100@0	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C2	N/A	ALL RBs	42	Mid/C C1	N/A	ALL RBs	42	Mid/C C2	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
4	42	Low/C C1	100@0	ALL RBs	42	Low/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
5	42	High/C C1	100@0	ALL RBs	42	High/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		25	N/A	QPSK		100	N/A	QPSK		100
6	42	Low/C C1	50@0	ALL RBs	42	Low/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs
	QPSK	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
7	42	High/C C1	50@0	ALL RBs	42	High/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs
	QPS	QPSK		50	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100

	K																			
8	42	Low/C C1	100@0	ALL RBs	42	Low/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
9	42	Mid/C C1	100@0	ALL RBs	42	Mid/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100
10	42	High/C C1	100@0	ALL RBs	42	High/C C2	N/A	ALL RBs	1	Mid	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs	41	Mid/C C1	N/A	ALL RBs
	QPSK	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100	N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41F, X=41.
Note 6: **Inter-band:** X,Y,Z,R,S correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-20A-42A,X=1,Y=3,Z=7,R=20,S=42.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 11: Test points that fulfil criteria of Note 4 in Table 7.3A.5.5-3.
Note 12: Only Band 1 and Band 42 need to be tested and Band 3 does not need to be tested.
Note 13: Only Band 1 and Band 3 need to be tested and Band 42 does not need to be tested.
Note 14: Band 42: $f_{UL/DL}$ for SCC1 = 3430.2MHz ($N_{UL/DL}$ = 41892), $f_{UL/DL}$ for SCC2 = 3450MHz ($N_{UL/DL}$ = 42090)
Note 15: Band 42: $f_{UL/DL}$ for SCC1 = 3500.2MHz ($N_{UL/DL}$ = 42592), $f_{UL/DL}$ for SCC2 = 3520MHz ($N_{UL/DL}$ = 42790)

Table 7.3A.10.4.1-2: Test Configuration Table with Wgap

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default, exceptions listed in Table 7.3.3-3, dependent on PCC Band

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3				W_{gap} [MHz]	SCC4			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	UL alloc (Note 2,3, 4)	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	UL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for a CA_CA_XA-XA-YA-ZA-RA Configuration (Intra-band non-contiguous + Inter-band)																								
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
4	R	Mid	REFSEN	ALL RB	-	X	CC2	N/A	ALL RB	Max	X	CC1	N/A	ALL RB	-	Y	Mid	N/A	ALL RB	-	Z	Mid	N/A	ALL RB

			S	s					s					s					s					s	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.55.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.3A.10.4.1-1 through Table7.3A.10.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3A.10.4.3.

7.3A.10.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.3A.10.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3A.10.4.1-1 through Table7.3A.10.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3A.10.4.1-1 through Table7.3A.10.4.1-2 as appropriate on PCC and SCCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCCs to the appropriate REFSENS value defined in Table [TBD]. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.
7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.3A.10.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

7.3A.10.5 Test requirement

For intra-band contiguous carrier aggregation the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.10.5-1. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.10.5-1: Reference sensitivity QPSK $P_{REFSENS}$ for Intra-band contiguous

Channel bandwidth								
CA Configuration	**E-UTRA Band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
CA_XF								
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.								
NOTE 2: The reference measurement channel is specified in A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1								
NOTE 3: The signal power is specified per port								

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.10.5-2 (originated from single carrier Tables 7.3.5-1). The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.10.5-2: Reference sensitivity QPSK $P_{REFSENS}$ for inter-band

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_XA-YA-ZA-RA								
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A. NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. NOTE 3: The signal power is specified per port.								

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

Unless otherwise specified, in case the UE supports more than one of the above 5DL inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one 5DL inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz and the tolerances are the same, the value applies to the band. If the tolerances are different, the applicable additional 5DL tolerance is FFS. In case there is a harmonic relation between low band UL and high band DL, then the maximum tolerance among the different supported 5DL carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional 5DL tolerance shall be the maximum tolerance above that applies for that operating band among the supported 5DL CA configurations

The above additional tolerances applicable for the E-UTRA operating bands that belong to the supported highest order inter-band carrier aggregation configuration, also applies to the same E-UTRA operating bands that belong to a supported lower order CA configuration.

The reference receive sensitivity (REFSENS) requirement for inter-band specified in Table 7.3A.10.5-2 shall be met for an uplink CA configurations than or equal to that specified in Table 7.3.5-2.

NOTE: Table 7.3A.10.5-3 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3A.10.5-3: Void

For combinations of intra-band contiguous and inter-band carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.10.5-4. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.10.5-4: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band contiguous + inter-band

Channel bandwidth								
EUTRA CA Configuration	**EUTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex mode**
CA_1A-3A-19A-42C	1			-99.1	-96.1	-94.3	-93.1	FDD
	3[5]			-93.1	-90.6	-89.1	-88.1	
	3[6]			-96.1	-93.1	-91.3	-90.1	
	19			-99.3	-96.3	-94.5		
	42			-97.5	-94.5	-92.7	-91.5	TDD
CA_1A-3A-19A-42C[7,8]	1			-99.1	-96.1	-94.3	-93.1	FDD
	3			-96.1	-93.1	-91.3	-90.1	
	19			-99.3	-96.3	-94.5		
	42			-70.7	-70.7	-70.7	-70.7	TDD
CA_1A-3A-19A-42C[9]	1			-99.1	-96.1	-94.3	-93.1	FDD
	3			-96.1	-93.1	-91.3	-90.1	
	19			-99.3	-96.3	-94.5		
	42			-96.1	-93.7	-92.2	-91.5	TDD
CA_1A-19A-21A-42C	1			-99.3	-96.3	-94.5	-93.3	FDD
	1[4]			-102.0	-99.0	-97.2	-96.0	
	19			-99.3	-96.3	-94.5		
	21			-99.3	-96.3	-94.5		
	21[4]			-102.0	-99.0	-97.2		
	42			-98.0	-95.0	-93.2	-92.0	TDD
	42[4]			-100.2	-97.2	-95.4	-94.2	
CA_1A-41C-42C	1			-99.3	-96.3	-94.5	-93.3	FDD
				-102[4]	-99[4]	-97.2[4]	-96[4]	
	41			-97.3	-94.3	-92.5	-91.3	TDD
				-100[4]	-97[4]	-95.2[4]	-94[4]	
	42			-97.5	-94.5	-92.7	-91.5	
				-99.7[4]	-96.7[4]	-94.9[4]	-93.7[4]	

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: The signal power is specified per port.
NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 5: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is < 60 MHz. For each channel bandwidth in Band 3 and Band 5 or Band 8 or Band 19 or Band 20 or Band 26 or Band 28 or Band 42, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 6: These requirements apply when the uplink is active in Band 1 and the separation between the lower edge of the uplink channel in Band 1 and the upper edge of the downlink channel in Band 3 is ≥ 60 MHz. For each channel bandwidth in Band 3 and Band 5 or Band 8 or Band 19 or Band 20 or Band 26 or Band 28 or Band 42, the requirement applies regardless of channel bandwidth in Band 1.
NOTE 7: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ΔF_{HD} above and below the edge of this downlink transmission bandwidth. The value ΔF_{HD} depends on the E-UTRA configuration: ΔF_{HD} = 10 MHz for CA_3A-42C, CA_1A-3A-42C and CA_3A-19A-42C.
NOTE 8: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$ in MHz and $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$ with f_{DL}^{HB} carrier frequency in the victim (higher) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.
NOTE 9: The requirements are only applicable to channel bandwidths with a carrier frequency at $\pm\left(20 + BW_{Channel}^{HB}/2\right)$ MHz offset from $2\,f_{UL}^{LB}$ in the victim (higher band) with $F_{UL_low}^{LB} + BW_{Channel}^{LB}/2 < f_{UL}^{LB} < F_{UL_high}^{LB} - BW_{Channel}^{LB}/2$, where $BW_{Channel}^{LB}$ and $BW_{Channel}^{HB}$ are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.

For combinations of intra-band non-contiguous and inter-band carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.10.5-5. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.10.5-5: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band non-contiguous + inter-band

Channel bandwidth								
EUTRA CA Configuration	EUTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex mode
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A. NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 NOTE 3: The signal power is specified per port								

For combinations of intra-band non-contiguous and intra-band contiguous carrier aggregation with three downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.10.5-6. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.10.5-6: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band non-contiguous + intra-band contiguous

[TBD]

For combinations of intra-band non-contiguous and intra-band non-contiguous carrier aggregation with four downlink carriers and one uplink carrier assigned to one E-UTRA band the throughput of each component carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3A.10.5-7. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active.

Table 7.3A.10.5-7: Reference sensitivity QPSK $P_{REFSENS}$ for intra-band non-contiguous + intra-band non-contiguous

[TBD]

7.3B Reference sensitivity level for UL-MIMO

7.3B.1 Test purpose

To verify the ability of UE that support UL-MIMO to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

7.3B.3 Minimum conformance requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in Clause 7.3.3 shall be met with the UL-MIMO configurations specified in Table 6.2.2B.3-2. For UL-MIMO, the parameter P_{UMAX} is the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 36.101 [2] clause 7.3.1B.

7.3B.4 Test description

7.3B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3B.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3B.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth.						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.3B.4.1-1.
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3B.4.3.

7.3B.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 7.3B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3B.5-1. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the throughput measurement.

4. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex G.2.

7.3B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

7.3B.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 36.508 [7] clause 4.6 can be used without exceptions.

7.3B.4.3.2 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the SystemInformationblockType2 as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3B.4.3.2-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

7.3B.4.3.3 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the SystemInformationblockType2 as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3B.4.3.3-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_06"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

7.3B.4.3.4 Message contents exceptions (network signalled value "NS_[09]")

1. Information element additionalSpectrumEmission is set to NS_[09]. This can be set in the SystemInformationblockType2 as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3B.4.3.4-1: SystemInformationBlockType2: Additional spurious emissions test requirement for "NS_[09]"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	TBD		

7.3B.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.3B.5-1 and Table 7.3B.5-2.

Table 7.3B.5-1: Reference sensitivity QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
1	-	-	-99.3	-96.3	-94.5	-93.3	FDD
2	-102.0	-99.0	-97.3	-94.3	-92.5	-91.3	FDD
3	-101.0	-98.0	-96.3	-93.3	-91.5	-90.3	FDD
4	-104.0	-101.0	-99.3	-96.3	-94.5	-93.3	FDD
5	-102.5	-99.5	-97.3	-94.3			FDD
6	-	-	-99.3	-96.3			FDD
7	-	-	-97.3	-94.3	-92.5	-91.3	FDD
8	-101.5	-98.5	-96.3	-93.3			FDD
9	-	-	-98.3	-95.3	-93.5	-92.3	FDD
10	-	-	-99.3	-96.3	-94.5	-93.3	FDD
11	-	-	-99.3	-96.3			FDD
12	-101.0	-98.0	-96.3	-93.3			FDD
13			-96.3	-93.3			FDD
14		-	-96.3	-93.3			FDD
...							
17	-	-	-96.3	-93.3			FDD
18	-	-	-99.3	-96.3	-94.5	-	FDD
19	-	-	-99.3	-96.3	-94.5	-	FDD
20			-96.3	-93.3	-90.5	-89.3	FDD
21			-99.3	-96.3	-94.5		FDD
22			-96.0	-93.0	-91.2	-90.0	FDD
23	-104.0	-101.0	-99.3	-96.3	-94.5	-93.3	FDD
24			-99.3	-96.3			FDD
25	-100.5	-97.5	-95.8	-92.8	-91.0	-89.8	FDD
26	-102	-99	-96.8[6]	-93.8[6]	-92[6]		FDD
27	-102.5	-99.5	-97.3	-94.3			FDD
28		-99.5	-97.8	-94.8	-93.0	-90.3	FDD
30	-	-	-98.3	-95.3	-	-	FDD
31	-98.3	-95.0	-92.8				FDD
...							
33	-	-	-99.3	-96.3	-94.5	-93.3	TDD
34	-	-	-99.3	-96.3	-94.5	-	TDD
35	-105.5	-101.5	-99.3	-96.3	-94.5	-93.3	TDD
36	-105.5	-101.5	-99.3	-96.3	-94.5	-93.3	TDD
37	-	-	-99.3	-96.3	-94.5	-93.3	TDD
38	-	-	-99.3	-96.3	-94.5	-93.3	TDD
39	-	-	-99.3	-96.3	-94.5	-93.3	TDD
40	-	-	-99.3	-96.3	-94.5	-93.3	TDD
41	-	-	-97.3	-94.3	-92.5	-91.3	TDD
42	-	-	-98.0	-95.0	-93.2	-92.0	TDD
43	-	-	-98.0	-95.0	-93.2	-92.0	TDD
45	-	-	-99.3	-96.3	-94.5	-93.3	TDD
…							
48			-98.3	-95.3	-93.5	-92.6	TDD
…							
65	-103.5	-100.5	-99.5	-96.5	-94	-92.8	FDD
66	-103.5	-100.5	-98.8	-95.8	-94	-92.8	FDD

Note 1: The transmitter shall be set to P_{UMAX} as defined in clause 6.2.5
Note 2: The reference measurement channel is specified in A.3.2 with one sided

	dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
Note 3:	The signal power is specified per port
Note 4:	For the UE which supports both Band 3 and Band 9 the reference sensitivity level is FFS.
Note 5:	For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
Note 6:	[6] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C shall be applied for applicable bands.

In case the UE supports more than one of the inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is $\leq$ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL (i.e. bands listed in Table 7.3A.0-0a), then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 7.3.3-1A that would apply for that operating band among the supported CA configurations

NOTE 1: The relation to the received PSD is $\left\langle \mathrm{REF}\,\hat{I}_{or} \right\rangle = P_{REFSENS}\left(N_{sc}^{RB} N_{RB} \Delta f\right)^{-1}$ with N_{RB} is the transmission bandwidth configuration according to Table 5.4.2-1.

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3B.5-1 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3B.5-2.

NOTE 2: Table 7.3B.5-2 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3B.5-2: Uplink configuration for reference sensitivity

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex Mode**
1	-	-	25	50	75	100	FDD
2	6	15	25	50	50[1]	50[1]	FDD
3	6	15	25	50	50[1]	50[1]	FDD
4	6	15	25	50	75	100	FDD
5	6	15	25	25[1]	-	-	FDD
6	-	-	25	25[1]	-	-	FDD
7	-	-	25	50	75[1]	75[1]	FDD
8	6	15	25	25[1]	-	-	FDD
9	-	-	25	50	50[1]	50[1]	FDD
10	-	-	25	50	75	100	FDD
11	-	-	25	25[1]			FDD
12	6	15	20[1]	20[1]			FDD
13			20[1]	20[1]			FDD
14		-	15[1]	15[1]			FDD
...							
17	-	-	20[1]	20[1]			FDD
18	-	-	25	25[1]	25[1]	-	FDD
19	-	-	25	25[1]	25[1]	-	FDD
20			25	20[1]	20[3]	20[3]	FDD
21			25	25[1]	25[1]		FDD
22			25	50	50[1]	50[1]	FDD
23	6	15	25	50	75[1]	100[1]	FDD
24			25	50			FDD
25	6	15	25	50	50[1]	50[1]	FDD
26	6	15	25	25[1]	25[1]		FDD
27	6	15	25	25[1]	-	-	FDD
28		15	25	25[1]	25[1]	25[1]	FDD
30	-	-	25	25[1]	-	-	FDD
31	6	5[4]	5[4]				FDD
…							
33	-	-	25	50	75	100	TDD
34	-	-	25	50	75	-	TDD
35	6	15	25	50	75	100	TDD
36	6	15	25	50	75	100	TDD
37	-	-	25	50	75	100	TDD
38	-	-	25	50	75	100	TDD
39			25	50	75	100	TDD
40			25	50	75	100	TDD
41			25	50	75	100	TDD
42			25	50	75	100	TDD
43			25	50	75	100	TDD
45			25	50	75	100	TDD
…							
48			25	50	75	100	TDD
…							
65	6	15	25	50	75	100	FDD
66	-	-	25	50	75	100	FDD
Note 1: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth							

configuration for the channel bandwidth (Table 5.4.2-1).
Note 2: For the UE which supports both Band 11 and Band 21 the uplink configuration for reference sensitivity is FFS.
Note 3: For Band 20; in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start}=11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RB_{start}=16.
Note 4: [4] refers to Band 31; in the case of 3 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 9 and in the case of 5 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 10.

7.3C

7.3D Reference sensitivity level for ProSe

7.3D.0 Minimum requirements (QPSK) for ProSe

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.6.2 with parameters specified in Table 7.3D.0-1 and Table 7.3D.0-2.

Table 7.3D.0-1: Reference sensitivity for ProSe Direct Discovery QPSK PREFSENS

Channel bandwidth							
E-UTRA ProSe Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
2			-104.1	-104.1	-104.1	-104.1	HD
3			-103.1	-103.1	-103.1	-103.1	HD
4			-106.1	-106.1	-106.1	-106.1	HD
7			-103.8	-103.8	-103.8	-103.8	HD
14			-103.1	-103.1			HD
20			-103.2	-103.2	-102.2	-102.2	HD
26			-103.5[5]	-103.5 [5]	-103.5 [5]		HD
28			-104.4	-104.4	-104.4	-102.9	HD
31			-99.5				HD

NOTE 1: Reference measurement channel is A.6.2.
NOTE 2: The signal power is specified per port.
NOTE 3: For the UE which supports both Band 3 and Band 9 the reference sensitivity level is FFS.
NOTE 4: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 5: [5] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 6: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.

Table 7.3D.0-2: Reference sensitivity for ProSe Direct Communication QPSK PREFSENS

Channel bandwidth							
E-UTRA ProSe Band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
3				-97.6			HD
7				-98.3			HD
14				-97.6			HD
20				-97.7			HD
26				-98.0 [5]			HD
28				-98.9			HD
31			-96.7				HD

NOTE 1: Reference measurement channel is A.6.2.
NOTE 2: The signal power is specified per port.
NOTE 3: For the UE which supports both Band 3 and Band 9 the reference sensitivity level is FFS.
NOTE 4: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 5: [5] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 6: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.

NOTE: Table 7.3D.0-1/ Table 7.3D.0-2 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of allocated resource blocks will be practically constrained by other factors.

For the UE which supports ProSe in an operating band as specified in Clause 5.2D and is configured with (and can transmit on) only PCell, and the UE also supports a E-UTRA downlink inter-band carrier aggregation configuration in Table 7.3.3-1A or Table 7.3.3-1B, the minimum requirement for reference sensitivity in Table 7.3D.0-1 and Table 7.3D.0-2 shall be increased by the amount given in $\Delta_{RIB,c}$ in Table 7.3.3-1A or Table 7.3.3-1B for the corresponding E-UTRA ProSe band.

7.3D.1 Reference sensitivity level for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Use of OCNG for Downlink has not been considered and is still FFS.
- Message exceptions content needs further investigation (some values still TBD).
- Test time is FFS.

7.3D.1.1 Test purpose

Verify that UE receives ProSe Discovery physical channels data with a given average throughput under conditions of low signal level and ideal propagation.

7.3D.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

7.3D.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3D.0.

7.3D.1.4 Test description

7.3D.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA ProSe bands specified in table 5.4.2D.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3D.1.4.1-1. The details of the downlink, uplink and sidelink reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.6.

Table 7.3D.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range (Note 4)					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, Highest					
	Downlink Configuration (Note 2)		**Uplink Configuration (Note 2)**		**Sidelink Configuration (Reception) (Note 3)**	
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Mod'n	RB allocation
5MHz	QPSK	8	QPSK	8	QPSK	2
10MHz	QPSK	16	QPSK	16	QPSK	2
15MHz	QPSK	25	QPSK	25	QPSK	2
20MHz	QPSK	30	QPSK	30	QPSK	2
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA ProSe and Operating band, according to the applicability specified respectively in Table 5.4.2D.1-1 and Table 5.4.2.1-1. Note 2: After DRX configuration, DL-RMC (PDSCH) and DCI-0 for scheduling UL-RMC (PUSCH) are applied only in the DRX On subframes. Note 3: The RB start for the transmission of Sidelink RMC is RB#0. Note 4: Sidelink uses the frequencies defined for Uplink.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.67.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.3D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 7.3D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

7.3D.1.4.2 Test procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 7.3D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Initialise the variables Ptot and Pok as 0.
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3D.1.4.1-1. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.

6. SS transmits PSDCH to transmit the SL RMC according to Table 7.3D.1.4.1-1. Set the Sidelink signal level to the appropriate REFSENS value defined in Table 7.3D.1.5-1.

7. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable Ptot.

8. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".

9. SS calculates the variable Pok as (current counter value - counter value at last test iteration).

10. SS shall compute the throughput as following:

    TP = Pok / Ptot * 100%

7.3D.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 7.3D.1.4.3-1: ACTIVATE TEST MODE: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 7.3D.1.4.3-2: CLOSE UE TEST LOOP: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 7.3D.1.4.3-3: MAC-MainConfig-RBC: Reference sensitivity for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

7.3D.1.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.6.2 with parameters specified in Table 7.3D.1.5-1.

Table 7.3D.1.5-1: Reference sensitivity for ProSe Direct Discovery QPSK PREFSENS

Channel bandwidth							
E-UTRA ProSe Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
2			-103.4	-103.4	-103.4	-103.4	HD
3			-102.4	-102.4	-102.4	-102.4	HD
4			-105.4	-105.4	-105.4	-105.4	HD
7			-103.1	-103.1	-103.1	-103.1	HD
14			-102.4	-102.4			HD
20			-102.5	-102.5	-101.5	-101.5	HD
26			-102.8[5]	-102.8[5]	-102.8[5]		HD
28			-103.7	-103.7	-103.7	-102. 2	HD
31			-98.8				HD

NOTE 1: Reference measurement channel is A.6.2
NOTE 2: The signal power is specified per port
NOTE 3: For the UE which supports both Band 3 and Band 9 the reference sensitivity level is FFS.
NOTE 4: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 5: [5] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 6: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.

NOTE: Table 7.3D.1.5-1 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of allocated resource blocks will be practically constrained by other factors.

For the UE which supports ProSe in an operating band as specified in Clause 5.2D and is configured with (and can transmit on) only PCell, and the UE also supports a E-UTRA downlink inter-band carrier aggregation configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, the test requirement for reference sensitivity in Table 7.3D.1.5-1 shall be increased by the amount given in $\Delta_{RIB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C for the corresponding E-UTRA ProSe band.

7.3D.2 Reference sensitivity level for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Many clauses are TBD

7.3D.2.1 Test purpose

Verify that UE receives ProSe Communication physical channels data with a given average throughput under conditions of low signal level and ideal propagation.

7.3D.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

7.3D.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3D.0.

7.3D.2.4 Test description

TBD

7.3D.2.4.1 Initial conditions

TBD

7.3D.2.4.2 Test procedure

TBD

7.3D.2.4.3 Message contents

TBD

7.3D.2.5 Test requirements

TBD

7.3E Reference sensitivity level for UE category 0

7.3E.1 Test purpose

Same test purpose as in clause 7.3.1

7.3E.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward of UE category 0.

7.3E.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3E.3-1/Table 7.3E.3-2 and Table 7.3E.3-3.

Table 7.3E.3-1: Reference sensitivity for FDD and TDD UE category 0 QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
2	-100.2	-97.2	-95.5	-92.5	-90.7	-89.5	FDD
3	-99.2	-96.2	-94.5	-91.5	-89.7	-88.5	FDD
4	-102.2	-99.2	-97.5	-94.5	-92.7	-91.5	FDD
5	-100.7	-97.7	-95.5	-92.5			FDD
8	-99.7	-96.7	-94.5	-91.5			FDD
13			-94	-91			FDD
20			-94.5	-91.5	-88.2	-87	FDD
39			-97.5	-94.5	-92.7	-91.5	TDD
41			-95.5	-92.5	-90.7	-89.5	TDD
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5 NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1							

Table 7.3E.3-2: Reference sensitivity for HD-FDD UE category 0 QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
2	-101	-98	-96.3	-93.3	-91.5	-90.3	HD-FDD
3	-100	-97	-95.3	-92.3	-90.5	-89.3	HD-FDD
4	-103	-100	-98.3	-95.3	-93.5	-92.3	HD-FDD
5	-101.5	-98.5	-96.3	-93.3			HD-FDD
8	-100.5	-97.5	-95.3	-92.3			HD-FDD
13			-95.3	-92.3			HD-FDD
20			-95.3	-92.3	-89.5	-88.3	HD-FDD
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5 NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1							

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3E.3-1/Table 7.3E.3-2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3E.3-3.

NOTE: Table 7.3E.3-3 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3E.3-3: FDD and TDD UE category 0 Uplink configuration for reference sensitivity

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Duplex Mode
2	6	15	25	36[1]	36[1]	36[1]	FDD and HD-FDD
3	6	15	25	36[1]	36[1]	36[1]	FDD and HD-FDD
4	6	15	25	36[1]	36[1]	36[1]	FDD and HD-FDD
5	6	15	25	25[1]			FDD and HD-FDD
8	6	15	25	25[1]			FDD and HD-FDD
13			20[1]	20[1]			FDD and HD-FDD
20			25	20[1]	20[2]	20[2]	FDD and HD-FDD
39			25	36[1]	36[1]	36[1]	TDD
41			25	36[1]	36[1]	36[1]	TDD
NOTE 1: [1] refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1). NOTE 2: [2] refers to Band 20; in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 16.							

The normative reference for this requirement is TS 36.101 [2] clause 7.3.1E.

7.3E.4 Test description

7.3E.4.1 Initial conditions

Same initial conditions as in clause 7.3.4.1 with the following exceptions:

- Instead of Table 7.3.4.1-1 → use Table 7.3E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 7.3E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1		Low range, Mid range, High range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest, 5MHz, Highest				
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD and HD-FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	14	14	QPSK	15	15
5MHz	QPSK	14	14	QPSK	25	25
5MHz	QPSK	14	N/A	QPSK	20	N/A
10MHz	QPSK	14	14	QPSK	36	36
10MHz	QPSK	14	N/A	QPSK	25	N/A
10MHz	QPSK	14	N/A	QPSK	20	N/A
15MHz	QPSK	14	14	QPSK	36	36
15MHz	QPSK	14	N/A	QPSK	20	N/A
20MHz	QPSK	14	14	QPSK	36	36
20MHz	QPSK	14	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2. Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3E.3-3 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Downlink RB position shall be RB_{start} = 0						

7.3E.4.2 Test procedure

Same test procedure as in clause 7.3.4.2.

7.3E.4.3 Message contents

Same message contents as in clause 7.3.4.3

7.3E.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3E.5-1 and Table 7.3E.5-2.

Table 7.3E.5-1: Reference sensitivity for FDD and TDD UE category 0 QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
2	-99.5	-96.5	-94.8	-91.8	-90	-88.8	FDD
3	-98.5	-95.5	-93.8	-90.8	-89	-87.8	FDD
4	-101.5	-98.5	-96.8	-93.8	-92	-90.8	FDD
5	-100	-97	-94.8	-91.8			FDD
8	-99	-96	-93.8	-90.8			FDD
13			-93.3	-90.3			FDD
20			-93.8	-90.8	-87.5	-86.3	FDD
39			-96.8	-93.8	-92	-90.8	TDD
41			-94.8	-91.8	-90	-88.8	TDD
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5 NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1							

Table 7.3E.5-2: Reference sensitivity for HD-FDD UE category 0 QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
2	-100.3	-97.3	-95.6	-92.6	-90.8	-89.6	HD-FDD
3	-99.3	-96.3	-94.6	-91.6	-89.8	-88.6	HD-FDD
4	-102.3	-99.3	-97.6	-94.6	-92.8	-91.6	HD-FDD
5	-100.8	-97.8	-95.6	-92.6			HD-FDD
8	-99.8	-96.8	-94.6	-91.6			HD-FDD
13			-94.6	-91.6			HD-FDD
20			-94.6	-91.6	-88.8	-87.6	HD-FDD
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5 NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1							

7.3EA Reference sensitivity level for UE category M1

7.3EA.1 Test purpose

To verify the category M1 UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3EA.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category M1.

7.3EA.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3EA-1 and Table 7.3EA-2.

Table 7.3EA-1: Reference sensitivity for FDD and TDD UE category M1 QPSK $P_{REFSENS}$

E-UTRA Band	REFSENS (dBm)	Duplex Mode
1	-102.2	FDD
2	-100.2	FDD
3	-99.2	FDD
4	-102.2	FDD
5	-100.7	FDD
7	-100.2	FDD
8	-99.7	FDD
11	-102.2[3]	FDD
12	-99.2	FDD
13	-98.7	FDD
18	-102.2[4]	FDD
19	-102.2	FDD
20	-99.7	FDD
21	-102.2[3]	FDD
26	-100.2	FDD
27	-100.7	FDD
28	-100.7	FDD
31	-96.5	FDD
…		
39	-103.7	TDD
41	-101.7	TDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5EA.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 4: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.
NOTE 5: For cat M1 the same RF bandwidth applies for all applicable channel bandwidths as specified in Table 5.4.2.1-1.
NOTE 6: The reference receive sensitivity shall be met for an uplink transmission bandwidth less than or equal to 6 RB except for band 31. For band 31; in the case of 3 MHz channel bandwidth 5 RB applies and the UL resource blocks shall be located at RB_{start} 9. In case of 5 MHz channel bandwidth 5 RB applies and the UL resource blocks shall be located at RB_{start} 10.
NOTE 7: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

Table 7.3EA-2: Reference sensitivity for HD-FDD UE category M1 QPSK $P_{REFSENS}$

E-UTRA Band	REFSENS (dBm)	Duplex Mode
1	-103	HD-FDD
2	-101	HD-FDD
3	-100	HD-FDD
4	-103	HD-FDD
5	-101.5	HD-FDD
7	-101	HD-FDD
8	-100.5	HD-FDD
11	-103[3]	HD-FDD
12	-100	HD-FDD
13	-100	HD-FDD
18	-103[4]	HD-FDD
19	-103	HD-FDD
20	-100.5	HD-FDD
21	-103[3]	HD-FDD
26	-101	HD-FDD
27	-101.5	HD-FDD
28	-101.5	HD-FDD
31	-97.3	HD-FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5EA.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 4: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.
NOTE 5: For cat M1 the same RF bandwidth applies for all applicable channel bandwidths as specified in Table 5.4.2-1.

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3EA-1/Table 7.3EA-2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3EA-3.

NOTE: Table 7.3EA-3 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors. Typical receiver sensitivity performance with HARQ retransmission enabled and using a residual BLER metric relevant for e.g. Speech Services is given in the Annex G (informative).

Table 7.3EA-3: FDD and TDD UE category M1 Uplink configuration for reference sensitivity

E-UTRA Band	N_{RB}	Duplex Mode
1	6[1]	FDD and HD-FDD
2	6[1]	FDD and HD-FDD
3	6[1]	FDD and HD-FDD
4	6[1]	FDD and HD-FDD
5	6[1]	FDD and HD-FDD
7	6[1]	FDD and HD-FDD
8	6[1]	FDD and HD-FDD
11	6[1]	FDD and HD-FDD
12	6[1]	FDD and HD-FDD
13	6[1]	FDD and HD-FDD
18	6[1]	FDD and HD-FDD
19	6[1]	FDD and HD-FDD
20	6[1]	FDD and HD-FDD
21	6[1]	FDD and HD-FDD
26	6[1]	FDD and HD-FDD
27	6[1]	FDD and HD-FDD
28	6[1]	FDD and HD-FDD
31	6[1]	FDD and HD-FDD
…		
39	6[1]	TDD
41	6[1]	TDD
NOTE 1: [1] refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).		

…

Unless given by Table 7.3EA-4, the minimum requirements specified in Tables 7.3EA-1 and 7.3EA-2 shall be verified with the network signalling value NS_01 (Table 6.2.4EA-1) configured.

Table 7.3EA-4: Network signalling value for reference sensitivity

E-UTRA Band	Network Signalling value
2	NS_03
4	NS_03
10	NS_03
12	NS_06
13	NS_06
14	NS_06
17	NS_06
19	NS_08
21	NS_09
23	NS_03
30	NS_21
66	NS_03

The normative reference for this requirement is TS 36.101 [2] clauses 7.3.1 and 7.3.1E.

7.3EA.4 Test description

7.3EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for CAT M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3EA.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 7.3EA.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz					
Test Parameters for Channel Bandwidths and Narrowband positions						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD and HD-FDD	TDD
5MHz	QPSK	4	4	QPSK	6	6
Note 1: Downlink RB position shall be RB_{start} = 0 within the narrowband Note 2: The Narrowband index (TS36.211, 5.2.4) shall be set to 0 for all testpoints.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.3EA.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.3EA.4.3.

7.3EA.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 7.3EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The SS sends one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.

2. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 7.3EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3EA.5-1 for FDD and TDD and in Table 7.3EA.5-2 for HD-FDD. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

4. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex G.2.

7.3EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

Table 7.3EA.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-NumRepetition-r13	r1		

7.3EA.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 36.508 [7] subclause 4.6 can be used without exceptions.

7.3EA.4.3.2 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EA.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

7.3EA.4.3.3 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EA.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_06"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

7.3EA.4.3.4 Message contents exceptions (network signalled value "NS_09")

1. Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EA.4.3.4-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_09"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	9 (NS_09)		

7.3EA.4.3.5 Message contents exceptions (network signalled value "NS_08")

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EA.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_08"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	8 (NS_08)		

7.3EA.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 with parameters specified in Table 7.3EA.5-1 and Table 7.3EA.5-2.

Table 7.3EA.5-1: Reference sensitivity for FDD and TDD UE category M1 QPSK P_{REFSEN}

E-UTRA Band	REFSENS (dBm)	Duplex Mode
1	-101.5	FDD
2	-99.5	FDD
3	-98.5	FDD
4	-101.5	FDD
5	-100.0	FDD
7	-99.5	FDD
8	-99.0	FDD
11	-101.5[3]	FDD
12	-98.5	FDD
13	-98.0	FDD
18	-101.5[4]	FDD
19	-101.5	FDD
20	-99.0	FDD
21	-101.5[3]	FDD
26	-99.5	FDD
27	-100.0	FDD
28	-100.0	FDD
31	-95.8	FDD
…		
39	-103.0	TDD
41	-101.0	TDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5EA.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 4: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.
NOTE 5: For cat M1 the same RF bandwidth applies for all applicable channel bandwidths as specified in Table 5.4.2.1-1.
NOTE 6: The reference receive sensitivity shall be met for an uplink transmission bandwidth less than or equal to 6 RB except for band 31. For band 31; in the case of 3 MHz channel bandwidth 5 RB applies and the UL resource blocks shall be located at RB_{start} 9. In case of 5 MHz channel bandwidth 5 RB applies and the UL resource blocks shall be located at RB_{start} 10.
NOTE 7: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.
NOTE 8: These REFSENS levels are applicable only to 6 RB. OCNG shall be filled to entire channel bandwidth with the same PSD of REFSENS level in 6 RBs.

Table 7.3EA.5-2: Reference sensitivity for HD-FDD UE category M1 QPSK $P_{REFSENS}$

E-UTRA Band	REFSENS (dBm)	Duplex Mode
1	-102.3	HD-FDD
2	-100.3	HD-FDD
3	-99.3	HD-FDD
4	-102.3	HD-FDD
5	-100.8	HD-FDD
7	-100.3	HD-FDD
8	-99.8	HD-FDD
11	-102.3[3]	HD-FDD
12	-99.3	HD-FDD
13	-99.3	HD-FDD
18	-102.3[4]	HD-FDD
19	-102.3	HD-FDD
20	-99.8	HD-FDD
21	-102.3[3]	HD-FDD
26	-100.3	HD-FDD
27	-100.8	HD-FDD
28	-100.8	HD-FDD
31	-96.6	HD-FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5EA.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 4: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.
NOTE 5: For cat M1 the same RF bandwidth applies for all applicable channel bandwidths as specified in Table 5.4.2-1.
NOTE 6: These REFSENS levels are applicable only to 6 RB. OCNG shall be filled to entire channel bandwidth with the same PSD of REFSENS level in 6 RBs.

7.3EB Reference sensitivity level for UE category 1bis

Editor's note: FDD/TDD aspects missing or not yet determined:

- The Maximum Sensitivity Degradation figures for large transmission configurations are not finalised in the core specification.

- This clause is also incomplete for CA_42A-46A and CA_7A-8A-20.

- $\Delta R_{IB,c}$ is in square brackets (awaiting for RAN4 decision).

- Clarification to the use of signalling the non-default Tx-Rx separation of 295MHz for Band 70 testing is under discussion.

7.3EB.1 Test purpose

To verify the category 1bis UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3EB.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category 1bis.

7.3EB.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3EB.3-1 and Table 7.3EB.3-2.

Table 7.3EB.3-1: Reference sensitivity for FDD and TDD UE category 1bis QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
1			-97.5	-94	-92.2	-91	FDD
2	-100.2	-97.2	-95.5	-92	-90.2	-89	FDD
3	-99.2	-96.2	-94.5	-91	-89.2	-88	FDD
4	-102.2	-99.2	-97.5	-94	-92.2	-91	FDD
5	-100.7	-97.7	-95.5	-92.5			FDD
7			-95.5	-92	-90.2	-89	FDD
8	-99.7	-96.7	-94.5	-91.5			FDD
12	-98.7	-95.7	-94	-91			FDD
13			-94	-91			FDD
18			-97.5	-94.5	-92.7		FDD
20			-94.5	-91.5	-88.2	-87	FDD
26	-100.2	-97.2	-95.0[3]	-92.0[3]	-90.2[3]		FDD
28		-97.7	-96.0	-93.0	-91.2	-88.5	FDD
31	-96.5	-92.5	-90.5				FDD
39			-97.5	-94.5	-92.7	-91.5	TDD
41			-95.5	-92.5	-90.7	-89.5	TDD
66	-101.7	-98.7	-97	-93.5	-91.7	-90.5	FDD
72	-96.5	-92.5	-90.5				FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: [3] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3EB.3-1 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3EB.3-2.

NOTE: Table 7.3EB.3-2 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors. Typical receiver sensitivity performance with HARQ retransmission enabled and using a residual BLER metric relevant for e.g. Speech Services is given in the Annex G of TS 36.101 [2] (informative).

For the UE which supports inter-band carrier aggregation configuration with the uplink in one or two E-UTRA bands, the minimum requirement for reference sensitivity in Table 7.3EB.3-1 and Table 7.3EB.3-2 shall be increased by the amount given in $\Delta R_{IB,c}$ in Table 7.3.3-1A, Table 7.3.3-1B, Table 7.3.3-1C and Table 7.3.3-1D for the applicable E-UTRA bands.

NOTE: To meet the $\Delta R_{IB,c}$ requirements for CA_20A-28A state-of-the-art filter combiner technology is needed.

NOTE: The above additional tolerances do not apply to supported UTRA operating bands with frequency range below 1 GHz that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations when such bands are belonging only to band combination(s) where one band is <1GHz and other bands are >1.7GHz and there is no harmonic relationship between the low band UL and high band DL. Otherwise the above additional tolerances also apply to supported UTRA operating bands that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

Table 7.3EB.3-2: FDD and TDD UE category 1bis Uplink configuration for reference sensitivity

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex Mode**
1			25	50	75	100	FDD
2	6	15	25	50	50[1]	50[1]	FDD
3	6	15	25	50	50[1]	50[1]	FDD
4	6	15	25	50	75	100	FDD
5	6	15	25	25[1]			FDD
7			25	50	75	75[1]	FDD
8	6	15	25	25[1]			FDD
12	6	15	20[1]	20[1]			FDD
13			20[1]	20[1]			FDD
18			25	25	25		FDD
20			25	20[1]	20[2]	20[2]	FDD
26	6	15	25	25[1]	25[1]		FDD
28		15	25	25[1]	25[1]	25[1]	FDD
31	6	5[3]	5[3]				FDD
39			25	50	75	100	TDD
41			25	50	75	100	TDD
66	6	15	25	50	75	100	FDD
72	6	5[3]	5[3]				FDD

NOTE 1: [1] refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1).

NOTE 2: [2] refers to Band 20; in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 16.

NOTE 3: [3] refers to Bands 31 and 72; in the case of 3 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 9 and in the case of 5 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 10.

Unless given by Table 7.3.3-3, the minimum requirements specified in Tables 7.3EB.3-1 and 7.3EB.3-2 shall be verified with the network signalling value NS_01 (Table 6.2.4.3-1) configured.

The normative reference for this requirement is TS 36.101 [2] clause 7.3.1E.

7.3EB.4 Test description

7.3EB.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Tables 7.3EB.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3EB.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
3MHz	QPSK	15	15	QPSK	5[4]	N/A
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20[5]	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2. Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3EB.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).

Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.

Note 4: Applicable only to E-UTRA FDD Band 31 and 72; in the case of 3 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 9 and in the case of 5 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 10. (according to Table 7.3EB.3-2).

Note 5: Applicable only to E-UTRA FDD Band 20; in the case of 15 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 11 and in the case of 20 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 16. (according to Table 7.3EB.3-2).

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Tables 7.3EB.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3EB.4.3.

7.3EB.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3EB.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.3EB.4.1-1 and 7.3EB.4.1-2. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3EB.5-1. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.3EB.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

7.3EB.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 36.508 [7] subclause 4.6 can be used without exceptions.

7.3EB.4.3.2 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

7.3EB.4.3.3 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_06"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

7.3EB.4.3.4 Message contents exceptions (network signalled value "NS_09")

1. Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.4-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_09"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	9 (NS_09)		

7.3EB.4.3.5 Message contents exceptions (network signalled value "NS_08")

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_08"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	8 (NS_08)		

7.3EB.4.3.6 Message contents exceptions (network signalled value "NS_21")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.6-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_21"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	21 (NS_21)		

7.3EB.4.3.7 Message contents exceptions (network signalled value "NS_27")

1. Information element additionalSpectrumEmission is set to NS_27. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.7-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_27"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	27 (NS_27)		

7.3EB.4.3.8 Message contents exceptions (Additional Band 70 test configurations in Table 7.3EB.4 for Tx-Rx frequency separation of 295 MHz)

1. Information element ul-CarrierFreq is set to UL EARFCN according to the test configuration ID. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the reference sensitivity requirement for a specific deployment scenario using a non-default Tx-Rx frequency separation of 295 MHz.

Table 7.3EB.4.3.8-1: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "1"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133047 (5 MHz)	Paired Mid Range	

Table 7.3EB.4.3.8-2: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "2"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133097 (5 MHz)	Paired High Range	

Table 7.3EB.4.3.8-3: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "3"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133072 (10 MHz)	Paired High Range	

7.3EB.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.3EB.5-1 and Table 7.3EB.5-2.

Table 7.3EB.5-1: Reference sensitivity for FDD and TDD UE category 1bis QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
1			-96.8	-93.3	-91.5	-90.3	FDD
2	-99.5	-96.5	-94.8	-91.3	-89.5	-88.3	FDD
3	-98.5	-95.5	-93.8	-90.3	-88.5	-87.3	FDD
4	-101.5	-98.5	-96.8	-93.3	-91.5	-90.3	FDD
5	-100	-97	-94.8	-91.8			FDD
7			-94.8	-91.3	-89.5	-88.3	FDD
8	-99	-96	-93.8	-90.8			FDD
12	-98	-95	-93.3	-90.3			FDD
13			-93.3	-90.3			FDD
18			-96.8	-93.8	-92		FDD
20			-93.8	-90.8	-87.5	-86.3	FDD
26	-99.5	-96.5	-94.3[3]	-91.3[3]	-89.5[3]		FDD
28		-97	-95.3	-92.3	-90.5	-87.8	FDD
31	-95.8	-91.8	-89.8				FDD
39			-96.8	-93.8	-92	-90.8	TDD
41			-94.8	-91.8	-90	-88.8	TDD
66	-101	-98	-96.3	-92.8	-91	-89.8	FDD
72	-95.8	-91.8	-89.8				FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: [3] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B, 7.3.3-1C and 7.3.3-1D shall be applied for applicable bands.

In case the UE supports more than one of the inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL (i.e. bands listed in Table 7.3A.0-0a), then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 7.3.3-1A that would apply for that operating band among the supported CA configurations

NOTE 1: The relation to the received PSD is $\left\langle \mathrm{REF}\,\hat{I}_{or} \right\rangle = P_{REFSENS}\left(N_{sc}^{RB} N_{RB} \Delta f\right)^{-1}$ with N_{RB} is the transmission bandwidth configuration according to Table 5.4.2-1.

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3EB.5-1 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3EB.5-2.

NOTE 2: Table 7.3EB.5-2 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3EB.5-2: FDD and TDD UE category 1bis Uplink configuration for reference sensitivity, L_{CRB} @ RB_{start} format

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	1.4 MHz / 6	3 MHz / 15	5 MHz / 25	10 MHz / 50	15 MHz / 75	20 MHz / 100	Duplex Mode
1	-	-	25@0	50@0	75@0	100@0	FDD
2	6@0	15@0	25@0	50@0	50@25	50@50	FDD
3	6@0	15@0	25@0	50@0	50@25	50@50	FDD
4	6@0	15@0	25@0	50@0	75@0	100@0	FDD
5	6@0	15@0	25@0	25@25	-	-	FDD
7	-	-	25@0	50@0	75@0	75@25	FDD
8	6@0	15@0	25@0	25@25	-	-	FDD
12	6@0	15@0	20@5	20@30	-	-	FDD
13	-	-	20@0	20@0	-	-	FDD
18	-	-	25@0	25@25	25@50	-	FDD
20	-	-	25@0	20@0	20@11	20@16	FDD
26	6@0	15@0	25@0	25@25	25@50	-	FDD
28		15@0	25@0	25@25	25@50	25@75	FDD
31	6@0	5@9	5@10	-	-	-	FDD
39	-	-	25@0	50@0	75@0	100@0	TDD
40	-	-	25@0	50@0	75@0	100@0	TDD
66	6@0	15@0	25@0	50@0	75@0	100@0	FDD
72	6@0	5@9	5@10				FDD

7.3EB Reference sensitivity level for UE category 1bis

Editor's note: FDD/TDD aspects missing or not yet determined:

- The Maximum Sensitivity Degradation figures for large transmission configurations are not finalised in the core specification.

- This clause is also incomplete for CA_42A-46A and CA_7A-8A-20.

- $\Delta R_{IB,c}$ is in square brackets (awaiting for RAN4 decision).

- Clarification to the use of signalling the non-default Tx-Rx separation of 295MHz for Band 70 testing is under discussion.

7.3EB.1 Test purpose

To verify the category 1bis UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3EB.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category 1bis.

7.3EB.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3EB.3-1 and Table 7.3EB.3-2.

Table 7.3EB.3-1: Reference sensitivity for FDD and TDD UE category 1bis QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
1			-97.5	-94	-92.2	-91	FDD
2	-100.2	-97.2	-95.5	-92	-90.2	-89	FDD
3	-99.2	-96.2	-94.5	-91	-89.2	-88	FDD
4	-102.2	-99.2	-97.5	-94	-92.2	-91	FDD
5	-100.7	-97.7	-95.5	-92.5			FDD
7			-95.5	-92	-90.2	-89	FDD
8	-99.7	-96.7	-94.5	-91.5			FDD
12	-98.7	-95.7	-94	-91			FDD
13			-94	-91			FDD
18			-97.5	-94.5	-92.7		FDD
20			-94.5	-91.5	-88.2	-87	FDD
26	-100.2	-97.2	-95.0[3]	-92.0[3]	-90.2[3]		FDD
28		-97.7	-96.0	-93.0	-91.2	-88.5	FDD
31	-96.5	-92.5	-90.5				FDD
39			-97.5	-94.5	-92.7	-91.5	TDD
41			-95.5	-92.5	-90.7	-89.5	TDD
66	-101.7	-98.7	-97	-93.5	-91.7	-90.5	FDD
72	-96.5	-92.5	-90.5				FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: [3] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3EB.3-1 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3EB.3-2.

NOTE: Table 7.3EB.3-2 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors. Typical receiver sensitivity performance with HARQ retransmission enabled and using a residual BLER metric relevant for e.g. Speech Services is given in the Annex G of TS 36.101 [2] (informative).

For the UE which supports inter-band carrier aggregation configuration with the uplink in one or two E-UTRA bands, the minimum requirement for reference sensitivity in Table 7.3EB.3-1 and Table 7.3EB.3-2 shall be increased by the amount given in $\Delta R_{IB,c}$ in Table 7.3.3-1A, Table 7.3.3-1B, Table 7.3.3-1C and Table 7.3.3-1D for the applicable E-UTRA bands.

NOTE: To meet the $\Delta R_{IB,c}$ requirements for CA_20A-28A state-of-the-art filter combiner technology is needed.

NOTE: The above additional tolerances do not apply to supported UTRA operating bands with frequency range below 1 GHz that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations when such bands are belonging only to band combination(s) where one band is <1GHz and other bands are >1.7GHz and there is no harmonic relationship between the low band UL and high band DL. Otherwise the above additional tolerances also apply to supported UTRA operating bands that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

Table 7.3EB.3-2: FDD and TDD UE category 1bis Uplink configuration for reference sensitivity

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex Mode**
1			25	50	75	100	FDD
2	6	15	25	50	50[1]	50[1]	FDD
3	6	15	25	50	50[1]	50[1]	FDD
4	6	15	25	50	75	100	FDD
5	6	15	25	25[1]			FDD
7			25	50	75	75[1]	FDD
8	6	15	25	25[1]			FDD
12	6	15	20[1]	20[1]			FDD
13			20[1]	20[1]			FDD
18			25	25	25		FDD
20			25	20[1]	20[2]	20[2]	FDD
26	6	15	25	25[1]	25[1]		FDD
28		15	25	25[1]	25[1]	25[1]	FDD
31	6	5[3]	5[3]				FDD
39			25	50	75	100	TDD
41			25	50	75	100	TDD
66	6	15	25	50	75	100	FDD
72	6	5[3]	5[3]				FDD

NOTE 1: [1] refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1).

NOTE 2: [2] refers to Band 20; in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 16.

NOTE 3: [3] refers to Bands 31 and 72; in the case of 3 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 9 and in the case of 5 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 10.

Unless given by Table 7.3.3-3, the minimum requirements specified in Tables 7.3EB.3-1 and 7.3EB.3-2 shall be verified with the network signalling value NS_01 (Table 6.2.4.3-1) configured.

The normative reference for this requirement is TS 36.101 [2] clause 7.3.1E.

7.3EB.4 Test description

7.3EB.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Tables 7.3EB.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3EB.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
3MHz	QPSK	15	15	QPSK	5[4]	N/A
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20[5]	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2. Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3EB.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).

Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.

Note 4: Applicable only to E-UTRA FDD Band 31 and 72; in the case of 3 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 9 and in the case of 5 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 10. (according to Table 7.3EB.3-2).

Note 5: Applicable only to E-UTRA FDD Band 20; in the case of 15 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 11 and in the case of 20 MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 16. (according to Table 7.3EB.3-2).

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Tables 7.3EB.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3EB.4.3.

7.3EB.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3EB.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.3EB.4.1-1 and 7.3EB.4.1-2. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3EB.5-1. Send continuously uplink power control "up" commands in the uplink scheduling information to the UE to ensure the UE transmits P_{UMAX} level for at least the duration of the Throughput measurement.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.3EB.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

7.3EB.4.3.1 Message contents exceptions (network signalled value "NS_01")

Message contents according to TS 36.508 [7] subclause 4.6 can be used without exceptions.

7.3EB.4.3.2 Message contents exceptions (network signalled value "NS_03")

1. Information element additionalSpectrumEmission is set to NS_03. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_03"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	3 (NS_03)		

7.3EB.4.3.3 Message contents exceptions (network signalled value "NS_06")

1. Information element additionalSpectrumEmission is set to NS_06. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.3-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_06"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	6 (NS_06)		

7.3EB.4.3.4 Message contents exceptions (network signalled value "NS_09")

1. Information element additionalSpectrumEmission is set to NS_09. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.4-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_09"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	9 (NS_09)		

7.3EB.4.3.5 Message contents exceptions (network signalled value "NS_08")

1. Information element additionalSpectrumEmission is set to NS_08. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.5-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_08"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	8 (NS_08)		

7.3EB.4.3.6 Message contents exceptions (network signalled value "NS_21")

1. Information element additionalSpectrumEmission is set to NS_21. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.6-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_21"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	21 (NS_21)		

7.3EB.4.3.7 Message contents exceptions (network signalled value "NS_27")

1. Information element additionalSpectrumEmission is set to NS_27. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 7.3EB.4.3.7-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_27"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	27 (NS_27)		

7.3EB.4.3.8 Message contents exceptions (Additional Band 70 test configurations in Table 7.3EB.4 for Tx-Rx frequency separation of 295 MHz)

1. Information element ul-CarrierFreq is set to UL EARFCN according to the test configuration ID. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the reference sensitivity requirement for a specific deployment scenario using a non-default Tx-Rx frequency separation of 295 MHz.

Table 7.3EB.4.3.8-1: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "1"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133047 (5 MHz)	Paired Mid Range	

Table 7.3EB.4.3.8-2: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "2"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133097 (5 MHz)	Paired High Range	

Table 7.3EB.4.3.8-3: *SystemInformationBlockType2*: UL carrier frequency test requirement for test configuration ID "3"

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
ul-CarrierFreq-v9e0	133072 (10 MHz)	Paired High Range	

7.3EB.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.3EB.5-1 and Table 7.3EB.5-2.

Table 7.3EB.5-1: Reference sensitivity for FDD and TDD UE category 1bis QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
1			-96.8	-93.3	-91.5	-90.3	FDD
2	-99.5	-96.5	-94.8	-91.3	-89.5	-88.3	FDD
3	-98.5	-95.5	-93.8	-90.3	-88.5	-87.3	FDD
4	-101.5	-98.5	-96.8	-93.3	-91.5	-90.3	FDD
5	-100	-97	-94.8	-91.8			FDD
7			-94.8	-91.3	-89.5	-88.3	FDD
8	-99	-96	-93.8	-90.8			FDD
12	-98	-95	-93.3	-90.3			FDD
13			-93.3	-90.3			FDD
18			-96.8	-93.8	-92		FDD
20			-93.8	-90.8	-87.5	-86.3	FDD
26	-99.5	-96.5	-94.3[3]	-91.3[3]	-89.5[3]		FDD
28		-97	-95.3	-92.3	-90.5	-87.8	FDD
31	-95.8	-91.8	-89.8				FDD
39			-96.8	-93.8	-92	-90.8	TDD
41			-94.8	-91.8	-90	-88.8	TDD
66	-101	-98	-96.3	-92.8	-91	-89.8	FDD
72	-95.8	-91.8	-89.8				FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: [3] indicates that the requirement is modified by -0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.

For the UE which supports inter-band carrier aggregation configurations the $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B, 7.3.3-1C and 7.3.3-1D shall be applied for applicable bands.

In case the UE supports more than one of the inter-band carrier aggregation configurations and an E-UTRA operating band belongs to more than one inter-band carrier aggregation configurations then:

- When the E-UTRA operating band frequency range is ≤ 1GHz, the applicable additional tolerance shall be the average of the tolerances in Table 7.3.3-1A, truncated to one decimal place that would apply for that operating band among the supported CA configurations. In case there is a harmonic relation between low band UL and high band DL (i.e. bands listed in Table 7.3A.0-0a), then the maximum tolerance among the different supported carrier aggregation configurations involving such band shall be applied

- When the E-UTRA operating band frequency range is >1GHz, the applicable additional tolerance shall be the maximum tolerance in Table 7.3.3-1A that would apply for that operating band among the supported CA configurations

NOTE 1: The relation to the received PSD is $\left\langle \mathrm{REF}\,\hat{I}_{or} \right\rangle = P_{REFSENS}\left(N_{sc}^{RB} N_{RB} \Delta f\right)^{-1}$ with N_{RB} is the transmission bandwidth configuration according to Table 5.4.2-1.

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3EB.5-1 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3EB.5-2.

NOTE 2: Table 7.3EB.5-2 does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors.

Table 7.3EB.5-2: FDD and TDD UE category 1bis Uplink configuration for reference sensitivity, L_{CRB} @ RB_{start} format

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	1.4 MHz / 6	3 MHz / 15	5 MHz / 25	10 MHz / 50	15 MHz / 75	20 MHz / 100	Duplex Mode
1	-	-	25@0	50@0	75@0	100@0	FDD
2	6@0	15@0	25@0	50@0	50@25	50@50	FDD
3	6@0	15@0	25@0	50@0	50@25	50@50	FDD
4	6@0	15@0	25@0	50@0	75@0	100@0	FDD
5	6@0	15@0	25@0	25@25	-	-	FDD
7	-	-	25@0	50@0	75@0	75@25	FDD
8	6@0	15@0	25@0	25@25	-	-	FDD
12	6@0	15@0	20@5	20@30	-	-	FDD
13	-	-	20@0	20@0	-	-	FDD
18	-	-	25@0	25@25	25@50	-	FDD
20	-	-	25@0	20@0	20@11	20@16	FDD
26	6@0	15@0	25@0	25@25	25@50	-	FDD
28		15@0	25@0	25@25	25@50	25@75	FDD
31	6@0	5@9	5@10	-	-	-	FDD
39	-	-	25@0	50@0	75@0	100@0	TDD
40	-	-	25@0	50@0	75@0	100@0	TDD
66	6@0	15@0	25@0	50@0	75@0	100@0	FDD
72	6@0	5@9	5@10				FDD

7.3EC Reference sensitivity level for UE category M2

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Downlink RB allocation is TBD
- Reference measurement channel not defined for cat M2

7.3EC.1 Test purpose

To verify the category M2 UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3EC.2 Test applicability

This test applies to all types of E-UTRA UE release 14 and forward of UE category M2.

7.3EC.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3EC.3-1 and Table 7.3EC.3-2.

Table 7.3EC.3-1: Reference sensitivity for FDD /TDD UE category [M2] QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
1			-97.7	-97.7	-97.7	-97.7	FDD
2	-100.2	-97.2	-95.7	-95.7	-95.7	-95.7	FDD
3	-99.2	-96.2	-94.7	-94.7	-94.7	-94.7	FDD
4	-102.2	-99.2	-97.7	-97.7	-97.7	-97.7	FDD
5	-100.7	-97.7	-95.7	-95.7			FDD
7			-95.7	-95.7	-95.7	-95.7	FDD
8	-99.7	-96.7	-94.7	-94.7			FDD
11			-97.7	-97.7			
12	-99.2	-96.2	-94.7	-94.7			FDD
13			-94.2	-94.2			FDD
18			-97.7	-97.7	-97.7		FDD
19			-97.7	-97.7	-97.7		FDD
20			-94.7	-94.7	-94.7	-94.7	FDD
21			-97.7	-97.7	-97.7		FDD
25	-98.7	-95.7	-94.2	-94.2	-94.2	-94.2	FDD
26	-100.2	-97.2	-95.2	-95.2	-95.2		FDD
27	-100.7	-97.7	-95.7	-95.7			FDD
28		-97.7	-96.2	-96.2	-96.2	-96.2	FDD
31	-96.5	-93.2	-91.2				FDD
…							
39			-97.7	-97.7	-97.7	-97.7	TDD
40			-97.7	-97.7	-97.7	-97.7	TDD
41			-95.7	-95.7	-95.7	-95.7	TDD
66	-101.7	-98.7	-97.2	-97.2	-97.2	-97.2	FDD

NOTE 1: The transmitter shall be set to PUMAX as defined in subclause 6.2.5
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 4: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.
NOTE 5: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.

Table 7.3EC.3-2: Reference sensitivity for HD-FDD category [M2] QPSK $P_{REFSENS}$

Channel bandwidth							
E-UTRA Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
1			-97	-97	-97	-97	HD-FDD
2	-101	-97	-95	-95	-95	-95	HD-FDD
3	-100	-96	-94	-94	-94	-94	HD-FDD
4	-103	-99	-97	-97	-97	-97	HD-FDD
5	-101.5	-97.5	-95.5	-95.5			HD-FDD
7			-95	-95	-95	-95	HD-FDD
8	-100.5	-96.5	-94.5	-94.5			HD-FDD
11			-97	-97			HD-FDD
12	-100	-96	-94	-94			HD-FDD
13			-94	-94			HD-FDD
18			-97	-97	-97		HD-FDD
19			-97	-97	-97		HD-FDD
20			-94.5	-94.5	-94.5	-94.5	HD-FDD
21			-97	-97	-97		HD-FDD
25	-99.5	-95.5	-93.5	-93.5	-93.5	-93.5	HD-FDD
26	-101	-97	-95	-95	-95		HD-FDD
27	-101.5	-97.5	-95.5	-95.5			HD-FDD
28		-97.5	-95.5	-95.5	-95.5	-95.5	HD-FDD
31	-97.3	-93.3	-91.3				HD-FDD

NOTE 1: The transmitter shall be set to PUMAX as defined in subclause 6.2.5
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 4: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3EC.3-1/Table 7.3EC.3-2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3EC.3-3.

NOTE: Table 7.3EC.3-3 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors. Typical receiver sensitivity performance with HARQ retransmission enabled and using a residual BLER metric relevant for e.g. Speech Services is given in the Annex G (informative).

Table 7.3EC.3-3: FDD/HD-FDD and TDD UE category M2 Uplink configuration for reference sensitivity

E-UTRA Band / Channel bandwidth / N_{RB} / Duplex mode							
E-UTRA Band	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**Duplex Mode**
1			[24]	[24]	[24]	[24]	FDD/HD-FDD
2	[6]	[15]	[24]	[24]	[24]	[24]	FDD/HD-FDD
3	[6]	[15]	[24]	[24]	[24]	[24]	FDD/HD-FDD
4	[6]	[15]	[24]	[24]	[24]	[24]	FDD/HD-FDD
5	[6]	[15]	[24]	[24]			FDD/HD-FDD
7			[24]	[24]	[24]	[24]	FDD/HD-FDD
8	[6]	[15]	[24]	[24]			FDD/HD-FDD
11			[24]	[24]			FDD/HD-FDD
12	[6]	[15]	[20[1]]	[20[1]]			FDD/HD-FDD
13			[20[1]]	[20[1]]			FDD/HD-FDD
18			[24]	[24]	[24]		FDD/HD-FDD
19			[24]	[24]	[24]		FDD/HD-FDD
20			[24]	[20[1]]	[20[3]]	[20[3]]	FDD/HD-FDD
21			[24]	[24[1]]	[24[1]]		FDD/HD-FDD
25	[6]	[15]	[24]	[24]	[24]	[24]	FDD/HD-FDD
26	[6]	[15]	[24]	[24]	[24]		FDD/HD-FDD
27	[6]	[15]	[24]	[24]			FDD/HD-FDD
28		[15]	[24]	[24]	[24]	[24]	FDD/HD-FDD
31	[6]	[5[4]]	[5[4]]				FDD/HD-FDD
…							
39				[24]	[24]	[24]	TDD
40				[24]	[24]	[24]	TDD
41				[24]	[24]	[24]	TDD

NOTE 1: [1] refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1).

NOTE 2: For the UE which supports both Band 11 and Band 21 the uplink configuration for reference sensitivity is FFS.

NOTE 3: [3] refers to Band 20; in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart 11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart 16

NOTE 4: [4] refers to Band 31; in the case of 3 MHz channel bandwidth, the UL resource blocks shall be located at RBstart 9 and in the case of 5 MHz channel bandwidth, the UL resource blocks shall be located at RBstart 10.

Unless given by Table 7.3EC.3-4, the minimum requirements specified in Tables 7.3EC.3-1 and 7.3EC.3-2 shall be verified with the network signalling value NS_01 (Table 6.2.4EA-1) configured.

Table 7.3EC.3-4: Network signalling value for reference sensitivity

E-UTRA Band	Network Signalling value
2	NS_03
4	NS_03
10	NS_03
12	NS_06
13	NS_06
14	NS_06
17	NS_06
19	NS_08
21	NS_09
23	NS_03
30	NS_21
66	NS_03

The normative reference for this requirement is TS 36.101 [2] clauses 7.3.1 and 7.3.1E.

7.3EC.4 Test description

7.3EC.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for CAT M2 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3EC.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 7.3EC.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz					
Test Parameters for Channel Bandwidths and Narrowband positions						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD and HD-FDD	TDD
1.4MHz	QPSK	TBD	N/A	QPSK	[6]	N/A
3MHz	QPSK	TBD	N/A	QPSK	[15]	N/A
5MHz	QPSK	TBD	N/A	QPSK	[24]	N/A
5MHz	QPSK	TBD	N/A	QPSK	[20[3]]	N/A
5MHz	QPSK	TBD	N/A	QPSK	[5[4]]	N/A
10MHz	QPSK	N/A	TBD	QPSK	N/A	[24]
Note 1: Downlink RB position shall be RB_{start} = 0 within the narrowband Note 2: The Wideband index (TS36.211, 5.2.4) shall be set to 0 for all testpoints. Note 3: Applicable only to E-UTRA FDD band 12 and 13. The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1). Note 4: Applicable only to E-UTRA FDD band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3EC.3-3).						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.3EC.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.3EC.4.3.

7.3EC.4.2 Test procedure

Same as in clause 7.3EA.4.2

7.3EC.4.3 Message contents

Same as in clause 7.3EA.4.3

7.3EC.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 with parameters specified in Table 7.3EC.5-1 and Table 7.3EC.5-2.

Table 7.3EC.5-1: Reference sensitivity for FDD and TDD UE category M2 QPSK P_{REFSEN}

E-UTRA Band	REFSENS (dBm)	Duplex Mode
1	-101.5	FDD
2	-99.5	FDD
3	-98.5	FDD
4	-101.5	FDD
5	-100.0	FDD
7	-95.5	FDD
8	-99.0	FDD
11	-101.5[3]	FDD
12	-98.5	FDD
13	-98.0	FDD
18	-101.5[4]	FDD
19	-101.5	FDD
20	-99.0	FDD
21	-101.5[3]	FDD
26	-99.5	FDD
27	-100.0	FDD
28	-100.0	FDD
31	-95.8	FDD
…		
39	-103.0	TDD
41	-101.0	TDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5EA.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1
NOTE 3: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 4: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.
NOTE 5: For cat M2 the same RF bandwidth applies for all applicable channel bandwidths as specified in Table 5.4.2.1-1.
NOTE 6: The reference receive sensitivity shall be met for an uplink transmission bandwidth less than or equal to 6 RB except for band 31. For band 31; in the case of 3 MHz channel bandwidth 5 RB applies and the UL resource blocks shall be located at RB_{start} 9. In case of 5 MHz channel bandwidth 5 RB applies and the UL resource blocks shall be located at RB_{start} 10.
NOTE 7: The UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth.
NOTE 8: These REFSENS levels are applicable only to 6 RB. OCNG shall be filled to entire channel bandwidth with the same PSD of REFSENS level in 6 RBs.

Table 7.3EC.5-2: Reference sensitivity for HD-FDD UE category M2 QPSK $P_{REFSENS}$

E-UTRA Band	REFSENS (dBm)	Duplex Mode
1	-102.3	HD-FDD
2	-100.3	HD-FDD
3	-99.3	HD-FDD
4	-102.3	HD-FDD
5	-100.8	HD-FDD
7	-100.3	HD-FDD
8	-99.8	HD-FDD
11	-102.3[3]	HD-FDD
12	-99.3	HD-FDD
13	-99.3	HD-FDD
18	-102.3[4]	HD-FDD
19	-102.3	HD-FDD
20	-99.8	HD-FDD
21	-102.3[3]	HD-FDD
26	-100.3	HD-FDD
27	-100.8	HD-FDD
28	-100.8	HD-FDD
31	-96.6	HD-FDD

NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5EA.
NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: For the UE which supports both Band 11 and Band 21 the reference sensitivity level is FFS.
NOTE 4: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.
NOTE 5: For cat M2 the same RF bandwidth applies for all applicable channel bandwidths as specified in Table 5.4.2-1.
NOTE 6: These REFSENS levels are applicable only to 6 RB. OCNG shall be filled to entire channel bandwidth with the same PSD of REFSENS level in 6 RBs.

7.3F Reference sensitivity level for category NB1

7.3F.1 Reference sensitivity level without repetitions for category NB1

7.3F.1.1 Test purpose

To verify the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3F.1.2 Test applicability

This test applies to all types of UE release 13 and forward of category NB1.

7.3F.1.3 Minimum conformance requirements

The category NB1 UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with received signal level as specified in Table 7.3F.1.3-1. Requirement in Table 7.3F.1.3-1 applies for any uplink configuration.

Table 7.3F.1.3-1: Reference sensitivity for category NB1

Operating band	REFSENS [dBm]
1, 2, 3, 5, 8, 11, 12, 13, 17, 18, 19, 20, 25, 26, 28, 31, 66, 70	- 108.2

The normative reference for this requirement is TS 36.101 clause 7.3.1F.1.

7.3F.1.4 Test description

7.3F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 7.3F.1.4.1-1. The details of the downlink reference measurement channel (RMC) are specified in Annex A.3. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 7.3F.1.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] clause 8.1.1			NC, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defined in Annex K.1.2		
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Modulation	Subcarriers	Modulation	N_{tones}	Subcarrier spacing
1	QPSK	12	BPSK	1@0	15kHz

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C1 and C.3.0, and NPUSCH Format 2 is used to carry ACK/NACK on the uplink.
4. The DL Reference Measurement channels are set according to Table 7.3F.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 7.3F.1.4.3.

7.3F.1.4.2 Test Procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.3F.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send the HARQ feedback based on information contain in DCI format N1.
2. Set the Downlink signal level to the REFSENS value defined in Table 7.3F.1.5-1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.3F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 8.1.6.

7.3F.1.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.3F.1.5-1.

Table 7.3F.1.5-1: Reference sensitivity for category NB1

Operating band	REFSENS [dBm]
1, 2, 3, 5, 8, 11, 12, 13, 17, 18, 19, 20, 25, 26, 28, 31, 66, 70	- 107.5

7.3F.2 Reference sensitivity level with repetitions for category NB1

Editor's note: This clause is incomplete, the following items are TBD

- Applicability of Annex G.2 TBC

- Sensitivity level is TBD

7.3F.2.1 Test purpose

To verify the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under extreme coverage scenario of low signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area of an e-NodeB.

7.3F.2.2 Test applicability

This test applies to all types of UE release 13 and forward of category NB1 UE.

7.3F.2.3 Minimum conformance requirements

In order to guarantee the UE performance in extreme coverage scenario enabled by usage of repetitions additional repetition sensitivity requirement is defined. Repetition sensitivity requirement applies only for normal conditions as defined in TS 36.508 [7] clause 4.1. Other category NB1 receiver requirements are not applicable for repetition sensitivity defined in Table 7.3F.2.3-1.

The category NB1 UE throughput shall be ≥ TBD% of the maximum throughput of the repetition reference measurement channel as specified in Annex A.3.2 with received signal level and parameters as specified in Table 7.3F.2.3-1. Requirement in Table 7.3.1F.2-1 applies for any uplink configuration.

Table 7.3F.2.3-1: Repetition sensitivity for category NB1 UE

Operating band	Sensitivity [dBm]	NB-PDSCH repetitions N_{Rep}
1, 2, 3, 5, 8, 11, 12, 13, 17, 18, 19, 20, 25, 26, 28, 31, 66, 70	TBD	TBD

The normative reference for this requirement is TS 36.101 clause 7.3.1F.2.

7.3F.2.4 Test description

7.3F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 7.3F.2.4.1-1. The details of the downlink reference measurement channel (RMC) are specified in Annex A.3. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 7.3F.2.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] clause 8.1.1			NC		
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defined in Annex K.1.2		
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Modulation	Subcarriers	Modulation	N_{tones}	Subcarrier spacing
1	QPSK	12	BPSK	1@0	15kHz
NOTE 1: Number of NPDSCH repetitions for Downlink Configuration = TBD					

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex [C0, C1 and C.3.0], and NPUSCH Format 2 is used to carry ACK/NACK on the uplink.
4. The DL Reference Measurement channels are set according to Table 7.3F.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 7.3F.2.4.3.

7.3F.2.4.2 Test Procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.3F.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send the HARQ feedback based on information contain in DCI format N1.
2. Set the Downlink signal level to the REFSENS value defined in Table 7.3F.2.5-1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to [Annex G2].

7.3F.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 8.1.6.

7.3F.2.5 Test requirement

The throughput shall be ≥ TBD% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.3F.2.5-1.

Table 7.3F.2.5-1: Reference sensitivity for category NB1 UE

Operating band	**Sensitivity [dBm]**	**NB-PDSCH repetitions** N_{Rep}
1, 2, 3, 5, 8, 11, 12, 13, 17, 18, 19, 20, 25, 26, 28, 31, 66, 70	TBD	TBD

7.3G Reference sensitivity level for V2X Communication

7.3G.0 Minimum conformance requirements

When UE is configured for E-UTRA V2X reception non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.2G-1, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.3G.0-1.

Table 7.3G.0-1: Reference sensitivity

Channel bandwidth							
E-UTRA V2X Band	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
47				-90.4		-87.5	TDD
NOTE 1: Reference measurement channel is defined in A.8.2. NOTE 2: The signal power is specified per port.							

The normative reference for this requirement is TS 36.101 [2] clause 7.3.1G.

When UE is configured for E-UTRA V2X reception on V2X carrier con-current with E-UTRA uplink for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, E-UTRA V2X throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.3G.0-2. Also the E-UTRAdownlink throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.3.3.2.

For the UE which supports V2X in an operating band as specified in Table 5.2G-2, and the UE also supports a E-UTRA downlink inter-band con-current configuration in Table 7.3.1-1A, the minimum requirement for reference sensitivity in Table 7.3G.0-1 and Table 7.3G.0-2 shall be increased by the amount given in $\Delta R_{IB,c}$ in Table 7.3G.0-2a for the corresponding E-UTRA V2X band.

Table 7.3G.0-2: Reference sensitivity for V2X Communication QPSK $P_{REFSENS}$

Inter-band V2V reception		Channel bandwidth							
E-UTRA V2X Band	**E-UTRA band**	**E-UTRA band**	**1.4 MHz (dBm)**	**3 MHz (dBm)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**Duplex Mode**
Band 47	Band 3	3	-101.7	-98.7	-97	-94	-92.2	-91	TDD-FDD
		47				-90.4		-87.5	
Band 47	Band 7	7			-98	-95	-93.2	-92	TDD-FDD
		47				-90.4		-87.5	
Band 47	Band 8	8	-102.2	-99.2	-97	-94			TDD-FDD
		47				-90.4		-87.5	
Band 47	Band 39	39			-100	-97	-95.2	-94	TDD-TDD
		47				-90.4		-87.5	
Band 47	Band 41	41			-98	-95	-93.2	-92	TDD-TDD
		47				-90.4		-87.5	

Table 7.3G.0-2A: $\Delta R_{IB,c}$ (two bands)

V2X inter-band con-current band Configuration	E-UTRA Band	$\Delta R_{IB,c}$ [dB]
V2X_3A-47A	3	0
V2X_7A-47A	7	0
V2X_8A-47A	8	0
V2X_39A-47A	39	0
V2X_41A-47A	41	0

The reference sensitivity is defined to be met with E-UTRA uplink assigned to one band (that differs from the V2X operating band) and all E-UTRA downlink carriers active. The E-UTRA uplink resource blocks shall be located as close as possible to E-UTRA V2X operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1). The uplink configuration for the E-UTRA operating band is specified in Table 7.3G.0-3 and 7.3G.0-4.

Table 7.3G.0-3: Uplink configuration for REFSENS of E-UTRA V2X Bands(PC5)

Inter-band E-UTRA V2X /E-UTRA configuration		E-UTRA UL band / Channel BW / N_{RB} / Duplex mode			
E-UTRA V2X band (PC5)	E-UTRA V2X band (Uu)	E-UTRA V2X UL band (Uu)	Channel Bandwidth (MHz)	N_{RB}	Duplex Mode
47	3	3	10	50	TDD-FDD
47	7	7	10	50	TDD-FDD
47	8	8	10	50	TDD-FDD
47	39	39	10	50	TDD-TDD
47	41	41	10	50	TDD-TDD

Table 7.3G.0-4: Uplink configuration for REFSENS of E-UTRA V2X Bands (Uu)

Inter-band E-UTRA V2X /E-UTRA configuration		E-UTRA UL band / Channel BW / N_{RB} / Duplex mode			
E-UTRA V2X band (PC5)	E-UTRA V2X band (Uu)	E-UTRA V2X band (PC5)	Channel Bandwidth (MHz)	N_{RB}	Duplex Mode
47	3	47	10	50	TDD-FDD
47	7	47	10	50	TDD-FDD
47	8	47	10	50	TDD-FDD
47	39	47	10	50	TDD-TDD
47	41	47	10	50	TDD-TDD

For intra-band contiguous multi-carrier operation the above reference sensitivity requirement shall apply for each component carrier with both carriers active. The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmission are activated at the same time.

7.3G.1 Reference sensitivity level for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration is investigating
- UE Test mode is TBD
- The test tolerance is left FFS

7.3G.1.1 Test purpose

Verify that UE receives V2X Communication physical channels data with a given average throughput under conditions of low signal level and ideal propagation.

7.3G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.3G.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3G.0.

7.3G.1.4 Test description

7.3G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A. 8.3. GNSS simulator is configured as Table C.2-8 in Annex C.2.

Table 7.3G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A. 92.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 7.3G.1.4.3.
3. The V2X reference measurement channel is set according to Table 7.3G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode – FFS.

7.3G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.3G.1.4.1-1.
2. Set the signal level of V2X to the appropriate REFSENS value defined in Table 7.3 G.1. 3-1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.3G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.10.

7.3G.1.5 Test requirements

When UE is configured for E-UTRA V2X reception non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.2G-1, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.3G.1. 5-1.

Table 7.3G.1. 5-1: Reference sensitivity

Channel bandwidth							
E-UTRA V2X Band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
47				-90.5+TT		-87.6+TT	TDD
NOTE 1: Reference measurement channel is defined in A.8.2. NOTE 2: The signal power is specified per port.							

7.3G.2 Reference sensitivity level for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration is investigating
- Connection diagram is TBD
- The test tolerance is left FFS

7.3G.2.1 Test purpose

Same as in clause 7.3G.1.1.

7.3G.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.3G.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3G.0.

7.3G.2.4 Test description

7.3G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3G.2.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3.

Table 7.3G.2.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1				Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1				Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1				Lowest, 5MHz, Highest for uplink Lowest, Highest for V2X			
Test Parameters for Channel Bandwidths							
	Downlink		**Uplink Configuration**		**V2X Configuration**		
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz	QPSK	1	QPSK	1	10 MHz	QPSK	[48]
1.4 MHz	QPSK	5	QPSK	5	20 MHz	QPSK	[96]
3 MHz	QPSK	1	QPSK	1			
3 MHz	QPSK	4	QPSK	4			
5 MHz	QPSK	1	QPSK	1			
5 MHz	QPSK	8	QPSK	8			
10 MHz	QPSK	1	QPSK	1			
10 MHz	QPSK	12	QPSK	12			
15 MHz	QPSK	1	QPSK	1			
15 MHz	QPSK	16	QPSK	16			
20 MHz	QPSK	1	QPSK	1			
20 MHz	QPSK	18	QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.3G.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.3G.2.4.3.

7.3G.2.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.3G.2.4.1-1 on E-UTRA band. The SS sends downlink MAC padding bits on the DL RMC.
2. SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 7.3G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.
3. Set the signal level of V2X for V2X band and E-UTRA band to the appropriate REFSENS value defined in Table 7.3G.2.5-1.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.3G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.3G.2.5 Test requirements

When UE is configured for E-UTRA V2X reception on V2X carrier con-current with E-UTRA uplink for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, E-UTRA V2X sidelink throughput shall be ≥ 95% of the

maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.3G.2.5-1. Also the E-UTRA downlink throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.3.3.2.

For the UE which supports V2X in an operating band as specified in Table 5.2G-2, and the UE also supports a E-UTRA downlink inter-band con-current configuration in Table 7.3.1G-2A, the minimum requirement for reference sensitivity in Table 7.3G.0-1 and Table 7.3G.0-2 shall be increased by the amount given in $\Delta R_{IB,c}$ in Table 7.3.1G-2A for the corresponding E-UTRA V2X band.

Table 7.3G.2.5-1: Reference sensitivity for V2X Communication QPSK $P_{REFSENS}$

Inter-band V2V reception		Channel bandwidth							
E-UTRA V2X Band	E-UTRA band	E-UTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
Band 47	Band 3	3	-101.7+TT	-98.7+TT	-97+TT	-94+TT	-92.2+TT	-91+TT	TDD-FDD
		47				-90.4+TT		-87.5+TT	
Band 47	Band 7	7			-98+TT	-95+TT	-93.2+TT	-92+TT	TDD-FDD
		47				-90.4+TT		-87.5+TT	
Band 47	Band 8	8	-102.2+TT	-99.2+TT	-97+TT	-94+TT			TDD-FDD
		47				-90.4+TT		-87.5+TT	
Band 47	Band 39	39			-100+TT	-97+TT	-95.2+TT	-94+TT	TDD-TDD
		47				-90.4+TT		-87.5+TT	
Band 47	Band 41	41			-98+TT	-95+TT	-93.2+TT	-92+TT	TDD-TDD
		47				-90.4+TT		-87.5+TT	

7.3G.3 Reference sensitivity level for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration is investigating
- The test tolerance is left FFS

7.3G.3.1 Test purpose

Same as in clause 7.3G.1.1.

7.3G.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support Intra-band contiguous multi-carrier operation V2X Communication.

7.3G.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3G.0.

7.3G.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.3G.3.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3.

Table 7.3G.3.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest N_{RB_agg}, Highest N_{RB_agg}	
Test Parameters for Channel Bandwidths			
V2X multi-carrier Configuration		**V2X PSSCH Allocation**	
CC1 N_{RB}	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**CC1 and CC2 RB Allocation**
10MHz	10MHz	QPSK	[48+48]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.89a.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.3G.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.3G.3.4.3.

7.3G.3.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.3G.3.4.1-1 for 2 carrier intra-concurrent receptions. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Set the signal level of V2X for each component carrier to the appropriate REFSENS value defined in Table 7.3G.3.5-3.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.3G.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.3G.3.5 Test requirements

When UE is configured for E-UTRA V2X reception non-concurrent with E-UTRA uplink transmissions for E-UTRA V2X operating bands specified in Table 5.2G-1, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.3G.3.5-3.

Table 7.3G.3.5-3: Reference sensitivity for V2X Communication QPSK $P_{REFSENS}$

Intra-band multi-carrier		Channel bandwidth							
E-UTRA V2X Band	E-UTRA V2X Band	E-UTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode
Band 47	Band 47	47				-90.4+TT		-87.5+TT	TDD-TDD
		47				-90.4+TT		-87.5+TT	

For intra-band contiguous multi-carrier operation, the above reference sensitivity requirement shall apply for each component carrier with both carriers active. The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmissions are activated at the same time.

7.4 Maximum input level

7.4.1 Test purpose

Maximum input level tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.4.3 Minimum conformance requirements

Maximum input level is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4.3-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.4.3-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-25[2]					
		-27[3]					
NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.							
NOTE 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
NOTE 3: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

The normative reference for this requirement is TS 36.101 [2] clause 7.4.1.

7.4.4 Test description

7.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.4.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.4.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] clause 4.1	NC						
Test Frequencies as specified in TS36.508 [7] clause 4.3.1	Mid range						
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1	Lowest, 5MHz, Highest						
Test Parameters for Channel Bandwidths							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**		**UE**
		FDD	**TDD**		**FDD**	**TDD**	**Category**
1.4MHz	64-QAM	6	6	QPSK	6	6	1-5
3MHz	64-QAM	15	15	QPSK	15	15	1-5
5MHz	64-QAM	25	25	QPSK	25	25	2-5
5MHz	64-QAM	25	N/A	QPSK	20	N/A	2-5
5MHz	64-QAM	25	N/A	QPSK	15	N/A	2-5
5MHz	64-QAM	25	N/A	QPSK	5[4]	N/A	2-5
5MHz	64-QAM	18	18	QPSK	25	25	1
5MHz	64-QAM	18	18	QPSK	20	20	1
5MHz	64-QAM	18	18	QPSK	15	15	1
5MHz	64-QAM	18	N/A	QPSK	5[4]	N/A	1
10MHz	64-QAM	50	50	QPSK	50	50	2-5
10MHz	64-QAM	50	N/A	QPSK	25	N/A	2-5
10MHz	64-QAM	50	N/A	QPSK	20	N/A	2-5
10MHz	64-QAM	50	N/A	QPSK	15	N/A	2-5
10MHz	64-QAM	17	17	QPSK	50	50	1
10MHz	64-QAM	17	N/A	QPSK	25	N/A	1
10MHz	64-QAM	17	N/A	QPSK	20	N/A	1
10MHz	64-QAM	17	N/A	QPSK	15	N/A	1
15MHz	64-QAM	75	75	QPSK	75	75	2-5
15MHz	64-QAM	75	N/A	QPSK	50	N/A	2-5
15MHz	64-QAM	75	N/A	QPSK	25	N/A	2-5
15MHz	64-QAM	75	N/A	QPSK	20	N/A	2-5
15MHz	64-QAM	17	17	QPSK	75	75	1
15MHz	64-QAM	17	N/A	QPSK	50	N/A	1
15MHz	64-QAM	17	N/A	QPSK	25	N/A	1
15MHz	64-QAM	17	N/A	QPSK	20	N/A	1
20MHz	64-QAM	100	100	QPSK	100	100	3-5
20MHz	64-QAM	100	N/A	QPSK	75	N/A	3-5
20MHz	64-QAM	100	N/A	QPSK	50	N/A	3-5
20MHz	64-QAM	100	N/A	QPSK	25	N/A	3-5
20MHz	64-QAM	100	N/A	QPSK	20	N/A	3-5
20MHz	64-QAM	83	83	QPSK	100	100	2
20MHz	64-QAM	83	N/A	QPSK	75	N/A	2
20MHz	64-QAM	83	N/A	QPSK	50	N/A	2
20MHz	64-QAM	83	N/A	QPSK	25	N/A	2
20MHz	64-QAM	83	N/A	QPSK	20	N/A	2
20MHz	64-QAM	17	17	QPSK	100	100	1
20MHz	64-QAM	17	N/A	QPSK	75	N/A	1
20MHz	64-QAM	17	N/A	QPSK	50	N/A	1
20MHz	64-QAM	17	N/A	QPSK	25	N/A	1
20MHz	64-QAM	17	N/A	QPSK	20	N/A	1

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band. The applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.3.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.4.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.4.4.3.

7.4.4.2 Test procedure

SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.4.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.4.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

Set the Downlink signal level to the value defined in Table 7.4.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.4.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.

Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.4.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.4.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4.5-1.

Table 7.4.5-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz

Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.		

7.4_1 Maximum input level with 4 Rx antenna ports

7.4_1.1 Test purpose

Same test purpose as in clause 7.4.1.

7.4_1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports but not 256QAM in DL.

7.4_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.4.3.

7.4_1.4 Test description

7.4_1.4.1 Initial conditions

Same as in clause 7.4.4.1 with following exceptions:

- Instead of Table 7.4.4.1-1→ use Table 7.4_1.4.1-1.
- Instead of Figure A.3→ use Figure A.69.

Table 7.4_1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	64QAM	6	N/A	QPSK	6	N/A
3MHz	64QAM	15	N/A	QPSK	15	N/A
5MHz	64QAM	25	N/A	QPSK	25	N/A
10MHz	64QAM	50	N/A	QPSK	50	N/A
10MHz	64QAM	50	N/A	QPSK	20	N/A
15MHz	64QAM	75	N/A	QPSK	75	N/A
15MHz	64QAM	75	N/A	QPSK	50	N/A
15MHz	64QAM	75	N/A	QPSK	20	N/A
20MHz	64QAM	100	100	QPSK	100	100
20MHz	64QAM	100	N/A	QPSK	75	N/A
20MHz	64QAM	100	N/A	QPSK	50	N/A
20MHz	64QAM	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2. Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1). Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						

7.4_1.4.2 Test procedure

Same as in clause 7.4.4.2 with following exceptions:

- Instead of Table 7.4.4.1-1→ use Table 7.4_1.4.1-1.

7.4_1.4.3 Message contents

Same as in clause 7.4.4.3.

7.4_1.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4_1.5-1.

Table 7.4_1.5-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4_H Maximum input level for 256QAM in DL

7.4_H.1 Test purpose

Same test purpose as in clause 7.4.1.

7.4_H.2 Test applicability

This test applies to all types of E-UTRA UEs release 12 and forward that support 256QAM in DL.

7.4_H.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4.3.

7.4_H.4 Test description

7.4_H.4.1 Initial conditions

Same initial conditions as in clause 7.4.4.1 with the following exceptions:

- Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.3 if the UE supports 2 Rx antennas or Figure A.69 if the UE supports 4 Rx antennas in the band.
- Instead of Table 7.4.4.1-1, use Table 7.4_H.4.1-1.

Table 7.4_H.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] clause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] clause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	256-QAM	6	6	QPSK	6	6
3MHz	256-QAM	15	15	QPSK	15	15
5MHz	256-QAM	25	25	QPSK	25	25
5MHz	256-QAM	25	N/A	QPSK	20	N/A
5MHz	256-QAM	25	N/A	QPSK	15	N/A
5MHz	256-QAM	25	N/A	QPSK	5[4]	N/A
10MHz	256-QAM	50	50	QPSK	50	50
10MHz	256-QAM	50	N/A	QPSK	25	N/A
10MHz	256-QAM	50	N/A	QPSK	20	N/A
10MHz	256-QAM	50	N/A	QPSK	15	N/A
15MHz	256-QAM	75	75	QPSK	75	75
15MHz	256-QAM	75	N/A	QPSK	50	N/A
15MHz	256-QAM	75	N/A	QPSK	25	N/A
15MHz	256-QAM	75	N/A	QPSK	20	N/A
20MHz	256-QAM	100	100	QPSK	100	100
20MHz	256-QAM	100	N/A	QPSK	75	N/A
20MHz	256-QAM	100	N/A	QPSK	50	N/A
20MHz	256-QAM	100	N/A	QPSK	25	N/A
20MHz	256-QAM	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band. The applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

7.4_H.4.2 Test procedure

Same test procedure as in clause 7.4.4.2 with the following exceptions:

- Instead of Table 7.4.4.1-1, use Table 7.4_H.4.1-1.
- Instead of Table 7.4.5-1, use Table 7.4_H.5-1.
- Instead of DCI format 1A use DCI format 1.

7.4_H.4.3 Message contents

Same message contents as defined in clause 7.4.4.3.

7.4_H.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4_H.5-1.

Table 7.4_H.5-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4	3 MHz	5 MHz	10	15	20

		MHz			MHz	MHz	MHz
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A Maximum input level for CA

7.4A.0 Minimum conformance requirements

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the maximum input level is defined with the uplink active on the band(s) other than the band whose downlink is being tested. For E-UTRA CA configurations including an operating band without uplink band or an operating band with an unpaired DL part, the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. The UE shall meet the requirements specified in subclause 7.4.3 for each component carrier while all downlink carriers are active.

For intra-band contiguous carrier aggregation maximum input level is defined as the powers received at the UE antenna port over the Transmission bandwidth configuration of each CC, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel over each component carrier.

The downlink SCC shall be configured at nominal channel spacing to the PCC. For FDD the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.4A.0-1 with the uplink configuration set according to Table 7.3A.0-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.3-2.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels over each component carrier as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4A.0-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements also apply for an SCC assigned in the unpaired part with parameters specified in Table 7.4A.0-1.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink sub-blocks, each larger than or equal to 5 MHz, the maximum input level requirements are defined with the uplink configuration in accordance with Table 7.3A.0-3. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in Table 7.4.3-1 and Table 7.4A.0-1 for one component carrier and two component carriers per sub-block, respectively. The throughput of each downlink component carrier shall be ≥ 95% of the maximum throughput of the specified reference measurement channel as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1). The requirements apply with all downlink carriers active.

Table 7.4A.0-1: Maximum input level for intra-band contiguous CA

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F

Power in largestTransmission Bandwidth Configuration CC	dBm		-28[2]	-25[2]	-25[2]	-26[2]	-27[2]
			-30[3]	-27[3]	-27[3]	[-28][3]	[-29][3]
Power in each other CC	dBm		-28 + 10log(N RB,c /N RB,largest BW) [2]	-25 + 10log(N RB,c /N RB,largest BW) [2]	-25 + 10log (N RB,c /N RB,largest BW) [2]	-26 + 10log (N RB,c /N RB,largest BW) [2]	-27 + 10log (N RB,c /N RB,largest BW) [2]
			-30+ 10log(N RB,c /N RB,largest BW) [3]	-27 + 10log(N RB,c /N RB,largest BW) [3]	-27 + 10log (N RB,c /N RB,largest BW) [3]	[-28] + 10log (N RB,c /N RB,largest BW) [3]	[-29] + 10log (N RB,c /N RB,largest BW) [3]
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in clause 6.2.5A.							
Note 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

For combinations of intra-band and inter-band carrier aggregation with up to five downlink carriers (up to two non-contiguous sub-blocks per band and up to four contiguously aggregated carriers per band) and one uplink assigned to one E-UTRA band, the requirement is defined with the uplink active in a band other than that supporting the downlink(s) under test. The uplink configuration shall be in accordance with Table 7.3A.0-3 when the uplink is active in the band supporting two non-contiguous component carriers, Table 7.3A.0-1 when the uplink is active in a band supporting two contiguous component carriers and in accordance with Table 7.3.3-2 when the uplink is active in a band supporting one carrier per band. The downlink PCC shall be configured closer to the uplink operating band than the downlink SCC(s) when the uplink is active in band(s) supporting contiguous aggregation of up to four component carriers. For these uplink configurations, the UE shall meet the maximum input-level requirements for intra-band non-contiguous carrier aggregation of two downlink sub-blocks, the requirements for intra-band contiguous carrier aggregation for the contiguously aggregated downlink carriers and for any remaining component carrier(s) the requirements specified in subclause 7.4.3. All downlink carriers shall be active throughout the tests and the requirements for the downlinks shall be met with the single uplink carrier active in each band capable of UL operation.

The normative references for this requirement are TS 36.101 [2] clauses 7.4.1A and 7.4.1.

7.4A.1 Maximum input level for CA (intra-band contiguous DL CA and UL CA)

Editor's note:

- Any restriction of the applicability of test points due to the supported UE category is under investigation

7.4A.1.1 Test purpose

Maximum input level for CA test verifies the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4A.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

7.4A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.0.

7.4A.1.4 Test description

7.4A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.4A.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.4A.1.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] clause 4.1				NC			
Test Frequencies as specified in TS36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2				Mid range			
Test CC Combination setting (N_{RB_agg}) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.				Lowest N_{RB_agg} Highest N_{RB_agg} (Note 3)			
Test Parameters for CA Configurations							
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
50	25	64-QAM	50+25	QPSK	25	P_25@25	S_0@0
50	50	64-QAM	50+50	QPSK	25	P_25@25	S_0@0
50	100	64-QAM	50+100	QPSK	150	P_50@0	S_100@0
75	50	64-QAM	75+50	QPSK	75	P_75@0	S_0@0
75	75	64-QAM	75+75	QPSK	75	P_75@0	S_0@0
75	75	64-QAM	75+75	QPSK	129	P_75@0	S_54@0
75	75	64-QAM	75+75	QPSK	150	P_75@0	S_75@0
100	25	64QAM	100+25	QPSK	50	P_50@0	S_0@0
100	25	64-QAM	100+25	QPSK	125	P_100@0	S_25@0
100	50	64-QAM	100+50	QPSK	75	P_75@25	S_0@0
100	50	64-QAM	100+50	QPSK	150	P_100@0	S_50@0
100	75	64-QAM	100+75	QPSK	175	P_100@0	S_75@0
100	100	64-QAM	100+100	QPSK	50	P_50@50	S_0@0
100	100	64-QAM	100+100	QPSK	75	P_75@25	S_0@0
100	100	64-QAM	100+100	QPSK	130	P_100@0	S_30@0
100	100	64-QAM	100+100	QPSK	200	P_100@0	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3A.0-1 is tested per CA Configuration Test CC combination. Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.32 as appropriate if the UE supports 2 Rx antennas or Figure A.80 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1

4. The UL and DL Reference Measurement channels are set according to Table 7.4A.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.4A.1.4.3.

7.4A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.4A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.4A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.4A.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the value defined in Table 7.4A.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:
The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.4A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.4A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$) for carrier frequency $3.0\text{GHz} < f \leq 4.2$GHz.
The SCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.4A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.4A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$) for carrier frequency $3.0\text{GHz} < f \leq 4.2$GHz.

7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.4A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.4A.1.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

Table 7.4A.1.4.3-2: UplinkPowerControlDedicatedSCell-r10

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH-r10	0		
deltaMCS-Enabled-r10	en0		
accumulationEnabled-r10	TRUE		
pSRS-Offset-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
pSRS-OffsetAp-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
filterCoefficient-r10	fc8	larger filter length is used to reduce the RSRP measurement variation	
pathlossReferenceLinking-r10	sCell		
}			

7.4A.1.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4A.1.5-1.

Table 7.4A.1.5-1: Maximum input level for intra-band contiguous CA

Rx Parameter	**Units**	**CA Bandwidth Class**					
		A	**B**	**C**	**D**	**E**	**F**
Power in largest Transmission Bandwidth Configuration CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0			
Power in each other CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -25.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)			
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two uplink carriers. Note 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.1_H Maximum input level for CA (intra-band contiguous DL CA and UL CA) for 256QAM in DL

7.4A.1_H.1 Test purpose

Same test purpose as in clause 7.4A.1.

7.4A.1_H.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward that support intra-band contiguous DL CA and UL CA and 256QAM in DL.

7.4A.1_H.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.0 with the following exceptions:

- Instead of Table 7.4A.0-1, use Table 7.4A.1_H.3-1.

Table 7.4A.1_H.3-1: Maximum input level for intra-band contiguous CA

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F
Power in largest Transmission Bandwidth Configuration CC	dBm		-28[2]	-25[2]	-25[2]		
			-30[3]	-27[3]	-27[3]		
Power in each other CC	dBm		-28+ 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) [2]	-25 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) [2]	-25 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) [2]		
			-30+ 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) [3]	-27 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) [3]	-27 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) [3]		
NOTE 1: The transmitter shall be set to 4dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A.							
NOTE 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
NOTE 3: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.1_H.4 Test description

7.4A.1_H.4.1 Initial conditions

Same initial conditions as in clause 7.4A.1.4.1 with the following exceptions:

- Instead of Table 7.4A.1.4.1-1, use Table 7.4A.1_H.4.1-1.

Table 7.4A.1_H.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] clause 4.1			NC				
Test Frequencies as specified in TS36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			Mid range				
Test CC Combination setting (N_{RB_agg}) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 3)				
Test Parameters for CA Configurations							
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
50	25	256-QAM	50+25	QPSK	25	P_25@25	S_0@0
50	50	256-QAM	50+50	QPSK	25	P_25@25	S_0@0
50	100	256-QAM	50+100	QPSK	150	P_50@0	S_100@0
75	50	256-QAM	75+50	QPSK	75	P_75@0	S_0@0
75	75	256-QAM	75+75	QPSK	75	P_75@0	S_0@0
75	75	256-QAM	75+75	QPSK	129	P_75@0	S_54@0
75	75	256-QAM	75+75	QPSK	150	P_75@0	S_75@0
100	25	256-QAM	100+25	QPSK	50	P_50@0	S_0@0
100	25	256-QAM	100+25	QPSK	125	P_100@0	S_25@0
100	50	256-QAM	100+50	QPSK	75	P_75@25	S_0@0
100	50	256-QAM	100+50	QPSK	150	P_100@0	S_50@0
100	75	256-QAM	100+75	QPSK	175	P_100@0	S_75@0
100	100	256-QAM	100+100	QPSK	50	P_50@50	S_0@0
100	100	256-QAM	100+100	QPSK	75	P_75@25	S_0@0
100	100	256-QAM	100+100	QPSK	130	P_100@0	S_30@0
100	100	256-QAM	100+100	QPSK	200	P_100@0	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3A.0-1 is tested per CA Configuration Test CC combination. Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.							

7.4A.1_H.4.2 Test procedure

Same test procedure as in clause 7.4A.1.4.2 with the following exceptions:

- Instead of Table 7.4A.1.4.1-1, use Table 7.4A.1_H.4.1-1.
- Instead of Table 7.4A.1.5-1, use 7.4A.1_H.5-1.
- Instead of DCI format 1A use DCI format 1.

7.4A.1_H.4.3 Message contents

Same message contents as defined in clause 7.4A.1.4.3.

7.4A.1_H.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4A.1_H.5-1.

Table 7.4A.1_H.5-1: Maximum input level for intra-band contiguous CA

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F
Power in largest Transmission Bandwidth Configuration CC	dBm		For carrier frequency f ≤ 3.0GHz: -30.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -31.0	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0			
Power in each other CC	dBm		For carrier frequency f ≤ 3.0GHz: -30.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -31.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -27.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)			
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two uplink carriers. Note 2: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.2 Maximum input level for CA (intra-band contiguous DL CA without UL CA)

Editor's note:

- Any restriction of the applicability of test points due to the supported UE category is under investigation

7.4A.2.1 Test purpose

Same test purpose as in clause 7.4A.1.1.

7.4A.2.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA. This test case applies only for CA Configurations that do not support UL CA.

7.4A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.0.

7.4A.2.4 Test description

7.4A.2.4.1 Initial conditions

Same initial conditions as in clause 7.4A.1.4.1 with the following exceptions:

- Instead of Table 7.4A.1.4.1-1 → use Table 7.4A.2.4.1-1.
- Instead of clause 7.4A.1.4.3 → use clause 7.4A.2.4.3.

Table 7.4A.2.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] clause 4.1	NC
Test Frequencies as specified in TS36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	B: Mid range C: Mid range (Note 4)
Test CC Combination setting (N_{RB_agg}) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest N_{RB_agg} Highest N_{RB_agg} (Notes 3, 4)

Test Parameters for CA Configurations

CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
6	25	64-QAM	6+25	QPSK	6	P_6@0	NA
15	50	64-QAM	15+50	QPSK	15	P_15@0	NA
25	25	64-QAM	25+25	QPSK	20	P_20@0	NA
25	25	64-QAM	25+25	QPSK	25	P_25@0	NA
25	50	64-QAM	25+50	QPSK	20	P_20@0	NA
25	100	64-QAM	25+100	QPSK	25	P_25@0	NA
50	25	64-QAM	50+25	QPSK	25	P_25@25	NA
50	50	64-QAM	50+50	QPSK	25	P_25@25	NA
50	50	64-QAM	50+50	QPSK	50	P_50@0	NA
50	75	64-QAM	50+75	QPSK	50	P_50@0	NA
75	25	64-QAM	75+25	QPSK	75	P_75@0	NA
75	50	64-QAM	75+50	QPSK	75	P_75@0	NA
75	75	64-QAM	75+75	QPSK	75	P_75@0	NA
100	25	64-QAM	100+25	QPSK	50	P_50@50	NA
100	25	64-QAM	100+25	QPSK	100	P_100@0	NA
100	50	64-QAM	100+50	QPSK	75	P_75@25	NA
100	50	64-QAM	100+50	QPSK	100	P_100@0	NA
100	75	64-QAM	100+75	QPSK	100	P_100@0	NA
100	100	64-QAM	100+100	QPSK	50	P_50@50	NA
100	100	64-QAM	100+100	QPSK	75	P_75@25	NA
100	100	64-QAM	100+100	QPSK	100	P_100@0	NA

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per CA Configuration Test CC combination.

Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.

Note 4: For CA_70C all test frequency IDs shall be tested according to table 4.3.1.1.70A-1, in TS 36.508 [7].

7.4A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.4A.2.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.4A.2.4.1-1 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCC to the value defined in Table 7.4A.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.4A.1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq 4.2$GHz, for at least the duration of the Throughput measurement.
7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.4A.2.4.3 Message contents

Same message contents as in clause 7.4.4.3.

7.4A.2.5 Test requirement

Same test requirements as in clause 7.4A.1.5 with the following exceptions:

- Instead of Table 7.4A.1.5-1 → use Table 7.4A.2.5-1.

Table 7.4A.2.5-1: Maximum input level for intra-band contiguous CA

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F
Power in largest Transmission Bandwidth Configuration CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0			
Power in each other CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 + $10\log(N_{RB,c}/N_{RB,largest\ BW})$ For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0 + $10\log(N_{RB,c}/N_{RB,largest\ BW})$	For carrier frequency f ≤ 3.0GHz: -25.7 + $10\log(N_{RB,c}/N_{RB,largest\ BW})$ For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 + $10\log(N_{RB,c}/N_{RB,largest\ BW})$			
Note 1: The transmitter shall be set to 4dB below PC_{MAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.2_H Maximum input level for CA (intra-band contiguous DL CA without UL CA) for 256QAM in DL

7.4A.2_H.1 Test purpose

Same test purpose as in clause 7.4A.2.1.

7.4A.2_H.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward that support intra-band contiguous DL CA and 256QAM in DL. This test case applies only for CA Configurations that do not support UL CA.

7.4A.2_H.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.1_H.3.

7.4A.2_H.4 Test description

7.4A.2_H.4.1 Initial conditions

Same initial conditions as in clause 7.4A.2.4.1 with the following exceptions:

- Instead of Table 7.4A.2.4.1-1, use Table 7.4A.2_H.4.1-1.
- Instead of clause 7.4A.2.4.3, use clause 7.4A.2_H.4.3.

Table 7.4A.2_H.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] clause 4.1			NC				
Test Frequencies as specified in TS36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			B: Mid range C: Mid range (Note 4)				
Test CC Combination setting (N_{RB_agg}) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Notes 3, 4)				
Test Parameters for CA Configurations							
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
6	25	256-QAM	6+25	QPSK	6	P_6@0	NA
15	50	256-QAM	15+50	QPSK	15	P_15@0	NA
25	25	256-QAM	25+25	QPSK	20	P_20@0	NA
25	25	256-QAM	25+25	QPSK	25	P_25@0	NA
25	50	256-QAM	25+50	QPSK	20	P_20@0	NA
25	100	256-QAM	25+100	QPSK	25	P_25@0	NA
50	25	256-QAM	50+25	QPSK	25	P_25@25	NA
50	50	256-QAM	50+50	QPSK	25	P_25@25	NA
50	50	256-QAM	50+50	QPSK	50	P_50@0	NA
50	75	256-QAM	50+75	QPSK	50	P_50@0	NA
75	25	256-QAM	75+25	QPSK	75	P_75@0	NA
75	50	256-QAM	75+50	QPSK	75	P_75@0	NA
75	75	256-QAM	75+75	QPSK	75	P_75@0	NA
100	25	256-QAM	100+25	QPSK	50	P_50@50	NA
100	25	256-QAM	100+25	QPSK	100	P_100@0	NA
100	50	256-QAM	100+50	QPSK	75	P_75@25	NA
100	50	256-QAM	100+50	QPSK	100	P_100@0	NA
100	75	256-QAM	100+75	QPSK	100	P_100@0	NA
100	100	256-QAM	100+100	QPSK	50	P_50@50	NA
100	100	256-QAM	100+100	QPSK	75	P_75@25	NA
100	100	256-QAM	100+100	QPSK	100	P_100@0	NA
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per CA Configuration Test CC combination. Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested. Note 4: For CA_70C all test frequency IDs shall be tested according to table 4.3.1.1.70A-1, in TS 36.508 [7].							

7.4A.2_H.4.2 Test procedure

Same test procedure as defined in clause 7.4A.2.4.2 with the following exceptions:

- Instead of Table 7.4A.2.4.1-1, use Table 7.4A.2_H.4.1-1.
- Instead of Table 7.4A.1.5-1, use Table 7.4A.2_H.5-1.
- Instead of DCI format 1A use DCI format 1.

7.4A.2_H.4.3 Message contents

Same message contents as defined in clause 7.4A.2.4.3.

7.4A.2_H.5 Test requirement

Same test requirements as in clause 7.4A.1.5 with the following exceptions:

- Instead of Table 7.4A.1.5-1, use Table 7.4A.2_H.5-1.

Table 7.4A.2_H.5-1: Maximum input level for intra-band contiguous CA

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F
Power in largest Transmission Bandwidth Configuration CC	dBm		For carrier frequency f ≤ 3.0GHz: -30.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -31.0	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0			
Power in each other CC	dBm		For carrier frequency f ≤ 3.0GHz: -30.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -31.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -27.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)			
Note 1: The transmitter shall be set to 4dB below PC_{MAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.3 Maximum input level for CA (inter-band DL CA without UL CA)

Editor's note:

- Any restriction of the applicability of test points due to the supported UE category is under investigation

7.4A.3.1 Test purpose

Same test purpose as in clause 7.4A.1.1

7.4A.3.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 2DL CA with FDD-TDD inter-band CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support DL LAA.

7.4A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.0.

7.4A.3.4 Test description

7.4A.3.4.1 Initial conditions

Same initial conditions as in clause 7.4A.1.4.1 with the following exceptions:

- Instead of Table 7.4A.1.4.1-1 → use Table 7.4A.3.4.1-1.

- Instead of clause 7.4A.1.4.3 → use clause 7.4A.3.4.3.

Table 7.4A.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	A: Mid range for PCC and SCC					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE	Highest N_{RB_agg} for PCC and SCC					
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**			**UL Allocation**	
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC N_{RB_alloc}**
50	50	64-QAM	50	50	QPSK	50
50	50	64-QAM	50	50	QPSK	25
50	50	64-QAM	50	50	QPSK	20
50	50	64-QAM	50	50	QPSK	16
50	75	64-QAM	50	75	QPSK	25
50	100	64-QAM	50	100	QPSK	50
50	100	64-QAM	50	100	QPSK	25
50	100	64-QAM	50	100	QPSK	20
50	100	64-QAM	50	100	QPSK	16
75	25	64-QAM	75	25	QPSK	75
75	25	64-QAM	75	25	QPSK	20
75	50	64-QAM	75	50	QPSK	25
75	75	64-QAM	75	75	QPSK	25
75	100	64-QAM	75	100	QPSK	25
100	50	64-QAM	100	50	QPSK	100
100	50	64-QAM	100	50	QPSK	75
100	50	64-QAM	100	50	QPSK	50
100	75	64-QAM	100	75	QPSK	100
100	75	64-QAM	100	75	QPSK	50
100	100	64-QAM	100	100	QPSK	100
100	100	64-QAM	100	100	QPSK	75
100	100	64-QAM	100	100	QPSK	50
100	100	64-QAM	100	100	QPSK	45
100	100	64-QAM	100	100	QPSK	25
100	100	64-QAM	100	100	QPSK	20

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.3.5-2 for UE supporting one uplink carrier is tested per Test CA configuration.
Note 3: The UL resource blocks shall be located as close as possible to the downlink PCC but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 4: The frequencies of PCC and SCC shall be switched and tested in each configuration, according to the UE declared capability for UL support (within CA operation) in the individual bands.

7.4A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.4A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.4A.3.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level to the value as defined in Table 7.4A.3.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.4A.3.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.
7. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex G.2.

7.4A.3.4.3 Message contents

Same message contents as in clause 7.4.4.3.

7.4A.3.5 Test requirement

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the maximum input level is defined with the uplink active on the band other than the band whose downlink is being tested, i.e. the requirements are tested only for the SCell downlink. The UE shall meet the requirement for each component carrier, when operated as SCell, while both downlink carriers are active.

The throughput measured during the test procedure for each component carrier, when operated as SCell, shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4A.3.5-1 (originated from the single carrier Table 7.4.5-1).

Table 7.4A.3.5-1: Maximum input level for inter-band DL CA without UL CA

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 For carrier frequency 4.2GHz < f ≤ 6.0GHz: -26.5					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.3_H Maximum input level for CA (inter-band DL CA without UL CA) for 256QAM in DL

7.4A.3_H.1 Test purpose

Same test purpose as in clause 7.4A.3.

7.4A.3_H.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward that support inter-band DL CA without UL CA and 256QAM in DL.

7.4A.3_H.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.1_H.3.

7.4A.3_H.4 Test description

7.4A.3_H.4.1 Initial conditions

Same initial conditions as in clause 7.4A.1.4.1 with the following exceptions:

- Instead of Table 7.4A.1.4.1-1 → use Table 7.4A.3_H.4.1-1.
- Instead of clause 7.4A.1.4.3 → use clause 7.4A.3_H.4.3.

Table 7.4A.3_H.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	A: Mid range for PCC and SCC
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE	Highest N_{RB_agg} for PCC and SCC

Test Parameters for CA Configurations

CA Configuration / N_{RB_agg}		DL Allocation			UL Allocation	
PCC N_{RB}	SCCs N_{RB}	CC MOD	PCC & SCC RB allocation		CC MOD	PCC N_{RB_alloc}
50	50	256-QAM	50	50	QPSK	50
50	50	256-QAM	50	50	QPSK	25
50	50	256-QAM	50	50	QPSK	20
50	50	256-QAM	50	50	QPSK	16
50	75	256-QAM	50	75	QPSK	25
50	100	256-QAM	50	100	QPSK	50
50	100	256-QAM	50	100	QPSK	25
50	100	256-QAM	50	100	QPSK	20
75	50	256-QAM	75	50	QPSK	25
75	75	256-QAM	75	75	QPSK	25
75	100	256-QAM	75	100	QPSK	25
100	50	256-QAM	100	50	QPSK	100
100	50	256-QAM	100	50	QPSK	75
100	50	256-QAM	100	50	QPSK	50
100	75	256-QAM	100	75	QPSK	100
100	75	256-QAM	100	75	QPSK	75
100	75	256-QAM	100	75	QPSK	50
100	100	256-QAM	100	100	QPSK	100
100	100	256-QAM	100	100	QPSK	75
100	100	256-QAM	100	100	QPSK	50
100	100	256-QAM	100	100	QPSK	45
100	100	256-QAM	100	100	QPSK	25
100	100	256-QAM	100	100	QPSK	20

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.3.5-2 for UE supporting one uplink carrier is tested per Test CA configuration.
Note 3: The UL resource blocks shall be located as close as possible to the downlink PCC but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 4: The frequencies of PCC and SCC shall be switched and tested in each configuration, according to the UE declared capability for UL support (within CA operation) in the individual bands.

7.4A.3_H.4.2 Test procedure

Same test procedure as in clause 7.4A.3.4.2 with the following exceptions:

- Instead of Table 7.4A.3.4.1-1 → use Table 7.4A.3_H.4.1-1.
- Instead of Table 7.4A.3.5-1 → use 7.4A.3_H.5-1.
- Instead of DCI format 1A use DCI format 1.

7.4A.3_H.4.3 Message contents

Same message contents as defined in clause 7.4A.3.4.3.

7.4A.3_H.5 Test requirement

Same test requirement as defined in clause 7.4A.3.5 with the following exceptions:

- Instead of Table 7.4A.3.5-1 → use 7.4A.3_H.5-1.

Table 7.4A.3_H.5-1: Maximum input level for inter-band CA

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1..							

7.4A.4 Maximum input level for CA (intra band non-contiguous DL CA without UL CA)

7.4A.4.1 Test purpose

Same as in clause 7.4A.1.1.

7.4A.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA but no UL CA.

7.4A.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.0.

7.4A.4.4 Test description

7.4A.4.4.1 Initial conditions

Same initial conditions as in clause 7.4A.1.4.1 with the following exceptions:

- Instead of Table 7.4A.1.4.1-1 → use Tables 7.4A.4.4.1-1.
- Instead of clause 7.4A.1.4.3 → use clause 7.4A.3.4.3.

Table 7.4A.4.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			A: N/A (Range is not relevant)				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.			Refer to test point				
Test Parameters for CA Configurations							
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC RB allocations (L_{CRB} @ RB_{start})**

Test Parameters for CA_2A-2A Configurations							
1	100	25	35	64QAM	100+25	QPSK	P_16@57
2	100	100	20	64QAM	100+100	QPSK	P_16@57
Test Parameters for CA_3A-3A Configurations							
1	100	25	50	64QAM	100+25	QPSK	P_16@50
2	100	25	15	64QAM	100+25	QPSK	P_32@68
3	100	100	35	64QAM	100+100	QPSK	P_16@50
Test Parameters for CA_4A-4A Configurations							
1	50	25	30	64QAM	50+25	QPSK	P_50@0
2[5]	50	50	25	64QAM	50+50	QPSK	P_50@0
3[6]	100	25	20	64QAM	100+25	QPSK	P_100@0
4[6]	100	100	5	64QAM	100+100	QPSK	P_100@0
Test Parameters for CA_5A-5A Configurations							
1	50	25	10	64QAM	50+25	QPSK	P_12@38
2	50	50	5	64QAM	50+50	QPSK	P_12@38
Test Parameters for CA_7A-7A Configurations							
1	100	75	35	64QAM	100+75	QPSK	P_36@64
2	100	75	15	64QAM	100+75	QPSK	P_50@50
3	100	100	30	64QAM	100+100	QPSK	P_32@68
4	100	100	15	64QAM	100+100	QPSK	P_45@55
Test Parameters for CA_23A-23A Configurations							
1	50	25	5	64QAM	50+25	QPSK	P_50@0
Test Parameters for CA_25A-25A Configurations							
1	50	25	50	64QAM	50+25	QPSK	P_10@33
2	50	25	15	64QAM	50+25	QPSK	P_32@18
3[3]	50	50	45	64QAM	50+50	QPSK	P_10@33
4[3]	50	50	10	64QAM	50+50	QPSK	P_32@18
5[4]	100	25	40	64QAM	100+25	QPSK	P_12@62
6[4]	100	100	25	64QAM	100+100	QPSK	P_12@62
Test Parameters for CA_41A-41A Configurations							
1[4]	100	25	169	64QAM	100+25	QPSK	P_100@0
2[3]	100	50	164	64QAM	100+50	QPSK	P_100@0
3	100	100	154	64QAM	100+100	QPSK	P_100@0
Test Parameters for CA_42A-42A Configurations							
1	100	25	175	64QAM	100+25	QPSK	P_100@0
2	100	100	160	64QAM	100+100	QPSK	P_100@0
Test Parameters for CA_66A-66A Configurations							
1	100	25	65	64QAM	100+25	QPSK	P_100@0
2	100	100	50	64QAM	100+100	QPSK	P_100@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.
Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.
Note 3: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration
Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration
Note 5: Applicable if only Bandwidth Combination Set 1 is supported by the UE for the CA Configuration

Note 6:	Not applicable if only Bandwidth Combination Set 1 is supported by the UE for the CA Configuration

7.4A.4.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.4A.4.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.4A.4.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.4A.4.4.1-1 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCC to the value defined in Table 7.4A.4.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.4A.4.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.
7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.4A.4.4.3 Message contents

Same message contents as in clause 7.4.4.3.

7.4A.4.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4A.4.5-1 (originated from the single carrier Table 7.4.5-1).

Table 7.4A.4.5-1: Maximum input level for intra band non-contiguous DL CA without UL CA

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.4_H Maximum input level for CA (intra band non-contiguous DL CA without UL CA) for 256QAM in DL

7.4A.4_H.1 Test purpose

Same as in clause 7.4A.1.1.

7.4A.4_H.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward that support intra-band non-contiguous DL CA but no UL CA and 256QAM in DL.

7.4A.4_H.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.1_H.3

7.4A.4_H.4 Test description

7.4A.4_H.4.1 Initial conditions

Same initial conditions as defined in clause 7.4A.1.4.1 with the following exceptions:

- Instead of Table 7.4A.1.4.1-1 → use Tables 7.4A.4_H.4.1-1.
- Instead of clause 7.4A.1.4.3 → use clause 7.4A.3.4.3.

Table 7.4A.4_H.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1				NC			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2				A: N/A (Range is not relevant)			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.				Refer to test point			
Test Parameters for CA Configurations							
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC RB allocations (L_{CRB} @ RB_{start})**

Test Parameters for CA_2A-2A Configurations							
1	100	25	35	256QAM	100+25	QPSK	P_16@57
2	100	100	20	256QAM	100+100	QPSK	P_16@57
Test Parameters for CA_3A-3A Configurations							
1	100	25	50	256QAM	100+25	QPSK	P_16@50
2	100	25	15	256QAM	100+25	QPSK	P_32@68
3	100	100	35	256QAM	100+100	QPSK	P_16@50
Test Parameters for CA_4A-4A Configurations							
1	50	25	30	256QAM	50+25	QPSK	P_50@0
2[5]	50	50	25	256QAM	50+50	QPSK	P_50@0
3[6]	100	25	20	256QAM	100+25	QPSK	P_100@0
4[6]	100	100	5	256QAM	100+100	QPSK	P_100@0
Test Parameters for CA_5A-5A Configurations							
1	50	25	10	256QAM	50+25	QPSK	P_12@38
2	50	50	5	256QAM	50+50	QPSK	P_12@38
Test Parameters for CA_7A-7A Configurations							
1	100	75	35	256QAM	100+75	QPSK	P_36@64
2	100	75	15	256QAM	100+75	QPSK	P_50@50
3	100	100	30	256QAM	100+100	QPSK	P_32@68
4	100	100	15	256QAM	100+100	QPSK	P_45@55
Test Parameters for CA_23A-23A Configurations							
1	50	25	5	256QAM	50+25	QPSK	P_50@0
Test Parameters for CA_25A-25A Configurations							
1	50	25	50	256QAM	50+25	QPSK	P_10@33
2	50	25	15	256QAM	50+25	QPSK	P_32@18
3[3]	50	50	45	256QAM	50+50	QPSK	P_10@33
4[3]	50	50	10	256QAM	50+50	QPSK	P_32@18
5[4]	100	25	40	256QAM	100+25	QPSK	P_12@62
6[4]	100	100	25	256QAM	100+100	QPSK	P_12@62
Test Parameters for CA_41A-41A Configurations							
1[4]	100	25	169	256QAM	100+25	QPSK	P_100@0
2[3]	100	50	164	256QAM	100+50	QPSK	P_100@0
3	100	100	154	256QAM	100+100	QPSK	P_100@0
Test Parameters for CA_42A-42A Configurations							
1	100	25	175	256QAM	100+25	QPSK	P_100@0
2	100	100	160	256QAM	100+100	QPSK	P_100@0
Test Parameters for CA_66A-66A Configurations							
1	100	25	65	256QAM	100+25	QPSK	P_100@0
2	100	100	50	256QAM	100+100	QPSK	P_100@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.

Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.

Note 3: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration

Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration

Note 5: Applicable if only Bandwidth Combination Set 1 is supported by the UE for the CA Configuration

Note 6:	Not applicable if only Bandwidth Combination Set 1 is supported by the UE for the CA Configuration

7.4A.4_H.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.4A.4_H.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer 3GPP TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer 3GPP TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Table 7.4A.4_H.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.4A.4_H.4.1-1 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCC to the value defined in Table 7.4A.4_H.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:
   The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.4A.4_H.5-1), for carrier frequency f $\leq$ 3.0GHz,
   or within (+0dB, -4 dB) of (target level in Table 7.4A.4_H.5-1) for carrier frequency 3.0GHz < f $\leq$ 4.2GHz.
7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.4A.4_H.4.3 Message contents

Same message contents as defined in clause 7.4.4.3.

7.4A.4_H.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4A.4_H.5-1 (originated from the single carrier Table 7.4.5-1).

Table 7.4A.4_H.5-1: Maximum input level for intra band non-contiguous DL CA without UL CA

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.5 Maximum input level for 3DL CA

7.4A.5.1 Test purpose

Maximum input level for CA test verifies the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4A.5.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support 3DL with Intra-band contiguous CA or 3DL with Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 3DL with FDD-TDD CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 3DL CA involving Band 46.

7.4A.5.3 Minimum conformance requirements

The Minimum conformance requirements are defined in clause 7.4A.0.

7.4A.5.4 Test description

7.4A.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in tables of 5.4.2A.1 as applicable. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.4A.5.4.1-1 to 7.4A.5.4.1-2. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.4A.5.4.1-1: Test Configuration Table

Initial Conditions	
est Environment as specified in TS 36.508[7] subclause 4.1	NC
est Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA andwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
est CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA onfiguration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
etwork signalling value	NS_01 by default

Test Parameters for CA Configurations

	PCC				SCC1				SCC2			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLallo
Default Test Settings for a CA_XD Configuration (Intra-band contiguous)												
	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All RBs
	QPSK	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowes N_{RB_ag}
	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highes N_{RB_ag}
Default Test Settings for a CA_XA-YA-ZA Configuration (Inter-band)												
	X	Mid	REFSENS	All RBs	Y	Mid	N/A	All RBs	Z	Mid	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highes N_{RB}
	Y	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Z	Mid	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highes N_{RB}
	Z	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highes N_{RB}
Default Test Settings for CA_XB-YA and CA_XC-YA Configuration (Intra-band contiguous + Inter-band)												
	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Highes N_{RB}
	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highes N_{RB}
	Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowes N_{RB_ag}
	Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highes N_{RB_ag}
Default Test Settings for CA_XA-YB and CA_XA-YC Configuration (Intra-band contiguous + Inter-band)												
	Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highes N_{RB}
	Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Highes N_{RB}
	X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highes N_{RB_ag}
	X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowes N_{RB_ag}

ote 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration, The applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
ote 2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
ote 3: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individu band within the CA Configuration, test points with that individual band as PCC are not applicable.
ote 4: **Intra-band contiguous:** X corresponds to the band in the CA Configuration. E.g. for CA_41D, X=41
ote 5: **Inter-band:** X,Y,Z correspond to the 1st, 2nd and 3rd band in the CA Configuration. E.g. for CA_1A-3A-19A, X=1, Y=3, Z=19
ote 6: **Intra-band contiguous + Inter-band:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1C-3A, X=1 and Y=
ote 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3. 2.
ote 8: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
ote 9: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choos the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
ote 10: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.4A.5.4.1-2: Test Configuration Table with W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

D	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for CA_XA-XA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	X	CC2	REFSENS	All RBs	Max	X	CC1	N/A	All RBs	-	Y	Mid	N/A	All RBs
	QPSK	64-QAM				N/A	64-QAM				N/A	64-QAM		
2	Y	Mid	REFSENS	All RBs	-	X	CC2	N/A	All RBs	Max	X	CC1	N/A	All RBs
	QPSK	64-QAM				N/A	64-QAM				N/A	64-QAM		
Default Test Settings for CA_XA-YA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	Y	CC2	REFSENS	All RBs	Max	Y	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	64-QAM				N/A	64-QAM				N/A	64-QAM		
2	X	Mid	REFSENS	All RBs	-	Y	CC2	N/A	All RBs	Max	Y	CC1	N/A	All RBs
	QPSK	64-QAM				N/A	64-QAM				N/A	64-QAM		
Group Test Settings for CA_66A-66A-XA or CA_XA-66A-66A Configurations (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	64-QAM		100		N/A	64-QAM		100		N/A	64-QAM		Highes NRB
2	X	Mid	REFSENS	All RBs	-	66	CC1	N/A	All RBs	50	66	CC2	N/A	All RBs
	QPSK	64-QAM		Highest NRB		N/A	64-QAM		100		N/A	64-QAM		100
Test Settings for CA_29A-66A-66A Configuration (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	29	Mid	N/A	All RBs
	QPSK	64-QAM		100		N/A	64-QAM		100		N/A	64-QAM		50
Test Settings for a CA_41C-41A Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	41	CC3	100@0	All RBs	134.2	41	CC2	N/A	All RBs	-	41	CC1	N/A	All RBs
	QPSK	64-QAM		100		N/A	64-QAM		100		N/A	64-QAM		100
Test Settings for a CA_41A-41C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
2	41	CC3	100@0	All RBs	-	41	CC2	N/A	All RBs	134.2	41	CC1	N/A	All RBs
	QPSK	64-QAM		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_66A-66C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	66	CC1	100@0	All RBs	30.2	66	CC2	N/A	All RBs	-	66	CC3	N/A	All RBs
	QPSK	64-QAM		100		N/A	64-QAM		100		N/A	64-QAM		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band non-contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: **Intra-band non-contiguous + Intra-band contiguous:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band non-contiguous + Inter-band:** X and Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A,X=2,Y=5
Note 6: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A,X=41.
Note 7: **Intra-band non-contiguous + Inter-band:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RE allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 10: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.55.
2. The parameter settings for the cell are set up according to TS 36.50 if the UE supports 2 Rx antennas or Figure A.80 if the UE supports 4 Rx antennas in the band.8 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Tables 7.4A.5.4.1-1 to 7.4A.5.4.1-2.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.4A.5.4.3.

7.4A.5.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.4A.5.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer to TS 36.321 [13] clauses 5.13 and 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clause 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.4A.5.4.1-1 to 7.4A.5.4.1-5 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.4A.5.4.1-1 to 7.4A.5.4.1-2 as appropriate on PCC. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCCs to the value defined in Table 7.4A.5.5-2 or 7.4A.5.5-3 according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq 3.0$GHz
or within +0dB, -4 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.
7. Measure the average throughput for the carrier(s) indicated in table 7.4A.5.4.2-1 for duration sufficient to achieve statistical significance according to Annex G.2A.
8. Repeat steps 6 to 7 for all component carriers indicated in Table 7.4A.5.4.2-1.

Table 7.4A.5.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2	7.4A.5.5-1
	2		
Inter-band	1	SCC1	7.4A.5.5-2
		SCC2	
	2	SCC1	
		SCC2	
	3	SCC1	
		SCC2	
Intra-band contiguous + Inter-band	1	SCC2	7.4A.5.5-2
	2		
	3	SCC1, SCC2	7.4A.5.5-1
	4		
Intra-band non-contiguous + Inter-band	1	SCC2	7.4A.5.5-2
	2	SCC1	
		SCC2	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.4A.5.5-2
		SCC1, SCC2	7.4A.5.5-1
	2	PCC, SCC1	7.4A.5.5-1
		SCC2	7.4A.5.5-2

Note 1: Test point ID for the particular CA configuration as defined in section 7.4A.5.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.4A.5.4.3 Message contents

Same message contents as in clause 7.4.4.3 for without UL CA.

Same message contents as in clause 7.4A.1.4.3 for UL CA.

7.4A.5.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.4A.5.5-1 and 7.4A.5.5-2, as applicable.

Table 7.4A.5.5-1: Maximum input level for 3DL CA (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F

Power in largest Transmission Bandwidth Configuration CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0		
Power in each other CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -25.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -25.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)		
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier. Note 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.4A.5.5-2: Maximum input level for 3DL CA (Inter-band), per CC

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.5_H Maximum input level for 3DL CA for 256QAM in DL

7.4A.5_H.1 Test purpose

Same test purpose as in clause 7.4A.5.1.

7.4A.5_H.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward that support 256QAM in DL and 3DL CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 256QAM in DL and 3DL CA involving Band 46.

7.4A.5_H.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.4A.1_H.3.

7.4A.5_H.4 Test description

7.4A.5_H.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in tables of 5.4.2A.1 as applicable. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.4A.5_H.4.1-1 to 7.4A.5_H.4.1-5. The details of the uplink and downlink reference measurement channels (RMCs) are specified in clauses A.2 and A.3 respectively. The details of the OCNG patterns used are specified in clause A.5. Configurations of PDSCH and PDCCH before measurement are specified in clause C.2.

Table 7.4A.5_H.4.1-1: Test Configuration Table (Intra-band contiguous)

Initial Conditions													
Test Environment as specified in TS 36.508 [7] subclause 4.1								NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.								For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.								Refer to “PCC NRB” and “SCCs NRB” columns					
Network signalling value								NS_01 by default					
Test Parameters for CA Configurations													
ID	**CA Configuration / N_{RB_agg}**							**DL Allocation**				**UL Allocation** (Note 4)	
	CA Configuration					**PCC N_{RB}**	**SCCs N_{RB}**		**CC MOD**	**PCC & SCCs RB allocation**		**CC MOD**	**PCC L_{CRB} @ RB_{start}**
	Band	**Range**	**PCC CC**	**SCC1 CC**	**SCC2 CC**		**SCC1**	**SCC2**		**PCC**	**SCC1**	**SCC2**		
Default Test Settings for a CA_XD Configuration													
1	X	Mid	CC1	CC2	CC3	Lowest N_{RB_agg}			256-QAM	All RBs			QPSK	REFSENS
2	X	Mid	CC1	CC2	CC3	Highest N_{RB_agg}			256-QAM	All RBs			QPSK	REFSENS

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration, The applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: X corresponds to the band in the CA Configuration. E.g. for CA_41D, X=41.
Note 4: REFSENS refers to the PCC band’s and PCC N_{RB} ‘s single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 5: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.

Table 7.4A.5_H.4.1-2: Test Configuration Table (Inter-band)

Initial Conditions														
Test Environment as specified in TS 36.508 [7] subclause 4.1							NC							
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.							For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns							
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.							Refer to “PCC NRB” and “SCCs NRB” columns							
Network signalling value							NS_01 by default							
Test Parameters for CA Configurations														
ID	**CA Configuration / N_{RB_agg}**									**DL Allocation**			**UL Allocation** (Note 5)	
	CA Configuration						**PCC N_{RB}**	**SCCs N_{RB}**		**CC MOD**	**PCC & SCCs RB allocation**		**CC MOD**	**PCC L_{CRB} @ RB_{start}**
	PCC		**SCC1**		**SCC2**			**SCC1**	**SCC2**		**PCC**	**SCC1**	**SCC2**		
	Band	**Range**	**Band**	**Range**	**Band**	**Range**								
Default Test Settings for a CA_XA-YA-ZA Configuration														
1	X	Mid	Y	Mid	Z	Mid	Highest N_{RB}	Highest N_{RB}	Highest N_{RB}	256-QAM	All RBs		QPSK	REFSENS
2	Y	Mid	X	Mid	Z	Mid	Highest N_{RB}	Highest N_{RB}	Highest N_{RB}	256-QAM	All RBs		QPSK	REFSENS
3	Z	Mid	X	Mid	Y	Mid	Highest N_{RB}	Highest N_{RB}	Highest N_{RB}	256-QAM	All RBs		QPSK	REFSENS

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration. The applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2a.
Note 2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: X,Y,Z correspond to the 1st, 2nd and 3rd band in the CA Configuration. E.g. for CA_1A-3A-19A, X=1, Y=3, Z=19
Note 5: REFSENS refers to the PCC band’s and PCC N_{RB}‘s single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.

Table 7.4A.5_H.4.1-3: Test Configuration Table (Intra-band contiguous + Inter-band)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to "PCC NRB" and "SCCs NRB" columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	CA Configuration / N_{RB_agg}								DL Allocation				UL Allocation (Note 2,3)	
	CA Configuration						PCC N_{RB}	SCCs N_{RB}	CC MOD	PCC & SCCs RB allocation			CC MOD	PCC L_{CRB} @ RB_{start}
	PCC		SCC1		SCC2									
	Band	Range /CC	Band	Range /CC	Band	Range /CC		SCC1 SCC2		PCC	SCC1	SCC2		
Default Test Settings for CA_XB-YA and CA_XC-YA Configuration														
1	X	Mid /CC1	X	Mid /CC2	Y	Mid	Lowest N_{RB_agg}	Highest N_{RB}	256-QAM	All RBs			QPSK	REFSENS
2	X	Mid /CC1	X	Mid /CC2	Y	Mid	Highest N_{RB_agg}	Highest N_{RB}	256-QAM	All RBs			QPSK	REFSENS
3	Y	Mid	X	Mid /CC1	X	Mid /CC2	Highest N_{RB}	Lowest N_{RB_agg}	256-QAM	All RBs			QPSK	REFSENS
4	Y	Mid	X	Mid /CC1	X	Mid /CC2	Highest N_{RB}	Highest N_{RB_agg}	256-QAM	All RBs			QPSK	REFSENS
Default Test Settings for CA_XA-YB and CA_XA-YC Configuration														
1	Y	Mid /CC1	Y	Mid /CC2	X	Mid	Highest N_{RB_agg}	Highest N_{RB}	256-QAM	All RBs			QPSK	REFSENS
2	Y	Mid /CC1	Y	Mid /CC2	X	Mid	Lowest N_{RB_agg}	Highest N_{RB}	256-QAM	All RBs			QPSK	REFSENS
3	X	Mid	Y	Mid /CC1	Y	Mid /CC2	Highest N_{RB}	Highest N_{RB_agg}	256-QAM	All RBs			QPSK	REFSENS
4	X	Mid	Y	Mid /CC1	Y	Mid /CC2	Highest N_{RB}	Lowest N_{RB_agg}	256-QAM	All RBs			QPSK	REFSENS

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use the Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1C-3A, X=1 and Y=3
Note 5: REFSENS refers to the PCC band's and PCC N_{RB}'s single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 6: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.4A.5_H.4.1-4: Test Configuration Table (Intra-band non-contiguous + Inter-band)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	CA Configuration / N_{RB_agg}								DL Allocation				UL Allocation (Note 2,3)	
	CA Configuration								CC MOD	PCC & SCCs			CC MOD	PCC
	PCC		W_{gap} [MHz]	SCC1		W_{gap} [MHz]	SCC2			RB allocation				L_{CRB} @ RB_{sta}
	Band	Range /CC		Band	Range /CC		Band	Range /CC		PCC	SCC1	SCC2		
Group Test Settings for CA_66A-66A-XA or CA_XA-66A-66A Configurations														
1	66	CC1	50	66	CC2	-	X	Mid	256-QAM	All RBs			QPSK	100@0
2	X	Mid	-	66	CC1	50	66	CC1	256-QAM	All RBs			QPSK	100@0
Default Test Settings for CA_XA-XA-YA Configurations														
1	X	CC2	Max	X	CC1	-	Y	Mid	256-QAM	All RBs			QPSK	REFSENS
2	Y	Mid	-	X	CC2	Max	X	CC1	256-QAM	All RBs			QPSK	REFSENS
Default Test Settings for CA_XA-YA-YA Configurations														
1	Y	CC2	Max	Y	CC1	-	X	Mid	256-QAM	All RBs			QPSK	REFSENS
2	X	Mid	-	Y	CC2	Max	Y	CC1	256-QAM	All RBs			QPSK	REFSENS

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: X and Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A,X=2,Y=5
Note 5: REFSENS refers to the PCC band’s and PCC N_{RB}‘s single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.

Table 7.4A.5_H.4.1-5: Test Configuration Table (Intra-band non-contiguous + Intra-band contiguous)

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to "Range" columns. For mapping within band refer to "CC" columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to "PCC NRB" and "SCCs NRB" columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	CA Configuration / N_{RB_agg}									DL Allocation				UL Allocation (Note 2,3)	
	CA Configuration						PCC N_{RB}	SCCs N_{RB}		CC MOD	PCC & SCCs RB allocation			CC MOD	PCC L_{CRB} @ RB_{start}
	Band	PCC	W_{gap} [MHz]	SCC1	W_{gap} [MHz]	SCC2		SCC1	SCC2		PCC	SCC1	SCC2		
		CC		CC		CC									
Test Settings for a 41A-41C Configuration															
1	41	CC3	134.2	CC2	-	CC1	100	100	100	256-QAM	All RBs			QPSK	100@0
Test Settings for a CA_41C-41A Configuration															
2	41	CC3	-	CC2	134.2	CC1	100	100	100	256-QAM	All RBs			QPSK	100@0
Test Settings for a CA_66A-66C Configuration															
1	66	CC1	30.2	CC2	-	CC3	100	100	100	256-QAM	All RBs			QPSK	100@0

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A,X=41.
Note 5: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 6: If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.55 if the UE supports 2 Rx antennas or Figure A.80 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to clauses C.0, C.1 and C.3.1, and uplink signals according to clauses H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Tables 7.4A.5_H.4.1-1.
5. Propagation conditions are set according to clause B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.4A.5_H.4.3.

7.4A.5_H.4.2 Test procedure

1. Configure SCCs according to clauses C.0, C.1 and clause C.3.1 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.4A.5_H.4.3

3. SS activates SCCs by sending the activation MAC-CE (Refer to TS 36.321 [13] clauses 5.13 and 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clause 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Table 7.4A.5_H.4.1-1 to 7.4A.5_H.4.1-5 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.4A.5_H.4.1-1 to 7.4A.5_H.4.1-5 as appropriate on PCC. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCCs to the value defined in Table 7.4A.5_H.5-1 or 7.4A.5_H.5-2 according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within (+0dB, -3.4dB) of the target level for carrier frequency $f \leq 3.0$GHz or within (+0dB, -4dB) of the target level for carrier frequency 3.0GHz < $f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

7. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to clause G.2A.

8. Repeat steps 6 to 7 for all component carriers indicated in Table 7.4A.5_H.4.2-1.

Table 7.4A.5_H.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2	7.4A.5_H.5-1
	2		
Inter-band	1	SCC1	7.4A.5_H.5-2
		SCC2	
	2	SCC1	
		SCC2	
	3	SCC1	
		SCC2	
Intra-band contiguous + Inter-band	1	SCC2	7.4A.5_H.5-2
	2		
	3	SCC1, SCC2	7.4A.5_H.5-1
	4		
Intra-band non-contiguous + Inter-band	1	SCC2	7.4A.5_H.5-2
	2	SCC1	
		SCC2	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.4A.5_H.5-2
		SCC1, SCC2	7.4A.5_H.5-1
	2	PCC, SCC1	7.4A.5_H.5-1
		SCC2	7.4A.5_H.5-2

Note 1: Test point ID for the particular CA configuration as defined in section 7.4A.5_H.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.4A.5_H.4.3 Message contents

Same message contents as defined in clause 7.4A.5.4.3.

7.4A.5_H.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Table 7.4A.5_H.5-1 and Table 7.4A.5_H.5-2.

Table 7.4A.5_H.5-1: Maximum input level for 3DL CA (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F
Power in largest Transmission Bandwidth Configuration CC	dBm		For carrier frequency f ≤ 3.0GHz: -30.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -31.0	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0		
Power in each other CC	dBm		For carrier frequency f ≤ 3.0GHz: -30.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -31.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -27.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -27.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)		
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in clause 6.2.5 for one uplink carrier. Note 2: Reference measurement channel is clause A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in clauses A.5.1.1/A.5.2.1.							

Table 7.4A.5_H.5-2: Maximum input level for 3DL CA (Inter-band), per CC

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.6

7.4A.7 Maximum input level for 4DL CA

7.4A.7.1 Test purpose

Maximum input level for CA test verifies the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4A.7.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 4DL with TDD Intra-band contiguous CA, or 4DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 4DL with Intra-band non-contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 4DL CA with FDD-TDD CA.

7.4A.7.3 Minimum conformance requirements

The Minimum conformance requirements are defined in clause 7.4A.0.

7.4A.7.4 Test description

7.4A.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in tables of 5.4.2A.1 as applicable. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.4A.7.4.1-1 to 7.4A.7.4.1-2. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.4A.7.4.1-1: Test Configuration Table

Initial Conditions																
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC															
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns															
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns															
Network signalling value	NS_01 by default															
Test Parameters for CA Configurations																
ID	**PCC**				**SCC1**				**SCC2**				**SCC3**			
	Band	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**	
	UL MOD	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**
Default Test Settings for a CA_XE Configuration (Intra-band contiguous)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA Configuration (Inter-band)																
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
4	R	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
Default Test Settings for CA_XB-YA-ZA and CA_XC-YA-ZA Configuration (Intra-band contiguous + Inter-band)																

Default Test Settings for CA_YA-XB-ZA and CA_YA-XC-ZA Configuration (Intra-band contiguous + Inter-band) Default Test Settings for CA_YA-ZA-XB and CA_YA-ZA-XC Configuration (Intra-band contiguous + Inter-band)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
3	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
4	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}
5	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}
Default Test Settings for CA_XC-YC Configuration (Intra-band contiguous + Inter-band(2))																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}
3	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
4	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41E, X=41.
Note 6: **Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-8A,X=1,Y=3,Z=7,R=8.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 11: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.4A.7.4.1-2: Test Configuration Table with Wgap

Initial Conditions																				
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC, TL/VL, TL/VH, TH/VL, TH/VH														
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.						For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns														
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Highest N_{RB}														
Network signalling value						NS_01 by default														
Test Parameters for CA Configurations																				
ID	**PCC**				**W_{gap} [MHz]**	**SCC1**				**W_{gap} [MHz]**	**SCC2**				**W_{gap} [MHz]**	**SCC3**				
	Band	**Range**	**NRB**			**Band**	**Range**	**NRB**			**Band**	**Range**	**NRB**			**Band**	**Range**	**NRB**		
	UL MOD	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	
Default Test Settings for CA_XA-XA-YA-ZA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-XA-XA-ZA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																				
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}	
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}	
3	Z	Mid	REFSENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}	
Default Test Settings for CA_XA-XD/XD-XA/XC-XC Configurations (Intra-band non-contiguous + Intra-band contiguous)																				
TBD																				
Default Test Settings for CA_XA-XA-YA-YA Configurations (Intra-band non-contiguous + Intra-band non-contiguous)																				
1	X	CC4	REFSENS	ALL RBs	Max	X	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs	
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}	

2	Y	CC4	REFSENS	ALL RBs	Max	Y	CC3	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band non-contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-12A,X=2,Y=4,Z=12.
Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A-41A,X=41.
Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-4A,X=2,Y=4.
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 9: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.55.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Tables 7.4A.7.4.1-1 to 7.4A.7.4.1-2.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.4A.7.4.3.

7.4A.7.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.4A.7.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer to TS 36.321 [13] clauses 5.13 and 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clause 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.4A.7.4.1-1 to 7.4A.7.4.1-6 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.4A.7.4.1-1 to 7.4A.7.4.1-2 as appropriate on PCC. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCCs to the value defined in Table 7.4A.7.5-2 or 7.4A.7.5-3 according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq 3.0$GHz
   or within +0dB, -4 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.
7. Measure the average throughput for the carrier(s) indicated in table 7.4A.7.4.2-1 for duration sufficient to achieve statistical significance according to Annex G.2A.
8. Repeat steps 6 to 7 for all component carriers indicated in Table 7.4A.7.4.2-1.

Table 7.4A.7.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3	7.4A.7.5-1
	2		
Inter-band	1	SCC1	7.4A.7.5-2
		SCC2	
		SCC3	
	2	SCC1	
		SCC2	
		SCC3	
	3	SCC1	
		SCC2	
		SCC3	
	4	SCC1	
		SCC2	
		SCC3	
Intra-band contiguous + Inter-band	1	SCC2 SCC3	7.4A.7.5-2
	2		
	3	SCC1, SCC2, SCC3	7.4A.7.5-1 7.4A.7.5-2
	4		
	5	SCC1, SCC2, SCC3	7.4A.7.5-2 7.4A.7.5-1
	6		
Intra-band contiguous + Inter-band(2)	1	SCC2 SCC3	7.4A.7.5-1 7.4A.7.5-2
	2		
	3		
	4		
Intra-band non-contiguous + Inter-band	1	SCC2, SCC3	7.4A.7.5-2
	2	SCC1,	7.4A.7.5-2
		SCC2	
		SCC3	
	3	SCC1,	7.4A.7.5-2
		SCC2	
		SCC3	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.4A.7.5-2
		SCC1, SCC2, SCC3	7.4A.7.5-1
	2	SCC2	7.4A.7.5-1
		PCC, SCC1, SCC3	7.4A.7.5-2 7.4A.7.5-1
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC2 SCC3	7.4A.7.5-2
	2		

Note 1: Test point ID for the particular CA configuration as defined in section 7.4A.7.4.1.

Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.

Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.4A.7.4.3 Message contents

Same message contents as in clause 7.4.4.3 for without UL CA.

Same message contents as in clause 7.4A.1.4.3 for UL CA.

7.4A.7.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.4A.7.5-1 to 7.4A.7.5-5, as applicable.

Table 7.4A.7.5-1: Maximum input level for 4DL CA (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F
Power in largest Transmission Bandwidth Configuration CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0	For carrier frequency f ≤ 3.0GHz: -26.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -27.0	
Power in each other CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -25.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -25.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -26.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -27.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier. Note 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.4A.7.5-2: Maximum input level for 4DL CA (Inter-band), per CC

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4A.8 Maximum input level for 5DL CA

7.4A.8.1 Test purpose

Maximum input level for CA test verifies the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4A.8.2 Test applicability

This test case also applies to all types of E-UTRA UE release 11 and forward that support 5DL with Intra-band non-contiguous CA or 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA, or 5DL with Intra-band non-contiguous and Intra-band non-contiguous CA, or 5DL with Intra-band contiguous and Intra-band contiguous CA..

This test case applies to all types of E-UTRA UE release 12 and forward that support 5DL with TDD Intra-band contiguous CA, or 5DL with Inter-band CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 5DL CA with FDD-TDD CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 5DL CA involving Band 46.

7.4A.8.3 Minimum conformance requirements

The Minimum conformance requirements are defined in clause 7.4A.0.

7.4A.8.4 Test description

7.4A.8.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in tables of 5.4.2A.1 as applicable. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.4A.8.4.1-1 to 7.4A.8.4.1-2. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.4A.8.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3				SCC4			
	Band	Range	NRB		Range	NRB	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc	UL MOD	DL MOD	ULalloc	DLalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for a CA_XF Configuration (Intra-band contiguous)																				
1	X	Mid/CC 1	REFSENS	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	X	Mid/CC 3	N/A	ALL RBs	X	Mid/CC 4	N/A	ALL RBs	X	Mid/CC 5	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}	N/A	64-QAM		Lowest N_{RB_agg}
2	X	Mid/CC 1	REFSENS	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	X	Mid/CC 3	N/A	ALL RBs	X	Mid/CC 4	N/A	ALL RBs	X	Mid/CC 5	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}	N/A	64-QAM		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA-SA Configuration (Inter-band)																				
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
4	R	Mid	REFSEN	ALL	X	Mid	N/A	ALL	Y	Mid	N/A	ALL	Z	Mid	N/A	ALL	S	Mid	N/A	ALL

			S	RBs				RBs				RBs				RBs				RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
5	S	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
Default Test Settings for CA_XE-YA Configuration (Intra-band contiguous + Inter-band)																				
1	X	Mid/CC 1	REFSENS	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	X	Mid/CC 3	N/A	ALL RBs	X	Mid/CC 4	N/A	ALL RBs	Y	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
2	X	Mid/CC 1	REFSENS	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	X	Mid/CC 3	N/A	ALL RBs	X	Mid/CC 4	N/A	ALL RBs	Y	Mid	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}
3	Y	Mid	REFSENS	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	X	Mid/CC 3	N/A	ALL RBs	X	Mid/CC 4	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
4	Y	Mid	REFSENS	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	X	Mid/CC 3	N/A	ALL RBs	X	Mid/CC 4	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}
Default Test Settings for CA_YA-ZA-XB-RA and CA_YA-ZA-XC-RA Configuration (Intra-band contiguous + Inter-band)																				
Default Test Settings for CA_YA-ZA-RA-XB and CA_YA-ZA-RA-XC Configuration (Intra-band contiguous + Inter-band)																				
1	X	Mid/CC 1	REFSENS	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
2	X	Mid/CC 1	REFSENS	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
3	Y	Mid	REFSENS	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
4	Y	Mid	REFSENS	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
5	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs	R	Mid	N/A	ALL RBs

	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}
7	R	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
8	R	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}
Default Test Settings CA_XB-YB-ZA, CA_XB-YC-ZA, CA_XC-YB-ZA, and CA_XC-YC-ZA Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band) **Default Test Settings CA_ZA-XB-YB, CA_ZA-XB-YC, CA_ZA-XC-YB, and CA_ZA-XC-YC Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band)**																			
1	X	Mid/CC 1	REFSENS	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Y	Mid/CC 1	N/A	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
2	X	Mid/CC 1	REFSENS	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Y	Mid/CC 1	N/A	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}
3	Y	Mid/CC 1	REFSENS	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
4	Y	Mid/CC 1	REFSENS	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Highest N_{RB}
5	Z	Mid	REFSENS	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Y	Mid/CC 1	N/A	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}	N/A	64-QAM		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	X	Mid/CC 1	N/A	ALL RBs	X	Mid/CC 2	N/A	ALL RBs	Y	Mid/CC 1	N/A	ALL RBs	Y	Mid/CC 2	N/A	ALL RBs
	QPSK	64-QAM		Highest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}	N/A	64-QAM		Lowest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_42F, X=42.

Note 6: **Inter-band:** X,Y,Z,R,S correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-20A-28A,X=1,Y=3,Z=7,R=20,S=28.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-5A-7A-46C, X=1,Y=5,Z=7 and R=46.
Note 8: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.4A.8.4.1-2: Test Configuration Table with Wgap

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3				W_{gap} [MHz]	SCC3			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	UL MOD	DL MOD		UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for CA_XA-XA-YA-ZA-RA Configurations (Intra-band non-contiguous + Inter-band) Default Test Settings for CA_YA-ZA-XA-XA-RA Configurations (Intra-band non-contiguous + Inter-band) Default Test Settings for CA_YA-ZA-RA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)																								
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}
3	Z	Mid	REFSENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}
4	R	Mid	REFSENS	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}
Default Test Settings for CA_XA-XA-YD Configurations (Intra-band non-contiguous + Intra-band contiguous)																								
1	Y	CC3	REFSENS	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		QPSK	64-QAM		N_{RB_agg}		QPSK	64-QAM		N_{RB_agg}		QPSK	64-QAM		N_{RB_agg}
2	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs

	QPSK	64-QAM		N_{RB_agg}		QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		QPSK	64-QAM		N_{RB_agg}
Default Test Settings for CA_XA-XA-YA-ZA-ZA Configurations Intra-band non-contiguous + Intra-band non-contiguous																							
1	Z	CC2	REFSENS	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}
2	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}
3	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs
	QPSK	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}		N/A	64-QAM		N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band non-contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-12A-66A,X=2,Y=5,Z=12,R=66.
Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X,Y corresponds to the band of the CA Configuration. E.g. for CA_5A-5A-66D,X=5,Y=66.
Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-66A-66A,X=2,Y=5,Z=66.
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.55.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Tables 7.4A.8.4.1-1 to 7.4A.8.4.1-2.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.4A.8.4.3.

7.4A.8.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.4A.8.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer to TS 36.321 [13] clauses 5.13 and 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clause 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.4A.8.4.1-1 to 7.4A.8.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.4A.8.4.1-1 to 7.4A.8.4.1-2 as appropriate on PCC. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCCs to the value defined in Table 7.4A.8.5-1 or 7.4A.8.5-2 according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq 3.0$GHz
   or within +0dB, -4 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.
7. Measure the average throughput for the carrier(s) indicated in table 7.4A.8.4.2-1 for duration sufficient to achieve statistical significance according to Annex G.2A.
8. Repeat steps 6 to 7 for all component carriers indicated in Table 7.4A.8.4.2-1.

Table 7.4A.8.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3,SCC4	7.4A.8.5-1
	2		
Inter-band	1	SCC1	7.4A.8.5-2
		SCC2	
		SCC3	
		SCC4	
	2	SCC1	
		SCC2	
		SCC3	
		SCC4	
	3	SCC1	
		SCC2	
		SCC3	
		SCC4	
	4	SCC1	
		SCC2	
		SCC3	
		SCC4	
	5	SCC1	
		SCC2	
		SCC3	
		SCC4	
Intra-band contiguous + Inter-band	1	SCC4	7.4A.8.5-2
	2		
	3	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-1 7.4A.8.5-2
	4		
Intra-band contiguous + Inter-band	1	SCC2 SCC3 SCC4	7.4A.8.5-2
	2		
	3	SCC1, SCC2, SCC3,SCC4	7.4A.8.5-1 7.4A.8.5-2
	4		
	5	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2 7.4A.8.5-1
	6		
	7	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2 7.4A.8.5-1
	8		
Intra-band contiguous + Intra-band contiguous + Inter-band	1	SCC2, SCC3, SCC4	7.4A.8.5-2 7.4A.8.5-1
	2	SCC2, SCC3, SCC4	7.4A.8.5-2 7.4A.8.5-1
	3	SCC2, SCC3, SCC4	7.4A.8.5-2 7.4A.8.5-1
	4	SCC2, SCC3, SCC4	7.4A.8.5-2 7.4A.8.5-1
	5	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2 7.4A.8.5-1
	6	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2 7.4A.8.5-1
Intra-band non-contiguous + Inter-band	1	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2
	2	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2
	3	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2
	4	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2

Intra-band non-contiguous + Intra-band contiguous	1	PCC, SCC1, SCC2	7.4A.8.5-1
		SCC3, SCC4	7.4A.8.5-2
	2	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC1, SCC2, SCC3, SCC4	7.4A.8.5-2
	2		
	3		
Note 1: Test point ID for the particular CA configuration as defined in section 7.4A.8.4.1. Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on. Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.			

7.4A.8.4.3 Message contents

Same message contents as in clause 7.4.4.3 for without UL CA.

Same message contents as in clause 7.4A.1.4.3 for UL CA.

7.4A.8.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.4A.8.5-1 to 7.4A.8.5-2, as applicable.

Table 7.4A.8.5-1: Maximum input level for 5DL CA (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class					
		A	B	C	D	E	F

Power in largest Transmission Bandwidth Configuration CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0	For carrier frequency f ≤ 3.0GHz: -26.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -27.0	For carrier frequency f ≤ 3.0GHz: -27.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0
Power in each other CC	dBm		For carrier frequency f ≤ 3.0GHz: -28.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -29.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -25.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -25.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -26.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -27.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)	For carrier frequency f ≤ 3.0GHz: -27.7 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) For carrier frequency 3.0GHz < f ≤ 4.2GHz: -28.0 + 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$)
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier. NOTE 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.4A.8.5-2: Maximum input level for 5DL CA (Inter-band), per CC

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4B Maximum input level for UL-MIMO

7.4B.1 Test purpose

Maximum input level tests the ability of UE that support UL- MIMO to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL- MIMO.

7.4B.3 Minimum conformance requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing, the minimum requirements in Clause 7.4.3 shall be met with the UL-MIMO configurations specified in Table 6.2.2B.3-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 36.101 [2] clause 7.4.1B.

7.4B.4 Test description

7.4B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.4B.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.4B.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest						
Test Parameters for Channel Bandwidths							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation		UE Category
		FDD	TDD		FDD	TDD	
1.4MHz	64-QAM	6	6	QPSK	5	5	1-5
3MHz	64-QAM	15	15	QPSK	4	4	1-5
5MHz	64-QAM	25	25	QPSK	8	8	2-5
5MHz	64-QAM	25	N/A	QPSK	5[3]	N/A	2-5
5MHz	64-QAM	18	18	QPSK	8	8	1
5MHz	64-QAM	18	N/A	QPSK	5[3]	N/A	1
10MHz	64-QAM	50	50	QPSK	12	12	2-5
10MHz	64-QAM	17	17	QPSK	12	12	1
15MHz	64-QAM	75	75	QPSK	16	16	2-5
15MHz	64-QAM	17	17	QPSK	16	16	1
20MHz	64-QAM	100	100	QPSK	18	18	3-5
20MHz	64-QAM	83	83	QPSK	18	18	2
20MHz	64-QAM	17	17	QPSK	18	18	1
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band. The applicable channel bandwidths are specified in Table 7.3.3-2.							
Note 2: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.							
Note 3: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Figure A.28.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.4B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.4B.4.3.

7.4B.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.4B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 7.4B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value defined in Table 7.4B.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB- of the target level in Table 7.4B.5-1 for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the throughput measurement.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.4B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception.

Table 7.4B.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.4B.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4B.5-1.

Table 7.4B.5-1: Maximum input level

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3MHz**	**5MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz:- 25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4C

7.4D Maximum input level for ProSe

7.4D.0 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Table 7.4D.0-1.

Table 7.4D.0-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-22					

The normative reference for this requirement is TS 36.101 clause 7.4.1D.

7.4D.1 Maximum input level for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Use of OCNG for Downlink has not been considered and is still FFS.
- Message exceptions content needs further investigation (some values still TBD).
- Test time is FFS.

7.4D.1.1 Test purpose

Verify the UE's ability to receive ProSe Discovery data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

7.4D.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

7.4D.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause TS 36.101 [2] 7.4D.0.

7.4D.1.4 Test description

7.4D.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA ProSe bands specified in table 5.4.2D.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.4D.1.4.1-1. The details of the downlink, uplink and sidelink reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.6.

Table 7.4D.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, Highest					
	Downlink Configuration (Note 2)		**Uplink Configuration (Note 2)**		**Sidelink Configuration (Reception) (Note 3)**	
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Mod'n	RB allocation
5MHz	QPSK	0	QPSK	0	QPSK	2
10MHz	QPSK	0	QPSK	0	QPSK	2
15MHz	QPSK	0	QPSK	0	QPSK	2
20MHz	QPSK	0	QPSK	0	QPSK	2
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA ProSe and Operating band, according to the applicability specified respectively in Table 5.4.2D.1-1 and Table 5.4.2.1-1. Note 2: The RB start for the transmission of Sidelink RMC is RB#0.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.67.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.4D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 7.4D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

7.4D.1.4.2 Test procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 7.4D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Initialise the variables P_{tot} and P_{ok} as 0.
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.4D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.4D.1.4.1-1. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.
6. SS transmits PSDCH to transmit the SL RMC according to Table 7.4D.1.4.1-1. Set the Sidelink signal level to the value defined in Table 7.4D.1.5-1.
7. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable P_{tot}.
8. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available

PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".

9. SS calculates the variable P_{ok} as (current counter value - counter value at last test iteration).

10. SS shall compute the throughput as following:

$$TP = P_{ok} / P_{tot} * 100\%$$

7.4D.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 7.4D.1.4.3-1: ACTIVATE TEST MODE: Maximum input level for ProSe Direct Discovery

Derivation Path: 36.508 [7], Table 4.7A-1, condition UE TEST LOOP MODE D

Table 7.4D.1.4.3-2: CLOSE UE TEST LOOP: Maximum input level for ProSe Direct Discovery

Derivation Path: 36.508 [7], Table 4.7A-3, condition UE TEST LOOP MODE D

Table 7.4D.1.4.3-3: *MAC-MainConfig-RBC*: Maximum input level for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

7.4D.1.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.6.2 with parameters specified in Table 7.4D.1.5-1.

Table 7.4D.1.5-1: Maximum input level for ProSe Direct Discovery

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-22 – TT					

7.4D.2 Maximum input level for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Many clauses are TBD

7.4D.2.1 Test purpose

Verify the UE's ability to receive ProSe Communication data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

7.4D.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

7.4D.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in TS 36.101 [2] clause 7.4D.0.

7.4D.2.4 Test description

TBD

7.4D.2.4.1 Initial conditions

TBD

7.4D.2.4.2 Test procedure

TBD

7.4D.2.4.3 Message contents

TBD

7.4D.2.5 Test requirements

TBD

7.4E Maximum input level for UE category 0

7.4E.1 Test purpose

Same test purpose as in clause 7.4.1.

7.4E.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward of UE category 0.

7.4E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.4.3.

7.4E.4 Test description

7.4E.4.1 Initial conditions

Same initial conditions as in clause 7.4.4.1 with the following exceptions:

- Instead of Table 7.4.4.1-1 → use Table 7.4E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

Table 7.4E.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508 [7] clause 4.1	NC						
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1	Mid range						
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1	Lowest, 5MHz, Highest						
Test Parameters for Channel Bandwidths							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**		**UE Category**
		FDD and HD-FDD	**TDD**		**FDD and HD-FDD**	**TDD**	
1.4MHz	64QAM	2	2	QPSK	6	6	0
3MHz	64QAM	2	2	QPSK	15	15	0
5MHz	64QAM	2	2	QPSK	25	25	0
5MHz	64QAM	2	N/A	QPSK	20	N/A	0
10MHz	64QAM	2	2	QPSK	36	36	0
10MHz	64QAM	2	N/A	QPSK	25	N/A	0
10MHz	64QAM	2	N/A	QPSK	20	N/A	0
15MHz	64QAM	2	2	QPSK	36	36	0
20MHz	64QAM	2	2	QPSK	36	36	0
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band. The applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3E.3-3 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1). Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used. Note 4: Downlink RB position shall be RB_{start} = 0							

7.4E.4.2 Test procedure

Same test procedure as in clause 7.4.4.2.

7.4E.4.3 Message contents

Same message contents as in clause 7.4.4.3.

7.4E.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4E.5-1.

Table 7.4E.5-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

7.4EA Maximum input level for UE category M1

7.4EA.1 Test purpose

Maximum input level tests the ability of category M1 UE to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4EA.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category M1.

7.4EA.3 Minimum conformance requirements

Maximum input level is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4EA.3-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.4EA.3-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-25[2]					
		-27[3]					
NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in subclause 6.2.5EA.							
NOTE 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
NOTE 3: Reference measurement channel is Annex A.3.2: 256QAM, R=4/5 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

The normative reference for this requirement is TS 36.101 [2] clause 7.4.1.

7.4EA.4 Test description

7.4EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands defined for CAT M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.4EA.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 7.4EA.4.1-1: Test Configuration Table RX test cases UE Cat-M1

Initial Conditions							
Test Environment as specified in TS 36.508[7] clause 4.1	NC						
Test Frequencies as specified in TS36.508 [7] clause 4.3.1	Mid range						
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1	5MHz						
Test Parameters for Channel Bandwidths and Narrowband positions							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**		**UE Category**
		FDD and HD-FDD	**TDD**		**FDD and HD-FDD**	**TDD**	
5MHz	16QAM	2	2	QPSK	6	6	M1
Note 1: Downlink RB position shall be RB_{start} = 0 within the narrowband Note 2: The Narrowband index (TS36.211, 5.2.4) shall be set to 0 for all testpoints.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.4EA.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.4EA.4.3.

7.4EA.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 7.4EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via M-PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.4EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value defined in Table 7.4EA.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.4EA.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.4EA.4.3 Message contents

- Same message contents as in clause 7.4.4.3 with the following exception.

Table 7.4EA.4.2-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-NumRepetition-r13	r1		

7.4EA.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.2.2, A.2.3 and A.3.2 with parameters specified in Table 7.4EA.5-1.

Table 7.4EA.5-1: Maximum input level

Rx Parameter	Units	Channel bandwidth
		5 MHz
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -25.7 For carrier frequency 3.0GHz < f ≤ 4.2GHz: -26.0
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5EA. Note 2: Reference measurement channel is Annex A.3.2 64QAM R=3/4variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.		

7.4F Maximum input level for category NB1

7.4F.1 Test Purpose

Maximum input level tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB.

7.4F.2 Test Applicability

This test applies to all types of UE release 13 and forward of category NB1.

7.4F.3 Minimum Conformance Requirements

Maximum input level is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel.

Category NB1 UE maximum input level requirement is – 25 dBm. For this input level the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A.3.2.

The normative reference for this requirement is TS 36.101 clause 7.4F.

7.4F.4 Test Description

7.4F.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the set of E-UTRA operating bands defined for NB-IoT in clause 5.2.F. All of these configurations shall be tested with applicable test parameters, and are shown in table 7.4F.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 7.4F.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] clause 8.1.1			NC		
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defined in Annex K.1.1		
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Modulation	Subcarriers	Modulation	N_{tones}	Subcarrier spacing
1	QPSK	12	BPSK	1@0	15kHz

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.3 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C0, C1 and C.3.0, and NPUSCH Format 2 is used to carry ACK/NACK on the uplink.
4. The DL Reference Measurement channels are set according to Table 7.4F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 7.4F.4.3.

7.4F.4.2 Test Procedure

4. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.4F.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send the HARQ feedback based on information contain in DCI format N1.
5. Set the Downlink signal level to the value defined in Table 7.4F.5-1.
6. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.4F.4.3 Message Contents

Message contents are according to TS 36.508 [7] clause 8.1.6.

7.4F.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.4F.5-1.

Table 7.4F.5-1: Maximum input level for category NB1

Rx Parameter	Units	Maximum input level test requirement
Power in Transmission Bandwidth Configuration	dBm	For carrier frequency f ≤ 3.0GHz: -25.7

7.4G Maximum input level for V2X Communication

7.4G.1 Maximum input level for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration is investigating
- UE Test mode is TBD
- The test tolerance is left FFS

7.4G.1.1 Test purpose

Verify the UE's ability to receive V2X Communication data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

7.4G.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.4G.1.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.4G.1.3-1.

Table 7.4G.1.3-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-	-	-	-22	-	-22
NOTE 1: Reference measurement channel is defined in Annex A.8.2.							

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 7.4G.1.3 apply for the E-UTRA V2X sidelink reception and the requirements in subclause 7.4.3 apply for the E-UTRA downlink reception while all downlink carriers are active.

The normative reference for this requirement is TS 36.101 [2] clause 7.4.1G.

7.4G.1.4 Test description

7.4G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.4G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A. 8.3. GNSS simulator is configured as Table C.2-8 in Annex C.2.

Table 7.4G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A. 92.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 7.4G.1.4.3.
3. The V2X reference measurement channel is set according to Table 7.4G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode – FFS.

7.4G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.4G.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.

2. Set the signal level of V2X to the value defined in Table 7.4G.1.5-1.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.4G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.10.

7.4G.1.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.4G.1.5-1.

Table 7.4G.1.5-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-	-	-	-22+TT	-	-22+TT
NOTE 1: Reference measurement channel is defined in Annex A.8.2.							

7.4G.2 Maximum input level for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

- Test configuration table is investigating.
- Test procedure is TBD
- The test tolerance is left FFS

7.4G.2.1 Test purpose

Same test purpose as in clause 7.4G.1.

7.4G.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.4G.2.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.4G.2.3-1.

Table 7.4G2.3-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-	-	-	-22	-	-22
NOTE 1: Reference measurement channel is defined in Annex A.8.2.							

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 7.4G.2.3 apply for the E-UTRA

V2X sidelink reception and the requirements in subclause 7.4.3 apply for the E-UTRA downlink reception while all downlink carriers are active.

The normative reference for this requirement is TS 36.101 [2] clause 7.4.1G.

7.4G.2.4 Test description

7.4G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.4G.2.4.1-1. The details of the uplink, downlink and V2X reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.8.3 respectively.

Table 7.4G.2.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Mid range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			Lowest, 5MHz, Highest for uplink Lowest, Highest for V2X				
Test Parameters for Channel Bandwidths							
	Downlink		**Uplink Configuration**		**V2X Configuration**		
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz	QPSK	1	QPSK	1	10 MHz	QPSK	[48]
1.4 MHz	QPSK	5	QPSK	5	20 MHz	QPSK	[96]
3 MHz	QPSK	1	QPSK	1			
3 MHz	QPSK	4	QPSK	4			
5 MHz	QPSK	1	QPSK	1			
5 MHz	QPSK	8	QPSK	8			
10 MHz	QPSK	1	QPSK	1			
10 MHz	QPSK	12	QPSK	12			
15 MHz	QPSK	1	QPSK	1			
15 MHz	QPSK	16	QPSK	16			
20 MHz	QPSK	1	QPSK	1			
20 MHz	QPSK	18	QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. 7.4G.2.4.2 Test procedure
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.4G.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.4G.2.4.3.

7.4G.2.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.4G.2.4.1-1 on E-UTRA band. The SS sends downlink MAC padding bits on the DL RMC.

2. SS simultaenously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 7.4G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.

3. Set the signal level of V2X for V2X band and E-UTRA band to the value defined in Table 7.4G.2.5-1.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.4G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.4G.2.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.8.2 with parameters specified in Table 7.4G.2.5-1.

Table 7.4G.2.5-1: Maximum input level

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-	-	-	-22+TT	-	-22+TT
NOTE 1: Reference measurement channel is defined in Annex A.8.2.							

7.4G.3 Maximum input level for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration table is investigating.
- Test procedure is TBD
- The test tolerance is left FFS

7.4G.3.1 Test purpose

Same test purpose as in clause 7.4G.1.

7.4G.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.4G.3.3 Minimum conformance requirements

For intra-band contiguous multi-carrier operation maximum input level is defined as the powers received at the UE antenna port over the Transmission bandwidth configuration of each CC, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel over each component carrier.

Table 7.4G.3.3-2: Maximum input level for intra-band contiguous multi-carrier for V2X

Rx Parameter	Units	V2X Bandwidth Class					
		A	B	C	D	E	F
Power in largest Transmission Bandwidth Configuration CC	dBm		-22[2]				
Power in each other CC	dBm		-22+ 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) [2]				
NOTE 2: The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmission are activated at the same time							

The normative reference for this requirement is TS 36.101 [2] clause 7.4.1G.

7.4G.3.4 Test description

7.4G.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.4G.3.4.1-1. The details of the uplink, downlink and V2X reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.8.3 respectively.

Table 7.4G.3.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest N_{RB_agg}, Highest N_{RB_agg}	
Test Parameters for Channel Bandwidths			
V2X multi-carrier Configuration		**V2X PSSCH Allocation**	
CC1 N_{RB}	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**CC1 and CC2 RB Allocation**
10MHz	10MHz	QPSK	[48+48]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.89a.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.4G.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.4G.3.4.3.

7.4G.3.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.4G.3.4.1-1 for 2carrier intr-band-concurrent receptions. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Set the signal level of V2X for each component carrier to the value defined in Table 7.4G.3.5-2.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.4G.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.4G.3.5 Test requirements

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Table 7.4G.3.5-2. Table 7.4G.3.5-2: Maximum input level for intra-band contiguous multi-carrier for V2X

Rx Parameter	Units	V2X Bandwidth Class					
		A	B	C	D	E	F
Power in largest Transmission Bandwidth Configuration CC	dBm		-22^{2}+TT				
Power in each other CC	dBm		-22+ 10log($N_{RB,c}$ /$N_{RB,largest\ BW}$) ^{2}+TT				
NOTE 2: The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmission are activated at the same time							

7.5 Adjacent Channel Selectivity (ACS)

7.5.1 Test purpose

Adjacent channel selectivity tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.5.3 Minimum conformance requirements

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive an E-UTRA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

The UE shall fulfil the minimum requirement specified in Table 7.5.3-1 for all values of an adjacent channel interferer up to –25 dBm. However it is not possible to directly measure the ACS, instead the lower and upper range of test parameters are chosen in Table 7.5.3-2 and Table 7.5.3-3 where the throughput R_{av} shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1). For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.5.3-1: Adjacent channel selectivity

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5.3-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	**1.4+0.0025 /** -1.4-0.0025	**3+0.0075 /** -3-0.0075	**5+0.0025 /** -5-0.0025	**7.5+0.0075 /** -7.5-0.0075	**10+0.0125 /** -10-0.0125	**12.5+0.0025 /** -12.5-0.0025
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							
Note 3: The REFSENS power level is specified in Table 7.3.3-1 and Table 7.3.3-1a for two and four antenna ports, respectively.							

Table 7.5.3-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	**1.4+0.0025 /** -1.4-0.0025	**3+0.0075 /** -3-0.0075	**5+0.0025 /** -5-0.0025	**7.5+0.0075 /** -7.5-0.0075	**10+0.0125 /** -10-0.0125	**12.5+0.0025 /** -12.5-0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

The normative reference for this requirement is TS 36.101 [2] clause 7.5.1.

7.5.4 Test description

7.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters

for each channel bandwidth, and are shown in table 7.5.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.5.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] clause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] clause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).

1. Connect the SS and interfering source to the UE antenna connectors as shown in TS 36.508 [7] Figure A.4.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.5.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.5.4.3.

7.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.5.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.5.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.5.5-2 (Case 1). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5.5-2 (Case 1) for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the Throughput measurement.

4. Set the Interferer signal level to the value as defined in Table 7.5.5-2 (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 4.

7. Set the Downlink signal level to the value as defined in Table 7.5.5-3 (Case 2). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5.5-3 (Case 2) for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the Throughput measurement.

8. Set the Interferer signal level to the value as defined in Table 7.5.5-3 (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

9. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

10. Repeat steps from 7 to 9, using an interfering signal above the wanted signal in Case 2 at step 8.

11. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.

7.5.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception

Table 7.5.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.5.5 Test requirement

The throughput R_{av} shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 under the conditions specified in table 7.5.5-2, and also under the conditions specified in table 7.5.5-3.

Table 7.5.5-1: Adjacent channel selectivity

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025/ -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							
Note 3: The REFSENS power level is specified in Table 7.3.3-1 for two antenna ports.							

Table 7.5.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

7.5_1 Adjacent Channel Selectivity (ACS) with 4 Rx antenna ports

7.5_1.1 Test purpose

Same test purpose as in clause 7.5.1.

7.5_1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports.

7.5_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.5.3.

7.5_1.4 Test description

7.5.4_1.1 Initial conditions

Same as in clause 7.5.4.1 with following exceptions:

- Instead of Table 7.5.4.1-1→ use Table 7.5_1.4.1-1.
- Instead of Figure A.4→ use Figure A.81.

Table 7.5_1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	N/A	QPSK	6	N/A
3MHz	QPSK	15	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	50	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
15MHz	QPSK	75	N/A	QPSK	75	N/A
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2. Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						

7.5_1.4.2 Test procedure

Same as in clause 7.5.4.2 with following exceptions:

- Instead of Table 7.5.4.1-1→ use Table 7.5_1.4.1-1.
- Instead of Table 7.5.5-2→ use Table 7.5_1.5-2.
- Instead of Table 7.5.5-3→ use Table 7.5_1.5-3.

7.5_1.4.3 Message contents

Same as in clause 7.5.4.3.

7.5_1.5 Test requirement

The throughput R_{av} shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 under the conditions specified in table 7.5_1.5-2, and also under the conditions specified in table 7.5_1.5-3.

Table 7.5_1.5-1: Adjacent channel selectivity

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5_1.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025/ -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							
Note 3: The REFSENS power level is specified in Table 7.3_1.5-1 for four antenna ports.							

Table 7.5_1.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

7.5A Adjacent Channel Selectivity (ACS) for CA

7.5A.0 Minimum conformance requirements

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band, the adjacent channel requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.5.3 for each component carrier while all downlink carriers are active. For E-UTRA CA configurations including an operating band without uplink operation or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. For a component carrier configured in Band 46, the requirements specified in subclause 7.5.3 are replaced by the requirements in Table 7.5A.0-1a with test parameters in Table 7.5A.0-2a and Table 7.5A.0-3a.

Table 7.5A.0-1a: Adjacent channel selectivity

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	ACS	dB				33		27

Table 7.5A.0-2a: Test parameters for Adjacent channel selectivity, Case 1

E-UTRA Band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
	$P_{Interferer}$	dBm				REFSENS+45.5dB		REFSENS +39.5dB
	$BW_{Interferer}$	MHz				20		20
	$F_{Interferer}$ (offset)	MHz				15+0.0075/-15-0.0075		20+0.0025 / -20-0.0025

NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.

Table 7.5A.0-3a: Test parameters for Adjacent channel selectivity, Case 2

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm				-56.5		-50.5
	$P_{Interferer}$	dBm	-25					
	$BW_{Interferer}$	MHz				20		20
	$F_{Interferer}$ (offset)	MHz				15+0.0075/-15-0.0075		20+0.0025 / -20-0.0025

NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.

For E-UTRA CA configurations listed in Table 7.3A.0-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the adjacent channel requirements of subclause 7.5A.0 do not apply.

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.5A.0-2 or Table 7.5A.0-3 with the uplink configuration set according to Table 7.3A.0-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.3-2. The UE shall fulfil the minimum requirement specified in Table 7.5A.0-1 for an adjacent channel interferer on either side of the aggregated downlink signal at a specified frequency offset and for an interferer power up to -25 dBm. The throughput of each carrier shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.0-2 and 7.5A.0-3. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements also apply for an SCC assigned in the unpaired part with parameters specified in Tables 7.5A.0-2 and 7.5A.0-3.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink sub-blocks, each larger than or equal to 5 MHz, the adjacent channel selectivity requirements are defined with the uplink configuration in accordance with Table 7.3A.0-3. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclauses 7.5.3 and 7.5A.0 for one component carrier and two component carriers per sub-block, respectively. The UE shall fulfil the minimum requirements all values of a single adjacent channel interferer in-gap and out-of-gap up to a –25 dBm interferer power while all downlink carriers are active. For the lower range of test parameters (Case 1), the interferer power $P_{interferer}$ shall be set to the maximum of the levels given by the carriers of the respective sub-blocks as specified in Table 7.5.3-2 and Table 7.5A.0-2 for one component carrier and two component carriers per sub-block, respectively. The wanted signal power levels for the carriers of each sub-block shall then be adjusted relative to $P_{interferer}$ in accordance with the ACS requirement for each sub-block (Table 7.5.3-1 and Table 7.5A.0-1). For the upper range of test parameters (Case 2) for which the interferer power $P_{interferer}$ is -25 dBm (Table 7.5.3-3 and Table 7.5A.0-3) the wanted signal power levels for the carriers of each sub-block shall be adjusted relative to $P_{interferer}$ like for Case 1.

Table 7.5A.0-1: Adjacent channel selectivity

		CA Bandwidth Class				
Rx Parameter	**Units**	**B**	**C**	**D**	**E**	**F**
ACS	dB	27	24	22.2	21	20

Table 7.5A.0-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	**Units**	**CA Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC		REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB
$P_{Interferer}$	dBm	Aggregated power + 25.5 dB	Aggregated power + 22.5 dB	Aggregated power + 20.7 dB	Aggregated power + 19.5 dB	Aggregated power + 18.5 dB
$BW_{Interferer}$	MHz	5	5	5	5	5
$F_{Interferer}$ (offset)	MHz	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer} / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.0-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	-50.5 +10log10(N RB,c/ N RB agg)	-47.5 +10log10(N RB ,c/N RB agg)	-45.743.9 +10log10(N RB,c/N RB agg)	-44.5 +10log10(N RB,c/N RB agg) 5	-43.5 +10log10(N RB ,c/N RB agg)
$P_{Interferer}$	dBm	-25				
$BW_{Interferer}$	MHz	5	5	5	5	5
$F_{Interferer}$ (offset)	MHz	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}
NOTE 1: The transmitter shall be set to 24dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.						
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.						

For combinations of intra-band and inter-band carrier aggregation with up to five downlink carriers (up to four non-contiguously aggregated carriers per band and up to four contiguously aggregated carriers per band) and one uplink carrier assigned to one E-UTRA band, the requirement is defined with the uplink active in each band other than that supporting the downlink(s) under test. The uplink configuration shall be in accordance with Table 7.3A.0-3 when the uplink is active in the band supporting two non-contiguous component carriers, Table 7.3A.0-1 when the uplink is active in a band supporting two contiguous component carriers and in accordance with Table 7.3.3-2 when the uplink is active in a band supporting one carrier per band. The downlink PCC shall be configured closer to the uplink operating band than the downlink SCC(s) when the uplink is active in band(s) supporting contiguous aggregation of up to four component carriers. For these uplink configurations, the UE shall meet the adjacent channel selectivity requirements for intra-band non-contiguous carrier aggregation of two downlink sub-blocks with ΔR_{IBNC} = 0 dB for all sub-block gaps (Table 7.3A.0-3) for the two non-contiguous downlink sub-blocks, the requirements for intra-band contiguous carrier aggregation for the contiguously aggregated downlink carriers and for any remaining component carrier(s) the requirements specified in subclause 7.5.3. For contiguously aggregated component carriers configured in Band 46, the said requirements for intra-band contiguous carrier aggregation of downlink carriers are replaced by requirements in Table 7.5A.0-4 with test parameters in Table 7.5A.0-5 and Table 7.5A.0-6. For non-contiguously aggregated component carriers configured in Band 46, the said requirements are applied to each sub-block for in-gap and out-of-gap interferers. For the sub-block with a single component carrier, the requirement is replaced by Table 7.5A.0-1a with test parameters in Table 7.5A.0-1b and Table 7.5A.0-1c. For the sub-block with two or more contiguous component carriers, the requirement is replaced by Table 7.5A.0-4 with test parameters in Table 7.5A.0-5 and Table 7.5A.0-6. All downlink carriers shall be active throughout the tests and the requirements for downlinks shall be met with the single uplink carrier active in each band capable of UL operation.

Table 7.5A.0-4: Adjacent channel selectivity

E-UTRA band	Rx Parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	ACS	dB		24	22.2	21	

Table 7.5A.0-5: Test parameters for Adjacent channel selectivity, Case 1

E-UTRA Band	Rx Parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	Pw in Transmission Bandwidth Configuration, per CC			REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB	
	PInterferer	dBm		Aggregated power + 22.5 dB	Aggregated power + 20.7 dB	Aggregated power + 19.5 dB	
	$BW_{Interferer}$	MHz		20	20	20	
	$F_{Interferer\ (offset)}$	MHz		10 + F_{offset}	10 + F_{offset}	10 + F_{offset}	

				/ -10 - F_{offset}	/ -10 - F_{offset}	/ -10 - F_{offset}	

NOTE 1*: In a band capable of uplink operation, the transmitter shall be set to 4dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1 and set-up according to Annex C.3.1.
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.0-6: Test parameters for Adjacent channel selectivity, Case 2

E-UTRA band	Rx Parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	Pw in Transmission Bandwidth Configuration, per CC	dBm		-47.5 +10log10($N_{RB,c}/N_{RB\ agg}$)	-45.7 +10log10($N_{RB,c}/N_{RB\ agg}$)	-44.5 +10log10($N_{RB,c}/N_{RB\ agg}$)	
	$P_{Interferer}$	dBm	-25				
	$BW_{Interferer}$	MHz		20	20	20	
	$F_{Interferer}$ (offset)	MHz		10 + F_{offset} / -10 - F_{offset}	10 + F_{offset} / -10 - F_{offset}	10 + F_{offset} / -10 - F_{offset}	

NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 24dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1 and set-up according to Annex C.3.1.
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

The normative references for this requirement are TS 36.101 [2] clauses 7.5.1A and 7.5.1.

7.5A.1 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA and UL CA)

7.5A.1.1 Test purpose

Adjacent channel selectivity for CA test verifies the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5A.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

7.5A.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5A.0.

7.5A.1.4 Test description

7.5A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test

parameters for each channel bandwidth, and are shown in table 7.5A.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.5A.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] clause 4.1			NC						
Test Frequencies as specified in TS36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			Mid range						
Test CC Combination setting (NRB_agg) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 3)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**					
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
50	25	QPSK	50+25	QPSK	25	P_25@25	S_0@0	-	-
50	50	QPSK	50+50	QPSK	25	P_25@25	S_0@0	-	-
50	100	QPSK	50+100	QPSK	150	P_50@0	S_100@0	-	-
75	50	QPSK	75+50	QPSK	75	P_75@0	S_0@0	-	-
75	75	QPSK	75+75	QPSK	75	P_75@0	S_0@0	-	-
75	75	QPSK	75+75	QPSK	129	P_75@0	S_54@0	-	-
75	75	QPSK	75+75	QPSK	150	P_75@0	S_75@0	-	-
100	25	QPSK	100+25	QPSK	50	P_50@50	S_0@0	-	-
100	25	QPSK	100+25	QPSK	125	P_100@0	S_25@0	-	-
100	50	QPSK	100+50	QPSK	75	P_75@25	S_0@0	-	-
100	50	QPSK	100+50	QPSK	150	P_100@0	S_50@0	-	-
100	75	QPSK	100+75	QPSK	175	P_100@0	S_75@0	-	-
100	100	QPSK	100+100	QPSK	50	P_50@50	S_0@0	-	-
100	100	QPSK	100+100	QPSK	75	P_75@25	S_0@0	-	-
100	100	QPSK	100+100	QPSK	130	P_100@0	S_30@0	-	-
100	100	QPSK	100+100	QPSK	200	P_100@0	S_100@0	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.

Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3.3-2 for UE supporting one uplink carrier and to table 7.3A.0-1 for UE supporting two uplink carriers are tested per Test CA configuration.

Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.

1. Connect the SS and interfering source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.34 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and DL Reference Measurement channels are set according to Table 7.5A.1.4.1-1.

5, Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.5A.1.4.3.

7.5A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.5A.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.5A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.5A.1.4.1-1 on both PCC and SCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-2 (Case 1). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:
The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.5A.1.5-2 (Case 1) + $10\log(P_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.5A.1.5-2 (Case 1) + $10\log(P_L_{CRB}/N_{RB_alloc})$) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.
The SCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.5A.1.5-2 (Case 1) + $10\log(S_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.5A.1.5-2 (Case 1) + $10\log(S_L_{CRB}/N_{RB_alloc})$) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

7. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-2 (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document. The interferer frequencies are adjusted in analogy with table 7.5A.1.4.2-1.

8. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal in Case 1 at step 7.

10. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-3 (Case 2). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:
The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.5A.1.5-3 (Case 2) + $10\log(P_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.5A.1.5-3 (Case 2) + $10\log(P_L_{CRB}/N_{RB_alloc})$) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.
The SCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.5A.1.5-3 (Case 2) + $10\log(S_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.5A.1.5-3 (Case 2) + $10\log(S_L_{CRB}/N_{RB_alloc})$) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

11. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-3 (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document. The interferer frequencies are adjusted in analogy with table 7.5A.1.4.2-1.

12. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

13. Repeat steps from 10 to 12, using an interfering signal above the wanted signal in Case 2 at step 11.

Table 7.5A.1.4.2-1: Example for interferer frequencies

	Lower frequency	Upper frequency
F_{DL} = CA_1C Mid range (BW 20MHz + 20MHz)	2130.1 MHz	2149.9 MHz
F_{offset}	10 MHz	10 MHz
$F_{Interferer}$ (offset)	-12.5 MHz	+12.5 MHz
$\lfloor \lvert F_{interferer\ (offset)} \rvert / 0.015 + 0.5 \rfloor 0.015 + 0.0075$	12.5025 MHz	12.5025 MHz
Adjusted $F_{Interferer}$ (offset)	-12.5025 MHz	+12.5025 MHz
$F_{Interferer} = F_{DL}$ + Adjusted $F_{Interferer}$ (offset)	2117.5975 MHz	2162.4025 MHz

7.5A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.5A.1.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

Table 7.5A.1.4.3-2: UplinkPowerControlDedicatedSCell-r10

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH-r10	0		
deltaMCS-Enabled-r10	en0		
accumulationEnabled-r10	TRUE		
pSRS-Offset-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
pSRS-OffsetAp-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
filterCoefficient-r10	fc8	larger filter length is used to reduce the RSRP measurement variation	
pathlossReferenceLinking-r10	sCell		
}			

7.5A.1.5 Test Requirements

The throughput of each carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 under the conditions specified in table 7.5A.1.5-2, and also under the conditions specified in table 7.5A.1.5-3.

Table 7.5A.1.5-1: Adjacent channel selectivity

		CA Bandwidth Class				
Rx Parameter	**Units**	**B**	**C**	**D**	**E**	**F**
ACS	dB	27	24			

Table 7.5A.1.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	Units	CA Bandwidth Class				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC		REFSENS + 14 dB	REFSENS + 14 dB			
$P_{Interferer}$	dBm	Aggregated power + 25.5 dB	Aggregated power + 22.5 dB			
$BW_{Interferer}$	MHz	5	5			
$F_{Interferer}$ (offset)	MHz	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}			

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two uplink carriers.

Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1

Note 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor |F_{interferer\ (offset)}| / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.1.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	CA Bandwidth Class				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC	dBm	-50.5 +10log$_{10}$($N_{RB,c}$/ $N_{RB\ agg}$)	-47.5 +10log($N_{RB,c}$/ $N_{RB\ agg}$)			
$P_{Interferer}$	dBm	-25				
$BW_{Interferer}$	MHz	5	5			
$F_{Interferer}$ (offset)	MHz	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}			

Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two uplink carriers.

Note 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1

Note 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor |F_{interferer\ (offset)}| / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

7.5A.2 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA without UL CA)

7.5A.2.1 Test purpose

The test purpose is the same as in clause 7.5A.1.1.

7.5A.2.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA. This test case applies only for CA Configurations that do not support UL CA.

7.5A.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5A.0.

7.5A.2.4 Test description

7.5A.2.4.1 Initial conditions

Same as in clause 7.5A.1.4.1 with the following exceptions:

- Instead of Table 7.5A.1.4.1-1→ use Table 7.5A.2.4.1-1.
- Instead of clause 7.5A.1.4.3 → use clause 7.5A.2.4.3.

Table 7.5A.2.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] clause 4.1		NC							
Test Frequencies as specified in TS36.508 [7] clause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2		B: Mid range C: Mid range (Note 4)							
Test CC Combination setting (NRB_agg) as specified in clause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.		Lowest N_{RB_agg} Highest N_{RB_agg} (Notes 3, 4)							
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**					
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
6	25	QPSK	6+25	QPSK	6	P_6@0	-	-	-
15	50	QPSK	15+50	QPSK	15	P_15@0	-	-	-
25	25	QPSK	25+25	QPSK	20	P_20@0	-	-	-
25	25	QPSK	25+25	QPSK	25	P_25@0	-	-	-
25	50	QPSK	25+50	QPSK	20	P_20@0	-	-	-
25	100	QPSK	25+100	QPSK	25	P_25@0	-	-	-
50	25	QPSK	50+25	QPSK	25	P_25@25	-	-	-
50	50	QPSK	50+50	QPSK	25	P_25@25	-	-	-
50	50	QPSK	50+50	QPSK	50	P_50@0	-	-	-
50	75	QPSK	50+75	QPSK	50	P_50@0	-	-	-
75	25	QPSK	75+25	QPSK	75	P_75@0	-	-	-
75	50	QPSK	75+50	QPSK	75	P_75@0	-	-	-
75	75	QPSK	75+75	QPSK	75	P_75@0	-	-	-
100	25	QPSK	100+25	QPSK	50	P_50@50	-	-	-
100	25	QPSK	100+25	QPSK	100	P_100@0	-	-	-
100	50	QPSK	100+50	QPSK	75	P_75@25	-	-	-
100	50	QPSK	100+50	QPSK	100	P_100@0	-	-	-
100	75	QPSK	100+75	QPSK	100	P_100@0	-	-	-
100	100	QPSK	100+100	QPSK	50	P_50@50	-	-	-
100	100	QPSK	100+100	QPSK	75	P_75@25	-	-	-
100	100	QPSK	100+100	QPSK	100	P_100@0	-	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3.3-2 for UE supporting one uplink carrier. Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested. Note 4: For CA_70C all test frequency IDs shall be tested according to table 4.3.1.1.70A-1, in TS 36.508 [7].									

7.5A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.5A.2.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.5A.2.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-2 (Case 1). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5A.1.5-2 (Case 1) for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the Throughput measurement.

7. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-2 (Case 1) and frequency below the aggregated component carriers, using a modulated interferer bandwidth as defined in Annex D of the present document. The interferer frequencies are adjusted in analogy with table 7.5A.1.4.2-1.

8. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the aggregated component carriers in Case 1 at step 7.

10. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.1.5-3 (Case 2). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5A.1.5-3 (Case 2) for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the Throughput measurement.

11. Set the Interferer signal level to the value as defined in Table 7.5A.1.5-3 (Case 2) and frequency below the aggregated component carriers, using a modulated interferer bandwidth as defined in Annex D of the present document. The interferer frequencies are adjusted in analogy with table 7.5A.1.4.2-1.

12. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

13. Repeat steps from 10 to 12, using an interfering signal above the aggregated component carriers in Case 2 at step 11.

7.5A.2.4.3 Message contents

The message contents are the same as in clause 7.5.4.3.

7.5A.2.5 Test Requirements

The test requirements are the same as in clause 7.5A.1.5 with the following exceptions:

- Instead of Table 7.5A.1.5-1 → use Table 7.5A.2.5-1.
- Instead of Table 7.5A.1.5-2 → use Table 7.5A.2.5-2.
- Instead of Table 7.5A.1.5-3 → use Table 7.5A.2.5-3.

Table 7.5A.2.5-1: Adjacent channel selectivity

		CA Bandwidth Class				
Rx Parameter	**Units**	**B**	**C**	**D**	**E**	**F**
ACS	dB	27	24			

Table 7.5A.2.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC		REFSENS + 14 dB	REFSENS + 14 dB			
$P_{Interferer}$	dBm	Aggregated power + 25.5 dB	Aggregated power + 22.5 dB			
$BW_{Interferer}$	MHz	5	5			
$F_{Interferer}$ (offset)	MHz	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}			
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} as defined in subclause 6.2.5.						
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						
Note 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor \lvert F_{interferer\ (offset)} \rvert / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.						

Table 7.5A.2.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	-50.5 +10log($N_{RB,c}$/$N_{RB\ agg}$)	-47.5 +10log($N_{RB,c}$/ $N_{RB\ agg}$)			
$P_{Interferer}$	dBm	-25				
$BW_{Interferer}$	MHz	5	5			
$F_{Interferer}$ (offset)	MHz	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}			
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} as defined in subclause 6.2.5.						
Note 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						
Note 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor \lvert F_{interferer\ (offset)} \rvert / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.						

7.5A.3 Adjacent Channel Selectivity (ACS) for CA (inter-band DL CA without UL CA)

7.5A.3.1 Test purpose

The test purpose is the same as in clause 7.5A.1.1.

7.5A.3.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 2DL CA with FDD-TDD inter-band CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support DL LAA.

7.5A.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5A.0.

7.5A.3.4 Test description

7.5A.3.4.1 Initial conditions

Same as in clause 7.5A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2.- Instead of Table 7.5A.1.4.1-1→ use Table 7.5A.3.4.1-1.
- Instead of clause 7.5A.1.4.3 → use clause 7.5A.3.4.3.

Table 7.5A.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	A: Mid range for PCC and SCC					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE	Highest N_{RB_agg} for PCC and SCC					
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**			**UL Allocation**	
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC N_{RB_alloc}**
50	50	QPSK	50	50	QPSK	50
50	50	QPSK	50	50	QPSK	25
50	50	QPSK	50	50	QPSK	20
50	50	QPSK	50	50	QPSK	16
50	75	QPSK	50	75	QPSK	25
50	100	QPSK	50	100	QPSK	50
50	100	QPSK	50	100	QPSK	25
50	100	QPSK	50	100	QPSK	20
50	100	QPSK	50	100	QPSK	16
75	25	QPSK	75	25	QPSK	75
75	25	QPSK	75	25	QPSK	20
75	50	QPSK	75	50	QPSK	25
75	75	QPSK	75	75	QPSK	25
75	100	QPSK	75	100	QPSK	25
100	50	QPSK	100	50	QPSK	100
100	50	QPSK	100	50	QPSK	75
100	50	QPSK	100	50	QPSK	50
100	75	QPSK	100	75	QPSK	100
100	75	QPSK	100	75	QPSK	50
100	100	QPSK	100	100	QPSK	100
100	100	QPSK	100	100	QPSK	75
100	100	QPSK	100	100	QPSK	50
100	100	QPSK	100	100	QPSK	45
100	100	QPSK	100	100	QPSK	25
100	100	QPSK	100	100	QPSK	20
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.						
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.3.5-2 for UE supporting one uplink carrier is tested per Test CA configuration.						
Note 3: The UL resource blocks shall be located as close as possible to the downlink PCC but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 4: The frequencies of PCC and SCC shall be switched and tested in each configuration, according to the UE declared capability for UL support (within CA operation) in the individual bands.						

7.5A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.5A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.5A.3.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.3.5-2 (Case 1), or 7.5A.3.5-2a for operating band 46. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5A.3.5-2 (Case 1) for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.

7. Set the Interferer signal level to the value as defined in Table 7.5A.3.5-2 (Case 1), or 7.5A.3.5-2a for operating band 46, and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex G.2.

9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal in Case 1 at step 7.

10. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.3.5-3 (Case 2), or 7.5A.3.5-3a for operating band 46. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5A.3.5-3 (Case 2) for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.

11. Set the Interferer signal level to the value as defined in Table 7.5A.3.5-3 (Case 2), or 7.5A.3.5-3a for operating band 46, and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

12. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex G.2.

13. Repeat steps from 10 to 12, using an interfering signal above the wanted signal in Case 2 at step 11.

7.5A.3.4.3 Message contents

The message contents are the same as in clause 7.5.4.3.

7.5A.3.5 Test Requirements

For inter-band carrier aggregation with uplink assigned to one E-UTRA band, the adjacent channel requirements are defined with the uplink active on the band other than the band whose downlink is being tested i.e. the requirements are tested only for the SCell downlink. The UE shall meet the requirement specified in Table 7.5A.3.5-1 (originated from the single carrier Table 7.5.3.5-1), or the requirement specified in Table 7.5A.3.5-1a for operating band 46, with the test parameters specified in Tables 7.5A.3.5-2 and 7.5A.3.5-3 (originated from the single carrier Tables 7.5.5-2 and 7.5.5-3), or with the test parameters specified in Tables 7.5A.3.5-2a and 7.5A.3.5-3a for operating band 46, for each component carrier, when operated as SCell, while both downlink carriers are active.

The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.

Table 7.5A.3.5-1: Adjacent channel selectivity

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5A.3.5-1a: Adjacent channel selectivity

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	ACS	dB				33		27

Table 7.5A.3.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS for SCC +45.5dB	REFSENS for SCC+45.5 dB	REFSENS +45.5dB	REFSENS for SCC+45.5 dB	REFSENS for SCC+42.5 dB	REFSENSf or SCC +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset from SCC)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.

Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.

Table 7.5A.3.5-2a: Test parameters for Adjacent channel selectivity, Case 1

E-UTRA Band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
	$P_{Interferer}$	dBm				REFSENS+45.5dB		REFSENS +39.5dB
	$BW_{Interferer}$	MHz				20		20
	$F_{Interferer}$ (offset)	MHz				15+0.0075/-15-0.0075		20+0.0025 / -20-0.0025

NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.

NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.4.1 and set-up according to Annex C.3.1.

Table 7.5A.3.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset from SCC)	MHz	**1.4+0.0025 /** -1.4-0.0025	**3+0.0075 /** -3-0.0075	**5+0.0025 /** -5-0.0025	**7.5+0.0075 /** -7.5-0.0075	**10+0.0125 /** -10-0.0125	**12.5+0.0025 /** -12.5-0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.4.1 and set-up according to Annex C.3.1.							

Table 7.5A.3.5-3a: Test parameters for Adjacent channel selectivity, Case 2

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm				-56.5		-50.5
	$P_{Interferer}$	dBm	-25					
	$BW_{Interferer}$	MHz				20		20
	$F_{Interferer}$ (offset)	MHz				15+0.0075/-15-0.0075		20+0.0025 / -20-0.0025
NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.								
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.4.1 and set-up according to Annex C.3.1.								

7.5A.4 Adjacent Channel Selectivity (ACS) for CA (intra-band non-contiguous DL CA without UL CA)

7.5A.4.1 Test purpose

Same as in clause 7.5A.1.1.

7.5A.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA but no UL CA.

7.5A.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5A.0.

7.5A.4.4 Test description

7.5A.4.4.1 Initial conditions

Same as in clause 7.5A.1.4.1 with the following exceptions:

- Instead of Table 7.5A.1.4.1-1→ use Tables 7.5A.4.4.1-1.

- Instead of clause 7.5A.1.4.3 → use clause 7.5A.4.4.3.

Table 7.5A.4.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes , and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	A: N/A (Range is not relevant)
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.	Refer to test point

Test Parameters for CA Configurations							
ID	CA Configuration / N_{RB_agg}		W_{gap} [MHz]	DL Allocation		UL Allocation	
	PCC N_{RB}	SCCs N_{RB}		CC MOD	PCC & SCC RB allocation	CC MOD	PCC RB allocations (L_{CRB} @ RB_{start})

Test Parameters for CA_2A-2A Configurations							
1	100	25	35	QPSK	100+25	QPSK	P_16@57
2	100	100	20	QPSK	100+100	QPSK	P_16@57
Test Parameters for CA_3A-3A Configurations							
3	100	25	50	QPSK	100+25	QPSK	P_16@50
4	100	25	15	QPSK	100+25	QPSK	P_32@68
5	100	100	35	QPSK	100+100	QPSK	P_16@50
Test Parameters for CA_4A-4A Configurations							
6	50	25	30	QPSK	50+25	QPSK	P_50@0
7[4]	50	50	25	QPSK	50+50	QPSK	P_50@0
8[3]	100	25	20	QPSK	100+25	QPSK	P_100@0
9[3]	100	100	5	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_5A-5A Configurations							
10	50	25	10	QPSK	50+25	QPSK	P_12@38
11	50	50	5	QPSK	50+50	QPSK	P_12@38
Test Parameters for CA_7A-7A Configurations							
12	100	75	35	QPSK	100+75	QPSK	P_36@64
13	100	75	15	QPSK	100+75	QPSK	P_50@50
14	100	100	30	QPSK	100+100	QPSK	P_32@68
15	100	100	15	QPSK	100+100	QPSK	P_45@55
Test Parameters for CA_23A-23A Configurations							
16	50	25	5	QPSK	50+25	QPSK	P_50@0
Test Parameters for CA_25A-25A Configurations							
17	50	25	50	QPSK	50+25	QPSK	P_10@33
18	50	25	15	QPSK	50+25	QPSK	P_32@18
19[3]	50	50	45	QPSK	50+50	QPSK	P_10@33
20[3]	50	50	10	QPSK	50+50	QPSK	P_32@18
21[4]	100	25	40	QPSK	100+25	QPSK	P_12@62
22[4]	100	100	25	QPSK	100+100	QPSK	P_12@62
Test Parameters for CA_41A-41A Configurations							
23[4]	100	25	169	QPSK	100+25	QPSK	P_100@0
24[3]	100	50	164	QPSK	100+50	QPSK	P_100@0
25	100	100	154	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_42A-42A Configurations							
26	100	25	175	QPSK	100+25	QPSK	P_100@0
27	100	100	160	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_66A-66A Configurations							
28	100	25	65	QPSK	100+25	QPSK	P_100@0
29	100	100	50	QPSK	100+100	QPSK	P_100@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.

Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.

Note 3: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration

Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration

7.5A.4.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.5A.4.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.5A.4.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.5A.4.4.1-1 on PCC. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.4.5-2 (Case 1). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5A.1.5-2 (Case 1) for carrier frequency $f \leq$ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

7. Set the Interferer signal level to the value as defined in Table 7.5A.4.5-2 (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal in Case 1 at step 7.

10. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.5A.4.5-3 (Case 2). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5A.4.5-3 (Case 2) for carrier frequency $f \leq$ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

11. Set the Interferer signal level to the value as defined in Table 7.5A.4.5-3 (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

12. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

13. Repeat steps from 10 to 12, using an interfering signal above the wanted signal in Case 2 at step 11.

7.5A.4.4.3 Message contents

The message contents are the same as in clause 7.5.4.3.

7.5A.4.5 Test requirement

The throughput of each carrier shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 under the conditions specified in table 7.5A.4.5-2, and also under the conditions specified in table 7.5A.4.5-3.

Table 7.5A.4.5-1: Adjacent channel selectivity

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5A.4.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025/ -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.5A.4.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1							

7.5A.5 Adjacent Channel Selectivity (ACS) for 3DL CA

7.5A.5.1 Test purpose

Adjacent channel selectivity for CA test verifies the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5A.5.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support 3DL with Intra-band contiguous CA or 3DL with Inter-band CA or 3DL with Intra-band contiguous Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 3DL with FDD-TDD CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 3DL CA involving Band 46.

7.5A.5.3 Minimum conformance requirements

The Minimum conformance requirements are defined in clause 7.5A.0.

7.5A.5.4 Test description

7.5A.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in tables of 5.4.2A.1 as applicable. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in tables 7.5A.5.4.1-1 to 7.5A.5.4.1-2. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.5A.5.4.1-1: Test Configuration Table

Initial Conditions	
t Environment as specified in TS 36.508[7] subclause 4.1	NC
t Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth ses.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
t CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA figuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
work signalling value	NS_01 by default

Test Parameters for CA Configurations

PCC				SCC1				SCC2			
Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
UL MOD	DL MOD	ULalloc (Note 2,3)	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLall
Default Test Settings for a CA_XD Configuration (Intra-band contiguous)											
X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All R
QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowe $N_{RB_}$
X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All R
QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High $N_{RB_}$
Default Test Settings for a CA_XA-YA-ZA Configuration (Inter-band)											
X	Mid	REFSENS	All RBs	Y	Mid	N/A	All RBs	Z	Mid	N/A	All R
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		High N_{RB}
Y	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Z	Mid	N/A	All R
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		High N_{RB}
Z	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Y	Mid	N/A	All R
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		High N_{RB}
Default Test Settings for CA_XB-YA and CA_XC-YA Configuration (Intra-band contiguous + Inter-band)											
X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All R
QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		High N_{RB}
X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All R
QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High N_{RB}
Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All R
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowe $N_{RB_}$
Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All R
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High $N_{RB_}$
Default Test Settings for CA_XA-YB and CA_XA-YC Configuration (Intra-band contiguous + Inter-band)											
Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All R
QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		High N_{RB}
Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All R
QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High N_{RB}
X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All R
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowe $N_{RB_}$
X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All R
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High $N_{RB_}$

e 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration, The applicable aggregated char bandwidths are specified in Table 5.4.2A.1-1.
e 2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
e 3: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
e 4: **Intra-band contiguous:** X corresponds to the band in the CA Configuration. E.g. for CA_41D, X=41
e 5: **Inter-band:** X,Y,Z correspond to the 1st, 2nd and 3rd band in the CA Configuration. E.g. for CA_1A-3A-19A, X=1, Y=3, Z=19
e 6: **Intra-band contiguous + Inter-band:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1C-3A, X=1 and Y=3
e 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-
e 8: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
e 9: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
e 10: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.5A.5.4.1-2: Test Configuration Table W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	X	CC2	REFSENS	All RBs	Max	X	CC1	N/A	All RBs	-	Y	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	Y	Mid	REFSENS	All RBs	-	X	CC2	N/A	All RBs	Max	X	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Default Test Settings for CA_XA-YA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	Y	CC2	REFSENS	All RBs	Max	Y	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	X	Mid	REFSENS	All RBs	-	Y	CC2	N/A	All RBs	Max	Y	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Test Settings for CA_29A-66A-66A Configuration (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	29	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
Test Settings for a CA_41C-41A Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	41	CC3	100@0	All RBs	134.2	41	CC2	N/A	All RBs	-	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_41A-41C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
2	41	CC3	100@0	All RBs	-	41	CC2	N/A	All RBs	134.2	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Group Test Settings for CA_66A-66A-XA or CA_XA-66A-66A Configurations (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
2	X	Mid	REFSENS	All RBs	-	66	CC1	N/A	All RBs	50	66	CC2	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_66A-66C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	66	CC1	100@0	All RBs	30.2	66	CC2	N/A	All RBs	-	66	CC3	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.

Note 2: **Intra-band non-contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.

Note 3: **Intra-band non-contiguous + Intra-band contiguous:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.

Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.

Note 5: **Intra-band non-contiguous + Inter-band:** X and Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A,X=2,Y=5

Note 6: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A,X=41.
Note 7: **Intra-band non-contiguous + Inter-band:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RE allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 10: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.58 if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Tables 7.5A.5.4.1-1 to 7.5A.5.4.1-2.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.5A.5.4.3.

7.5A.5.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.5A.5.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer to TS 36.321 [13] clauses 5.13 and 6.1.3.8). Wait for at least 2 seconds (Refer to TS 36.133 [4], clause 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.5A.5.4.1-1 to 7.5A.5.4.1-5 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.5A.5.4.1-1 to 7.5A.5.4.1-2 as appropriate on PCC. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCCs to the value defined for Case 1 in Table 7.5A.5.4.2-1according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq$ 3.0GHzor within +0dB, -4 dB of the target level for carrier frequency 3.0GHz < $f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.
7. Set the Interferer signal level to the value defined for Case 1 in Table 7.5A.5.4.2-1, according to the type of CA, with frequency below the measured carrier(s) according to table 7.5A.5.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document. The interferer frequencies are adjusted in analogy with table 7.5A.1.4.2-1.
8. Measure the average throughput for the carrier(s) indicated in table 7.5A.5.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to table 7.5A.5.4.2-1.
10. Set the Downlink signal level for PCC and SCCs to the value defined for Case 2 in Table 7.5A.5.4.2-1, according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq$ 3.0GHz,

or within +0dB, -4 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the Throughput measurement.

11. Set the Interferer signal level to the value defined for Case 2 in Table 7.5A.5.4.2-1, according to the type of CA, with frequency below the measured carrier(s) according to table 7.5A.5.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document. The interferer frequencies are adjusted in analogy with table 7.5A.1.4.2-1.

12. Measure the average throughput for the carrier(s) indicated in table 7.5A.5.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.

13. Repeat steps from 10 to 12, using an interfering signal above the measured carrier(s) according to table 7.5A.5.4.2-1.

14. Repeat steps 6 to 13 for component carriers listed in Table 7.5A.5.4.2-1.

Table 7.5A.5.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2	7.5A.5.5-2 7.5A.5.5-3
	2		
Inter-band	1	SCC1	7.5A.5.5-0e 7.5A.5.5-0f 7.5A.5.5-5 7.5A.5.5-6
		SCC2	
	2	SCC1	
		SCC2	
	3	SCC1	
		SCC2	
Intra-band contiguous + Inter-band	1	SCC2	7.5A.5.5-0e 7.5A.5.5-0f 7.5A.5.5-5 7.5A.5.5-6
	2		
	3	SCC1, SCC2	7.5A.5.5-0b 7.5A.5.5-0c 7.5A.5.5-2 7.5A.5.5-3
	4		
Intra-band non-contiguous + Inter-band	1	SCC2	7.5A.5.5-0e 7.5A.5.5-0f 7.5A.5.5-5 7.5A.5.5-6
	2	SCC1	
		SCC2	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.5A.5.5-5 7.5A.5.5-6
		SCC1, SCC2	7.5A.5.5-0b 7.5A.5.5-0c 7.5A.5.5-2 7.5A.5.5-3
	2	PCC, SCC1	7.5A.5.5-0b 7.5A.5.5-0c 7.5A.5.5-2 7.5A.5.5-3
		SCC2	7.5A.5.5-5 7.5A.5.5-6

Note 1: Test point ID for the particular CA configuration as defined in section 7.5A.5.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.5A.5.4.3 Message contents

The message contents are the same as in clause 7.5.4.3 for without UL CA.

The message contents are the same as in clause 7.5A.1.4.3 for UL CA.

7.5A.5.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables below, according to the type of CA.

The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.

Table 7.5A.5.5-0a: Adjacent channel selectivity for 3DL CA (band 46)

E-UTRA band	Rx Parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	ACS	dB		24	22.2		

Table 7.5A.5.5-0b: Test parameters for Adjacent channel selectivity for 3DL CA (band 46), Case 1

E-UTRA Band	Rx Parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	Pw in Transmission Bandwidth Configuration, per CC			REFSENS + 14 dB	REFSENS + 14 dB		
	PInterferer	dBm		Aggregated power + 22.5 dB	Aggregated power + 20.7 dB		
	$BW_{Interferer}$	MHz		20	20		
	$F_{Interferer\ (offset)}$	MHz		10 + F_{offset} / -10 - F_{offset}	10 + F_{offset} / -10 - F_{offset}		
NOTE 1*: In a band capable of uplink operation, the transmitter shall be set to 4dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A.							
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1 and set-up according to Annex C.3.1.							
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.							

Table 7.5A.5.5-0c: Test parameters for Adjacent channel selectivity for 3DL CA (band46), Case 2

E-UTRA band	Rx Parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	Pw in Transmission Bandwidth Configuration, per CC	dBm		-47.5 +10log10($N_{RB,c}/N_{RB\ agg}$)	-45.7 +10log10($N_{RB,c}/N_{RB\ agg}$)		
	$P_{Interferer}$	dBm	-25				
	$BW_{Interferer}$	MHz		20	20		
	$F_{Interferer}$ (offset)	MHz		10 + F_{offset} / -10 - F_{offset}	10 + F_{offset} / -10 - F_{offset}		

NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 24dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1 and set-up according to Annex C.3.1.
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.5.5-0d: Adjacent channel selectivity for 3DL CA (band 46)

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	ACS	dB				33		27

Table 7.5A.5.5-0e: Test parameters for Adjacent channel selectivity for 3DL CA (band 46), Case 1

E-UTRA Band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
	$P_{Interferer}$	dBm				REFSENS +45.5dB		REFSENS +39.5dB
	$BW_{Interferer}$	MHz				20		20
	$F_{Interferer}$ (offset)	MHz				15+0.0075 /-15-0.0075		20+0.0025 /-20-0.0025

NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1 and set-up according to Annex C.3.1.

Table 7.5A.5.5-0f: Test parameters for Adjacent channel selectivity for 3DL CA (band 46), Case 2

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm				-56.5		-50.5
	$P_{Interferer}$	dBm	-25					
	$BW_{Interferer}$	MHz				20		20
	$F_{Interferer}$ (offset)	MHz				15+0.0075 /-15-0.0075		20+0.0025 /-20-0.0025

NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1 and set-up according to Annex C.3.1.

Table 7.5A.5.5-1: Adjacent channel selectivity for 3DL CA (Intra-band contiguous)

		CA Bandwidth Class				
Rx Parameter	Units	B	C	D	E	F
ACS	dB	27	24	22.2		

Table 7.5A.5.5-2: Test parameters for Adjacent channel selectivity, Case 1, 3DL CA (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC		REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB		
$P_{Interferer}$	dBm	Aggregated power + 22.5 dB	Aggregated power + 22.5 dB	Aggregated power + 20.7 dB		
$BW_{Interferer}$	MHz	5	5	5		
$F_{Interferer}$ (offset)	MHz	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}		

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\left\lfloor \left| F_{interferer\ (offset)} \right| / 0.015 + 0.5 \right\rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.5.5-3: Test parameters for Adjacent channel selectivity, Case 2, 3DL CA (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	-50.5 +10log$_{10}$($N_{RB,c}$/ $N_{RB\ agg}$)	-47.5 +10log$_{10}$($N_{RB,c}$/$N_{RB\ agg}$)	-43.9 +10log10($N_{RB,c}$/$N_{RB\ agg}$)		
$P_{Interferer}$	dBm	-25				
$BW_{Interferer}$	MHz	5	5	5		
$F_{Interferer}$ (offset)	MHz	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}		

NOTE 1: The transmitter shall be set to 24dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\left\lfloor \left| F_{interferer\ (offset)} \right| / 0.015 + 0.5 \right\rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.5.5-4: Adjacent channel selectivity for 3DL CA (Inter-band), per CC

		Channel bandwidth					
Rx Parameter	Units	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5A.5.5-5: Test parameters for Adjacent channel selectivity for 3DL CA (Inter-band), Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +42.5dB	REFSENS for SCC +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L}.at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.							
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1							

Table 7.5A.5.5-6: Test parameters for Adjacent channel selectivity for 3DL CA (Inter-band), Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
NOTE 1: The transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.							
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

7.5A.6

7.5A.7 Adjacent Channel Selectivity (ACS) for 4DL CA

7.5A.7.1 Test purpose

Adjacent channel selectivity for CA test verifies the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5A.7.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 4DL with TDD Intra-band contiguous CA, or 4DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 4DL with Intra-band non-contiguous CA and Inter-band CA, or 4DL with Intra-band non-contiguous and Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 4DL CA with FDD-TDD CA.

7.5A.7.3 Minimum conformance requirements

The Minimum conformance requirements are defined in clause 7.5A.0.

7.5A.7.4 Test description

7.5A.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in tables of 5.4.2A.1 as applicable. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in tables 7.5A.7.4.1-1 to 7.5A.7.4.1-2. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.5A.7.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for a CA_XE Configuration (Intra-band contiguous)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA Configuration (Inter-band)																
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

Default Test Settings for CA_XB-YA-ZA and CA_XC-YA-ZA Configuration (Intra-band contiguous + Inter-band) Default Test Settings for CA_YA-XB-ZA and CA_YA-XC-ZA Configuration (Intra-band contiguous + Inter-band) Default Test Settings for CA_YA-ZA-XB and CA_YA-ZA-XC Configuration (Intra-band contiguous + Inter-band)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
Default Test Settings for CA_XC-YC Configuration (Intra-band contiguous + Inter-band(2))																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest NRB	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest NRB	N/A	QPSK		Lowest N_{RB}
3	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest NRB	N/A	QPSK		Highest N_{RB}
4	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest NRB	N/A	QPSK		Lowest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41E, X=41.
Note 6: **Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-8A,X=1,Y=3,Z=7,R=8.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 11: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.5A.7.4.1-2: Test Configuration Table with Wgap

Initial Conditions																				
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC, TL/VL, TL/VH, TH/VL, TH/VH														
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.						For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns														
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Highest N_{RB}														
Network signalling value						NS_01 by default														
Test Parameters for CA Configurations																				
ID	**PCC**				**W_{gap} [MHz]**	**SCC1**				**W_{gap} [MHz]**	**SCC2**				**W_{gap} [MHz]**	**SCC3**				
	Band	**Range**	**NRB**			**Band**	**Range**	**NRB**			**Band**	**Range**	**NRB**			**Band**	**Range**	**NRB**		
	UL MOD	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	
Default Test Settings for CA_XA-XA-YA-ZA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-XA-XA-ZA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																				
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
3	Z	Mid	REFSENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
Default Test Settings for CA_XA-XD/XD-XA/XC-XC Configurations (Intra-band non-contiguous + Intra-band contiguous)																				
TBD																				
Default Test Settings for CA_XA-XA-YA-YA Configurations (Intra-band non-contiguous + Intra-band non-contiguous)																				
1	X	CC4	REFSENS	ALL RBs	Max	X	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
2	Y	CC4	REFSENS	ALL RBs	Max	Y	CC3	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	

Note 1:	CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2:	Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3:	If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4:	**Intra-band non-contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-12A,X=2,Y=4,Z=12.
Note 5:	**Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A-41A,X=41.
Note 6:	**Intra-band non-contiguous + Intra-band non-contiguous:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-4A,X=2,Y=4.
Note 7:	REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8:	**Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 9:	The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.58.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Tables 7.5A.7.4.1-1 to 7.5A.7.4.1-2.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.5A.7.4.3.

7.5A.7.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.5A.7.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer to TS 36.321 [13] clauses 5.13 and 6.1.3.8). Wait for at least 2 seconds (Refer to TS 36.133 [4], clause 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.5A.7.4.1-1 to 7.5A.7.4.1-6 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.5A.7.4.1-1 to 7.5A.7.4.1-2 as appropriate on PCC. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCCs to the value defined for Case 1 in Table 7.5A.7.5-2 or 7.5A.7.5-5, according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq 3.0$GHzor within +0dB, -4 dB of the target level for carrier frequency 3.0GHz < $f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.
7. Set the Interferer signal level to the value defined for Case 1 in Table 7.5A.7.5-2 or 7.5A.7.5-5, according to the type of CA, with frequency below the measured carrier(s) according to table 7.5A.7.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document.
8. Measure the average throughput for the carrier(s) indicated in table 7.5A.7.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to table 7.5A.7.4.2-1.
10. Set the Downlink signal level for PCC and SCCs to the value defined for Case 2 in Table 7.5A.7.5-3 or 7.5A.7.5-6, according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq 3.0$GHz,
or within +0dB, -4 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.
11. Set the Interferer signal level to the value defined for Case 2 in Table 7.5A.7.5-3 or 7.5A.7.5-6, according to the type of CA, with frequency below the measured carrier(s) according to table 7.5A.7.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document.
12. Measure the average throughput for the carrier(s) indicated in table 7.5A.7.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.
13. Repeat steps from 10 to 12, using an interfering signal above the measured carrier(s) according to table 7.5A.7.4.2-1.
14. Repeat steps 6 to 13 for component carriers listed in Table 7.5A.7.4.2-1.

Table 7.5A.7.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3	7.5A.7.5-2 7.5A.7.5-3
	2		
Inter-band	1	SCC1	7.5A.7.5-5 7.5A.7.5-6
		SCC2	
		SCC3	
	2	SCC1	
		SCC2	
		SCC3	
	3	SCC1	
		SCC2	
		SCC3	
	4	SCC1	
		SCC2	
		SCC3	
Intra-band contiguous + Inter-band	1	SCC2 SCC3	7.5A.7.5-5 7.5A.7.5-6
	2		
	3	SCC1, SCC2, SCC3	7.5A.7.5-2 7.5A.7.5-3 7.5A.7.5-5 7.5A.7.5-6
	4		
	5	SCC1, SCC2, SCC3	7.5A.7.5-5 7.5A.7.5-6 7.5A.7.5-2 7.5A.7.5-3
	6		
Intra-band contiguous + Inter-band(2)	1	SCC2 SCC3	7.5A.7.5-2 7.5A.7.5-3 7.5A.7.5-5 7.5A.7.5-6
	2		
	3		
	4		
Intra-band non-contiguous + Inter-band	1	SCC2, SCC3	7.5A.7.5-5 7.5A.7.5-6
	2	SCC1,	7.5A.7.5-5 7.5A.7.5-6
		SCC2	
		SCC3	
	3	SCC1,	7.5A.7.5-5 7.5A.7.5-6
		SCC2	
		SCC3	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.5A.7.5-5 7.5A.7.5-6
		SCC1, SCC2, SCC3	7.5A.7.5-5 7.5A.7.5-6 7.5A.7.5-2 7.5A.7.5-3
	2	SCC2	7.5A.7.5-2 7.5A.7.5-3
		PCC, SCC1, SCC3	7.5A.7.5-5 7.5A.7.5-6 7.5A.7.5-2 7.5A.7.5-3
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC2	7.5A.7.5-5 7.5A.7.5-6
		SCC3	
	2	SCC2	
		SCC3	

Note 1: Test point ID for the particular CA configuration as defined in section 7.5A.7.4.1.

Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.

Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.5A.7.4.3 Message contents

Same message contents as in clause 7.5.4.3 for without UL CA.

Same message contents as in clause 7.5A.1.4.3 for UL CA.

7.5A.7.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables below, according to the type of CA.

The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.

Table 7.5A.7.5-1: Adjacent channel selectivity for 4DL CA (Intra-band contiguous)

		CA Bandwidth Class				
Rx Parameter	**Units**	**B**	**C**	**D**	**E**	**F**
ACS	dB	27	24	22.2	21	

Table 7.5A.7.5-2: Test parameters for Adjacent channel selectivity, Case 1, 4DL CA (Intra-band contiguous)

Rx Parameter	**Units**	**CA Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC		REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB	
$P_{Interferer}$	dBm	Aggregated power + 22.5 dB	Aggregated power + 22.5 dB	Aggregated power + 20.7 dB	Aggregated power + 19.5 dB	
$BW_{Interferer}$	MHz	5	5	5	5	
$F_{Interferer}$ (offset)	MHz	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier.

NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.

NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer} / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.7.5-3: Test parameters for Adjacent channel selectivity, Case 2, 4DL CA (Intra-band contiguous)

Rx Parameter	**Units**	**CA Bandwidth Class**				
		B	**C**	**D**	**E**	**F**

Pw in Transmission Bandwidth Configuration, per CC	dBm	-50.5 +10log$_{10}$(N$_{RB,c}$/ N$_{RB\ agg}$)	-47.5 +10log$_{10}$(N$_{RB,c}$/N$_{RB\ agg}$)	-45.7 +10log$_{10}$ (N$_{RB,c}$/N$_{RB\ agg}$)	-44.5 +10log$_{10}$(N$_{RB,c}$/N$_{RB\ agg}$)	
$P_{Interferer}$	dBm	-25				
$BW_{Interferer}$	MHz	5	5	5	5	
$F_{Interferer}$ (offset)	MHz	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	

NOTE 1: The transmitter shall be set to 24dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.

NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5\rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.7.5-4: Adjacent channel selectivity for 4DL CA (Inter-band), per CC

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5A.7.5-5: Test parameters for Adjacent channel selectivity for 4DL CA (Inter-band), Case 1

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +42.5dB	REFSENS for SCC +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L}.at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.
NOTE 3: The REFSENS power level is specified in Table 7.3.1-1 and Table 7.3.1-1a for two and four antenna ports, respectively.

Table 7.5A.7.5-6: Test parameters for Adjacent channel selectivity for 4DL CA (Inter-band), Case 2

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Power in Transmission Bandwidth Configuration for each CC	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
NOTE 1: The transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.							
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

7.5A.8 Adjacent Channel Selectivity (ACS) for 5DL CA

7.5A.8.1 Test purpose

Adjacent channel selectivity for CA test verifies the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5A.8.2 Test applicability

This test case applies to all types of E-UTRA UE release 12 and forward that support 5DL with TDD Intra-band contiguous CA, or 5DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 5DL with Intra-band non-contiguous CA or 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA, or 5DL with Intra-band non-contiguous and Intra-band non-contiguous CA, or 5DL with Intra-band contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 5DL CA with FDD-TDD CA.

7.5A.8.3 Minimum conformance requirements

The Minimum conformance requirements are defined in clause 7.5A.0.

7.5A.8.4 Test description

7.5A.8.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in tables of 5.4.2A.1 as applicable. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in tables 7.5A.8.4.1-1 to 7.5A.8.4.1-2. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.5A.8.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3				SCC4			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	UL MOD	DL MOD	UL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for a CA_XF Configuration (Intra-band contiguous)																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC5	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC5	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA-SA Configuration (Inter-band)																				
1	X	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	S	Mid	REF	ALL	X	Mid	N/A	ALL	Y	Mid	N/A	ALL	Z	Mid	N/A	ALL	R	Mid	N/A	ALL

			SENS	RBs				RBs				RBs				RBs			
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for a CA_XE-YA Configuration (Intra-band contiguous + Inter-band)																			
1	X	Mid/ CC1	REF SENSE	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENSE	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REF SENSE	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REF SENSE	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
Default Test Settings for CA_YA-ZA-XB-RA and CA_YA-ZA-XC-RA Configuration (Intra-band contiguous + Inter-band) **Default Test Settings for CA_YA-ZA-RA-XB and CA_YA-ZA-RA-XC Configuration (Intra-band contiguous + Inter-band)**																			
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs

	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
7	R	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
8	R	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
Default Test Settings CA_XB-YB-ZA, CA_XB-YC-ZA, CA_XC-YB-ZA, and CA_XC-YC-ZA Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band) **Default Test Settings CA_ZA-XB-YB, CA_ZA-XB-YC, CA_ZA-XC-YB, and CA_ZA-XC-YC Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band)**																			
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41F, X=41.
Note 6: **Inter-band:** X,Y,Z,R,S correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-20A-42A,X=1,Y=3,Z=7,R=20,S=42.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.

Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.

Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.5A.8.4.1-2: Test Configuration Table with Wgap

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3				W_{gap} [MHz]	SCC4			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA-ZA-RA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-ZA-XA-XA-RA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-RA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																								
1	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REF SENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REF SENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
4	R	Mid	REF SENS	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XA-YD Configurations (Intra-band non-contiguous + Intra-band contiguous)																								
1	Y	CC3	REF SENS	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}
2	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XA-YA-ZA-ZA Configurations Intra-band non-contiguous + Intra-band non-contiguous																								
1	Z	CC2	REF SENS	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_ag}		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$

				$_{g}$					$_{agg}$					$_{agg}$					$_{agg}$				$_{agg}$
2	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Y	Mid	REF SENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band non-contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-12A-66A,X=2,Y=5,Z=12,R=66.
Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X,Y corresponds to the band of the CA Configuration. E.g. for CA_5A-5A-66D,X=5,Y=66.
Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-66A-66A,X=2,Y=5,Z=66.
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_CC1} = N_{RB_CC2} for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.58 if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Tables 7.5A.8.4.1-1 to 7.5A.8.4.1-2.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.5A.8.4.3.

7.5A.8.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.5A.8.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer to TS 36.321 [13] clauses 5.13 and 6.1.3.8). Wait for at least 2 seconds (Refer to TS 36.133 [4], clause 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.5A.8.4.1-1 to 7.5A.8.4.1-6 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Tables 7.5A.8.4.1-1 to 7.5A.8.4.1-2 as appropriate on PCC. Since the UE has no payload and no loopback data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level for PCC and SCCs to the value defined for Case 1 in Table 7.5A.8.5-2 or 7.5A.8.5-5, according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq 3.0$GHzor within +0dB, -4 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.
7. Set the Interferer signal level to the value defined for Case 1 in Table 7.5A.8.5-2 or 7.5A.8.5-5, according to the type of CA, with frequency below the measured carrier(s) according to table 7.5A.8.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document.
8. Measure the average throughput for the carrier(s) indicated in table 7.5A.8.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to table 7.5A.8.4.2-1.
10. Set the Downlink signal level for PCC and SCCs to the value defined for Case 2 in Table 7.5A.8.5-3 or 7.5A.8.5-6, according to the type of CA. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the PCC output power is within +0dB, -3.4 dB of the target level for carrier frequency $f \leq 3.0$GHz,
or within +0dB, -4 dB of the target level for carrier frequency 3.0GHz $< f \leq 4.2$GHz, for at least the duration of the Throughput measurement.
11. Set the Interferer signal level to the value defined for Case 2 in Table 7.5A.8.5-3 or 7.5A.8.5-6, according to the type of CA, with frequency below the measured carrier(s) according to table 7.5A.8.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document.
12. Measure the average throughput for the carrier(s) indicated in table 7.5A.8.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.
13. Repeat steps from 10 to 12, using an interfering signal above the measured carrier(s) according to table 7.5A.8.4.2-1.

14. Repeat steps 6 to 13 for component carriers listed in Table 7.5A.8.4.2-1.

Table 7.5A.8.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3,SCC4	7.5A.8.5-2 7.5A.8.5-3
	2		
Inter-band	1	SCC1	7.5A.8.5-5 7.5A.8.5-6
		SCC2	
		SCC3	
		SCC4	
	2	SCC1	
		SCC2	
		SCC3	
		SCC4	
	3	SCC1	
		SCC2	
		SCC3	
		SCC4	
	4	SCC1	
		SCC2	
		SCC3	
		SCC4	
	5	SCC1	
		SCC2	
		SCC3	
		SCC4	
Intra-band contiguous + Inter-band	1	SCC4	7.5A.8.5-5 7.5A.8.5-6
	2		
	3	SCC1, SCC2, SCC3, SCC4	7.5A.8.5-2 7.5A.8.5-3 7.5A.8.5-5 7.5A.8.5-6
	4		
Intra-band contiguous + Inter-band	1	SCC2 SCC3 SCC4	7.5A.8.5-5 7.5A.8.5-6
	2		
	3	SCC1, SCC2, SCC3,SCC4	7.5A.8.5-2 7.5A.8.5-3 7.5A.8.5-5 7.5A.8.5-6
	4		
	5	SCC1, SCC2, SCC3,SCC4	7.5A.8.5-2 7.5A.8.5-3 7.5A.8.5-5 7.5A.8.5-6
	6		
	7	SCC1, SCC2, SCC3,SCC4	7.5A.8.5-2 7.5A.8.5-3 7.5A.8.5-5 7.5A.8.5-6
	8		
Intra-band contiguous + Intra-band contiguous + Inter-band	1	SCC2, SCC3, SCC4	7.5A.8.5-2 7.5A.8.5-3 7.5A.8.5-5 7.5A.8.5-6
	2		
	3		
	4		
	5	SCC1, SCC2, SCC3, SCC4	7.5A.8.5-2 7.5A.8.5-3 7.5A.8.5-5 7.5A.8.5-6
	6		
Intra-band non-contiguous + Inter-band	1	SCC1, SCC2, SCC3, SCC4	7.5A.8.5-5 7.5A.8.5-6
	2	SCC1, SCC2, SCC3, SCC4	7.5A.8.5-5 7.5A.8.5-6
	3	SCC1, SCC2, SCC3, SCC4	7.5A.8.5-5 7.5A.8.5-6
	4	SCC1, SCC2, SCC3, SCC4	7.5A.8.5-5 7.5A.8.5-6
Intra-band non-	1	PCC, SCC1, SCC2	7.5A.8.5-2

contiguous + Intra-band contiguous			7.5A.8.5-3
		SCC3, SCC4	7.5A.8.5-5 7.5A.8.5-6
	2	SCC1, SCC2, SCC3, SCC4	7.5A.8.5-5 7.5A.8.5-6
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC1, SCC2, SCC3, SCC4	7.5A.8.5-5 7.5A.8.5-6
	2		
	3		
Note 1: Test point ID for the particular CA configuration as defined in section 7.5A.8.4.1. Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on. Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.			

7.5A.8.4.3 Message contents

Same message contents as in clause 7.5.4.3 for without UL CA.

Same message contents as in clause 7.5A.1.4.3 for UL CA.

7.5A.8.5 Test requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables below, according to the type of CA.

Table 7.5A.8.5-1: Adjacent channel selectivity for 5DL CA (Intra-band contiguous)

		CA Bandwidth Class				
Rx Parameter	**Units**	**B**	**C**	**D**	**E**	**F**
ACS	dB	27	24	22.2	21	20

Table 7.5A.8.5-2: Test parameters for Adjacent channel selectivity, Case 1, 5DL CA (Intra-band contiguous)

Rx Parameter	**Units**	**CA Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC		REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB	REFSENS + 14 dB
$P_{Interferer}$	dBm	Aggregated power + 22.5 dB	Aggregated power + 22.5 dB	Aggregated power + 20.7 dB	Aggregated power + 19.5 dB	Aggregated power + 18.5 dB
$BW_{Interferer}$	MHz	5	5	5	5	5
$F_{Interferer}$ (offset)	MHz	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}	2.5 + F_{offset} / -2.5 - F_{offset}
NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier. NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1. NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5 \rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.						

Table 7.5A.8.5-3: Test parameters for Adjacent channel selectivity, Case 2, 5DL CA (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	-50.5 +10log$_{10}$(N$_{RB,c}$/ N$_{RB\ agg}$)	-47.5 +10log$_{10}$(N$_{RB,c}$/N$_{RB\ agg}$)	-45.7 +10log$_{10}$ (N$_{RB,c}$/N$_{RB\ agg}$)	-44.5 +10log$_{10}$(N$_{RB,c}$/N$_{RB\ agg}$)	-43.5 +10log$_{10}$(N$_{RB,c}$/N$_{RB\ agg}$)
$P_{Interferer}$	dBm	-25				
$BW_{Interferer}$	MHz	5	5	5	5	5
$F_{Interferer}$ (offset)	MHz	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}	2.5+ F_{offset} / -2.5- F_{offset}

NOTE 1: The transmitter shall be set to 24dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.
NOTE 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5\rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.5A.8.5-4: Adjacent channel selectivity for 5DL CA (Inter-band), per CC

		Channel bandwidth					
Rx Parameter	Units	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5A.8.5-5: Test parameters for Adjacent channel selectivity for 5DL CA (Inter-band), Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +45.5dB	REFSENS for SCC +42.5dB	REFSENS for SCC +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L}.at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.
NOTE 3: The REFSENS power level is specified in Table 7.3.1-1 and Table 7.3.1-1a for two and four antenna ports, respectively.

Table 7.5A.8.5-6: Test parameters for Adjacent channel selectivity for 5DL CA (Inter-band), Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz

Power in Transmission Bandwidth Configuration for each CC	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
NOTE 1: The transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in subclause 6.2.5.							
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

7.5B Adjacent Channel Selectivity (ACS) for UL-MIMO

7.5B.1 Test purpose

Adjacent channel selectivity tests the ability of UE that support UL-MIMO to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

7.5B.3 Minimum conformance requirements

For UE(s) with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in Clause 7.5.3 shall be met with the UL-MIMO configurations specified in Table 6.2.2B.3-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 36.101 [2] clause 7.5.1B.

7.5B.4 Test description

7.5B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.5B.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.5B.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	Full	Full	QPSK	5	5
3MHz	QPSK	Full	Full	QPSK	4	4
5MHz	QPSK	Full	Full	QPSK	8	8
5MHz	QPSK	Full	N/A	QPSK	5[3]	N/A
10MHz	QPSK	Full	Full	QPSK	12	12
15MHz	QPSK	Full	Full	QPSK	16	16
20MHz	QPSK	Full	Full	QPSK	18	18
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band. The applicable channel bandwidths are specified in Table 7.3.3-2. Note 2: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used. Note 3: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS and interfering source to the UE antenna connectors as shown in TS 36.508 [7] Figure A.29.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.5B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.5B.4.3.

7.5B.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.5B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 7.5B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.5B.5-2 (Case 1). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5B.5-2 (Case 1) for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.
4. Set the Interferer signal level to the value as defined in Table 7.5B.5-2 (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 4.
7. Set the Downlink signal level to the value as defined in Table 7.5B.5-3 (Case 2). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5B.5-3 (Case 2) for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB

of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the throughput measurement.

8. Set the Interferer signal level to the value as defined in Table 7.5B.5-3 (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

9. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

10. Repeat steps from 7 to 9, using an interfering signal above the wanted signal in Case 2 at step 8.

11. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.

7.5B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception

Table 7.5B.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.5B.5 Test requirement

The throughput R_{av} shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 under the conditions specified in table 7.5B.5-2, and also under the conditions specified in table 7.5B.5-3.

Table 7.5B.5-1: Adjacent channel selectivity

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5B.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB*	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025	3+0.0075	5+0.0025	7.5+0.0075	10+0.0125	12.5+0.0025
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.5B.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025	3+0.0075	5+0.0025	7.5+0.0075	10+0.0125	12.5+0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

7.5D Adjacent Channel Selectivity (ACS) for ProSe

7.5D.0 Minimum conformance requirements

The UE shall fulfil the minimum requirement specified in Table 7.5D.0-1 for all values of an adjacent channel interferer up to –25 dBm. However it is not possible to directly measure the ACS, instead the lower and upper range of test parameters are chosen in Table 7.5D.0-2 and Table 7.5D.0-3 where the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2.

Table 7.5D.0-1: Adjacent channel selectivity for ProSe

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
ACS	dB			33.0	33.0	30	27

Table 7.5D.0-2: Test parameters for Adjacent channel selectivity for ProSe, Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + 14 dB					
$P_{Interferer}$	dBm			REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz			5	5	5	5
$F_{Interferer}$ (offset)	MHz			5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS 36.211.							

Table 7.5D.0-3: Test parameters for Adjacent channel selectivity for ProSe, Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm			-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz			5	5	5	5
$F_{Interferer}$ (offset)	MHz			5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS 36.211.							

The normative reference for this requirement is TS 36.101 [2] clause 7.5.1D.

7.5D.1 Adjacent Channel Selectivity (ACS) for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Use of OCNG for Downlink has not been considered and is still FFS.
- Message exceptions content needs further investigation (some values still TBD).
- Test time is FFS.

7.5D.1.1 Test Purpose

Adjacent channel selectivity tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5D.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

7.5D.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.5D.0.

7.5D.1.4 Test Description

7.5D.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA ProSe bands specified in table 5.4.2D.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.5D.1.4.1-1. The details of the downlink, uplink and sidelink reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.6.

Table 7.5D.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1			NC			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1			Mid range(Note 4)			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			5MHz, Highest			
	Downlink Configuration (Note 2)		**Uplink Configuration (Note 2)**		**Sidelink Configuration (Reception) (Note 3)**	
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Mod'n	RB allocation
5MHz	QPSK	8	QPSK	8	QPSK	2
10MHz	QPSK	16	QPSK	16	QPSK	2
15MHz	QPSK	25	QPSK	25	QPSK	2
20MHz	QPSK	30	QPSK	30	QPSK	2
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA ProSe and Operating band, according to the applicability specified respectively in Table 5.4.2D.1-1 and Table 5.4.2.1-1. Note 2: After DRX configuration, DL-RMC (PDSCH) and DCI-0 for scheduling UL-RMC (PUSCH) are applied only in the DRX On subframes. Note 3: The RB start for the transmission of Sidelink RMC is RB#0. Note 4: Sidelink uses the frequencies defined for Uplink.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.70.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.5D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 7.5D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

7.5D.1.4.2 Test Procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 7.5D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.

3. Initialise the variables Ptot and Pok as 0.

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.5D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.5D.1.4.1-1. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.

6. SS transmits PSDCH to transmit the SL RMC according to Table 7.5D.1.4.1-1. Set the Sidelink signal level to the appropriate value defined in Table 7.5D.1.4.1-1 to the value as defined in Table 7.5D.1.5-2 (Case 1)

7. Set the Interferer signal level to the value as defined in Table 7.5D.1.5-2 (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable Ptot.

9. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".

10. SS calculates the variable Pok as (current counter value - counter value at last test iteration).

11. SS shall compute the throughput as following:

    TP = Pok / Ptot * 100%

12. Repeat steps from 6 to 12, using an interfering signal above the wanted signal in Case 1 at step 7.

13. SS transmits PSDCH to transmit the SL RMC according to Table 7.5D.1.4.1-1. Set the Sidelink signal level to the appropriate value defined in Table 7.5D.1.4.1-1 to the value as defined in Table 7.5D.1.5-3 (Case 2)

14. Set the Interferer signal level to the value as defined in Table 7.5D.1.5-3 (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

15. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable Ptot.

16. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".

17. SS calculates the variable Pok as (current counter value - counter value at last test iteration).

18. SS shall compute the throughput as following:

    TP = Pok / Ptot * 100%

19. Repeat steps from 13 to 18, using an interfering signal above the wanted signal in Case 2 at step 14.

7.5D.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 7.5D.1.4.3-1: ACTIVATE TEST MODE: ACS for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 7.5D.1.4.3-2: CLOSE UE TEST LOOP: ACS for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 7.5D.1.4.3-3: MAC-MainConfig-RBC: ACS for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

7.5D.1.5 Test Requirement

The throughput TP shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Tables 7.5D.1.5-1, 7.5D.1.5-2 and 7.5D.1.5-3.

Table 7.5D.1.5-1: Adjacent channel selectivity for ProSe

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB			33.0	33.0	30	27

Table 7.5D.1.5-2: Test parameters for Adjacent channel selectivity for ProSe, Case 1

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + 14 dB					
$P_{Interferer}$	dBm			REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz			5	5	5	5
$F_{Interferer}$ (offset)	MHz			5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.5D.1.5-3: Test parameters for Adjacent channel selectivity for ProSe, Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm			-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz			5	5	5	5
$F_{Interferer}$ (offset)	MHz			5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

7.5D.2 Adjacent Channel Selectivity (ACS) for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test procedure is TBD
- Message contents are TBD

7.5D.2.1 Test Purpose

Same test purpose as in clause 7.5D.1.

7.5D.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

7.5D.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.5D.0.

7.5D.2.4 Test Description

7.5D.2.4.1 Initial Conditions

TBD

7.5D.2.4.2 Test Procedure

TBD

7.5D.2.4.3 Message Contents

TBD

7.5D.2.5 Test Requirement

Same test requirement as in clause 7.5D.1.5.

7.5E Adjacent Channel Selectivity (ACS) for category 0

7.5E.1 Test purpose

Same test purpose as in clause 7.5.1.

7.5E.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward of category 0.

7.5E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.5.3

7.5E.4 Test description

7.5E.4.1 Initial conditions

Same initial conditions as in clause 7.5.4.1 with the following exceptions:

- Instead of Table 7.5.4.1-1 → use Table 7.5E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.4 using only main UE Tx/Rx antenna.

Table 7.5E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] clause 4.1	NC					
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD and HD-FDD	TDD		FDD and HD-FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	14	14	QPSK	15	15
5MHz	QPSK	14	14	QPSK	25	25
5MHz	QPSK	14	N/A	QPSK	20	N/A
10MHz	QPSK	14	14	QPSK	36	36
10MHz	QPSK	14	N/A	QPSK	25	N/A
10MHz	QPSK	14	N/A	QPSK	20	N/A
15MHz	QPSK	14	14	QPSK	36	36
15MHz	QPSK	14	N/A	QPSK	20	N/A
20MHz	QPSK	14	14	QPSK	36	36
20MHz	QPSK	14	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3E.3-3 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Downlink RB position shall be RB_{start} = 0.						

7.5E.4.2 Test procedure

Same test procedure as in clause 7.5.4.2

7.5E.4.3 Message contents

Same message contents as in clause 7.5.4.3.

7.5E.5 Test requirement

The throughput R_{av} shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 under the conditions specified in table 7.5E.5-2, and also under the conditions specified in table 7.5E.5-3.

Table 7.5E.5-1: Adjacent channel selectivity

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5E.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025/ -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.5E.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025 / -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025	7.5+0.0075 / -7.5-0.0075	10+0.0125 / -10-0.0125	12.5+0.0025 / -12.5-0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

7.5EA Adjacent Channel Selectivity (ACS) for UE category M1

7.5EA.1 Test purpose

Adjacent channel selectivity tests the ability of category M1 UE to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5EA.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward of category M1.

7.5EA.3 Minimum conformance requirements

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive an E-UTRA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

The UE shall fulfil the minimum requirement specified in Table 7.5EA.3-1 for all values of an adjacent channel interferer up to –25 dBm. However it is not possible to directly measure the ACS, instead the lower and upper range of test parameters are chosen in Table 7.5EA.3-2 and Table 7.5EA.3-3 where the throughput R_{av} shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1). For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.5EA.3-1: Adjacent channel selectivity

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB	33.0	33.0	33.0	33.0	30	27

Table 7.5EA.3-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB					
$P_{Interferer}$	dBm	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +42.5dB	REFSENS +39.5dB
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	**1.4+0.0025 /** -1.4-0.0025	**3+0.0075 /** -3-0.0075	**5+0.0025 /** -5-0.0025	**7.5+0.0075 /** -7.5-0.0075	**10+0.0125 /** -10-0.0125	**12.5+0.0025 /** -12.5-0.0025
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in clause 6.2.5EA.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							
Note 3: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2 should be used as REFSENS for the power in Transmission Bandwidth Configuration and $P_{Interferer}$.							
Note 4: For DL category M1 UE, the parameters for the applicable channel bandwidth apply.							

Table 7.5EA.3-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**

Power in Transmission Bandwidth Configuration	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Interferer}$ (offset)	MHz	**1.4+0.0025 /** -1.4-0.0025	**3+0.0075 /** -3-0.0075	**5+0.0025 /** -5-0.0025	**7.5+0.0075 /** -7.5-0.0075	**10+0.0125 /** -10-0.0125	**12.5+0.0025 /** -12.5-0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in clause 6.2.5EA.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

The normative reference for this requirement is TS 36.101 [2] clause 7.5.1.

7.5EA.4 Test description

7.5EA.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands defined for CAT M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.5EA.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 7.5EA.4.1-1: Test Configuration Table RX test cases UE Cat-M1

Initial Conditions						
Test Environment as specified in TS 36.508[7] clause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] clause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.	1.4, 3MHz, 5MHz					
Test Parameters for Channel Bandwidths and Narrowband positions						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD and HD-FDD	TDD		FDD and HD-FDD	TDD
1.4MHz	QPSK	4	4	QPSK	6	6
3MHz	QPSK	4	4	QPSK	6	6
5MHz	QPSK	4	4	QPSK	6	6
Note 1: Downlink RB position shall be RB_{start} = 0 within the narrowband.						
Note 2: Use narrowband index (TS36.211, 5.2.4) 0 when interferer is below carrier, and max narrowband index when interferer is above carrier.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.4 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.5EA.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.5EA.4.3.

7.5EA.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 7.5EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via M-PDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 7.5EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.5EA.5-2 (Case 1). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5EA.5-2 (Case 1) for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

4. Set the Interferer signal level to the value as defined in Table 7.5EA.5-2 (Case 1) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 4.

7. Set the Downlink signal level to the value as defined in Table 7.5EA.5-3 (Case 2). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.5EA.5-3 (Case 2) for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

8. Set the Interferer signal level to the value as defined in Table 7.5EA.5-3 (Case 2) and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

9. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

10. Repeat steps from 7 to 9, using an interfering signal above the wanted signal in Case 2 at step 8.

11. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.

7.5EA.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception:

Table 7.5EA.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.5EA.5 Test requirement

The throughput R_{av} shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.2.2, A.2.3 and A.3.2 with parameters specified in table 7.5EA.5-2, and also under the conditions specified in table 7.5EA.5-3.

Table 7.5EA.5-1: Adjacent channel selectivity

		Channel bandwidth		
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**
ACS	dB	33.0	33.0	33.0

Table 7.5EA.5-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	**Units**	**Channel bandwidth**		
		1.4MHz	**3 MHz**	**5 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB		
$P_{Interferer}$	dBm	REFSENS +45.5dB	REFSENS +45.5dB	REFSENS +45.5dB
$BW_{Interferer}$	MHz	1.4	3	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025/ -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in clause 6.2.5EA.				
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.				
Note 3: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2 should be used as REFSENS for the power in Transmission Bandwidth Configuration and $P_{Interferer}$.				
Note 4: For DL category M1 UE, the parameters for the applicable channel bandwidth apply.				

Table 7.5EA.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	**Units**	**Channel bandwidth**		
		1.4 MHz	**3 MHz**	**5 MHz**

Power in Transmission Bandwidth Configuration	dBm	-56.5	-56.5	-56.5
$P_{Interferer}$	dBm	-25		
$BW_{Interferer}$	MHz	1.4	3	5
$F_{Interferer}$ (offset)	MHz	1.4+0.0025/ -1.4-0.0025	3+0.0075 / -3-0.0075	5+0.0025 / -5-0.0025
Note 1: The transmitter shall be set to 24dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5EA.				
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.				

7.5F Adjacent Channel Selectivity (ACS) for category NB1

7.5F.1 Test purpose

Adjacent channel selectivity tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1 UE.

7.5F.3 Minimum conformance requirements

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive a signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

Category NB1 UE shall fulfil the minimum requirement specified in Table 7.5F.3-1 for all values of an adjacent channel interferer up to –25 dBm. However it is not possible to directly measure the ACS, instead the lower and upper range of test parameters are chosen in Table 7.5F.3-1 where the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A.3.2.

Table 7.5F.3-1: Adjacent channel selectivity parameters for category NB1 UE

ACS1 test Parameters		
Interferer	**GSM (GMSK)**	**E-UTRA**
Category NB1 signal power (P_{wanted}) / dBm	REFSENS + 14 dB	
interferer signal power ($P_{Interferer}$) / dBm	REFSENS + 42 dB	REFSENS + 47 dB
Interferer bandwidth	200 kHz	5 MHz
Interferer offset from category NB1 channel edge	±200 kHz	±2.5 MHz
ACS2 test Parameters		
Interferer	**GSM (GMSK)**	**E-UTRA**
Category NB1 signal power (P_{wanted}) / dBm	-25 dBm -28 dB	-25 dBm -33 dB
interferer signal power ($P_{Interferer}$) / dBm	-25 dBm	
Interferer bandwidth	200 kHz	5 MHz
Interferer offset from category NB1 channel edge	±200 kHz	±2.5 MHz

The normative reference for this requirement is TS 36.101 [2] clause 7.5.1F.

7.5F.4 Test description

7.5F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 7.5F.4.1-1. The details of the downlink reference measurement channel (RMC) are specified in Annex A.3. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 7.5F.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] clause 8.1.1			NC		
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defined in Annex K.1.1		
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Modulation	Subcarriers	Modulation	N_{tones}	Subcarrier spacing
1	QPSK	12	BPSK	1@0	15kHz

1. Connect the SS to the UE antenna connector as shown in TS 36.508 [7] Annex A, Figure A.4 using only the main UE Tx/Rx antenna, and noting that the interference can be either GSM or E-UTRA.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.2, and NPUSCH Format 2 is used to carry ACK/NACK on the uplink.
4. The DL Reference Measurement channel is set according to Table 7.5F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 7.5F.4.3.

7.5F.4.2 Test procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.5F.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send HARQ feedback based on information contained in DCI format N1.
2. Set the Downlink signal level to the value defined for ACS1, GSM in Table 7.5F.5-1. For steps 2 to 5 and 6 to 9, use the default message contents.
3. Set the Interferer signal level to the value defined for ACS1, GSM in Table 7.5F.5-1, with frequency below the wanted signal according to table 7.5F.5-1, using a modulated interferer bandwidth as defined in Annex D.2 of the present document.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
5. Repeat steps 2 to 4, using an interfering signal above the wanted signal at step 3.
6. Set the Downlink signal level to the value defined for ACS1, E-UTRA in Table 7.5F.5-1.
7. Set the Interferer signal level to the value defined for ACS1, E-UTRA in Table 7.5F.5-1, with frequency below the wanted signal according to table 7.5F.5-1, using a modulated interferer bandwidth as defined in Annex D.2 of the present document.

8. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

9. Repeat steps 6 to 8, using an interfering signal above the wanted signal at step 7.

10. Release the connection through State 3A-NB.

11. Modify system information elements according to Table 7.5F.4.3-1 and notify the UE via paging message with SystemInformationModification included.

12. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5 using the new UL power control setting.

13. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.5F.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send HARQ feedback based on information contained in DCI format N1.

14. Set the Downlink signal level to the value defined for ACS2, GSM in Table 7.5F.5-1. For steps 14 to 17 and 18 to 21, use message contents with the exceptions defined in Table 7.5F.4.3-1.

15. Set the Interferer signal level to the value defined for ACS2, GSM in Table 7.5F.5-1, with frequency below the wanted signal according to table 7.5F.5-1, using a modulated interferer of 5MHz bandwidth defined in Annex D.2 of the present document.

16. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

17. Repeat steps 14 to 16, using an interfering signal above the wanted signal at step 15.

18. Set the Downlink signal level to the value defined for ACS2, E-UTRA in Table 7.5F.5-1.

19. Set the Interferer signal level to the value defined for ACS2, E-UTRA in Table 7.5F.5-1, with frequency below the wanted signal according to table 7.5F.5-1, using a modulated interferer of 5MHz bandwidth defined in Annex D.2 of the present document.

20. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

21. Repeat steps 18 to 20, using an interfering signal above the wanted signal at step 19.

7.5F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 8.1.6 with the following exceptions:

Table 7.5F.4.3-1: UplinkPowerControlCommon-NB-DEFAULT: ACS2

Derivation Path: TS 36.508 [7] clause 8.1.6.3, Table 8.1.6.3-14 UplinkPowerControlCommon-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-NB-DEFAULT ::= SEQUENCE { p0-NominalNPUSCH-r13	-70		

7.5F.5 Test requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.5F.5-1.

Table 7.5F.5-1: Test parameters for Adjacent channel selectivity, category NB1

ACS1 test Parameters		
Interferer	**GSM (GMSK)**	**E-UTRA**
Category NB1 signal power (P_{wanted}) / dBm	REFSENS + 14 dB	
interferer signal power ($P_{Interferer}$) / dBm	REFSENS + 42 dB	REFSENS + 47 dB
Interferer bandwidth	200 kHz	5 MHz
Interferer offset from category NB1 channel edge	±200 kHz	±2.5 MHz
ACS2 test Parameters		
Interferer	**GSM (GMSK)**	**E-UTRA**
Category NB1 signal power (P_{wanted}) / dBm	-53 dBm	-58 dBm
interferer signal power ($P_{Interferer}$) / dBm	-25 dBm	
Interferer bandwidth	200 kHz	5 MHz
Interferer offset from category NB1 channel edge	±200 kHz	±2.5 MHz

7.5G Adjacent Channel Selectivity (ACS) for V2X Communication

7.5G.1 Adjacent channel selectivity (ACS) for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration table is investigating.
- UE test mode is FFS

7.5G.1.1 Test Purpose

Adjacent channel selectivity tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when other e-NodeB transmitters exist in the adjacent channel.

7.5G.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.5G.1.3 Minimum Conformance Requirements

The V2X UE shall fulfil the minimum requirement specified in Table 7.5G.1.3-1 for all values of an adjacent channel interferer up to -25 dBm. However it is not possible to directly measure the ACS, instead the lower and upper range of test parameters are chosen in Table 7.5G.1.3-2 and Table 7.5G.1.3-3 where the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2.

Table 7.5G.1.3-1: Adjacent channel selectivity for V2X

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB				33.0		27

Table 7.5G.1.3-2: Test parameters for Adjacent channel selectivity for V2X, Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + 14 dB					
$P_{Interferer}$	dBm				$P_{REFSENS_V2X}$ +45.5dB		$P_{REFSENS_V2X}$ +39.5dB
$BW_{Interferer}$	MHz				10		10
$F_{Interferer}$ (offset)	MHz				10+0.0125 / -10-0.0125		15+0.0075 / -15-0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.5G.1.3-3: Test parameters for Adjacent channel selectivity for V2X, Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm				-56.5		-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz				10		10
$F_{Interferer}$ (offset)	MHz				10+0.0125 / -10-0.0125		15+0.0075 / -15-0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

The normative reference for this requirement is TS 36.101 [2] clause 7.5.1G.

7.5G.1.4 Test Description

7.5G.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.5G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A. 8.3. GNSS simulator is configured as Table C.2-8 in Annex C.2.

Table 7.5G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.92a.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 7.5G.1.4.3.
3. The V2X reference measurement channel is set according to Table 7.5G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode – FFS.

7.5G.1.4.2 Test Procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.5G.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Set the Interferer signal level to the value as defined in Table 7.5G.1.5-2 (Case 1) and frequency below and above the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.
3. Measure the mean power of the UE in the channel bandwidth for each test point in table 7.5G.1.5-2 according to the test configuration from Table 7.5G.1.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).
4. Set the Interferer signal level to the value as defined in Table 7.5G.1.5-3 (Case 2) and frequency below and above the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.5G.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.10.

7.5G.1.5 Test Requirement

The throughput R_{av} shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 under the conditions specified in table 7.5G.1.5-2, and also under the conditions specified in table 7.5G.1.5-3.

Table 7.5G.1.5-1: Adjacent channel selectivity for V2X

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB				33.0		27

Table 7.5G.1.5-2: Test parameters for Adjacent channel selectivity for V2X, Case 1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + 14 dB					
$P_{Interferer}$	dBm				$P_{REFSENS_V2X}$ +45.5dB		$P_{REFSENS_V2X}$ +39.5dB
$BW_{Interferer}$	MHz				10		10
$F_{Interferer}$ (offset)	MHz				10+0.0125 / -10-0.0125		15+0.0075 / -15-0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.5G.1.5-3: Test parameters for Adjacent channel selectivity for V2X, Case 2

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm				-56.5		-50.5
$P_{Interferer}$	dBm	-25					
$BW_{Interferer}$	MHz				10		10
$F_{Interferer}$ (offset)	MHz				10+0.0125 / -10-0.0125		15+0.0075 / -15-0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

7.5G.2 Adjacent channel selectivity (ACS) for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration table is investigating.
- Test procedure is TBD
- Message contents are TBD

7.5G.2.1 Test Purpose

The test purpose is the same as in clause 7.5G.1.1.

7.5G.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.5G.2.3 Minimum Conformance Requirements

The V2X UE shall fulfil the minimum requirement specified in Table 7.5G.2.3-1 for all values of an adjacent channel interferer up to -22 dBm. However it is not possible to directly measure the ACS, instead the lower and upper range of test parameters are chosen in Table 7.5G.2.3-2 and Table 7.5G.2.3-3 where the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2

Table 7.5G.2.3-1: Adjacent channel selectivity for V2X

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB				33.0		27

Table 7.5G.2.3-2: Test parameters for Adjacent channel selectivity for V2X, Case 1

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	DBm	$P_{REFSENS_V2X}$ + 14 dB					
$P_{Interferer}$	DBm				$P_{REFSENS_V2X}$ +45.5dB		$P_{REFSENS_V2X}$ +39.5dB
$BW_{Interferer}$	MHz				10		10
$F_{Interferer}$ (offset)	MHz				10+0.0125 / -10-0.0125		15+0.0075 / -15-0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.5G.2.3-3: Test parameters for Adjacent channel selectivity for V2X, Case 2

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	DBm				-53.5		-47.5
$P_{Interferer}$	DBm	-22					
$BW_{Interferer}$	MHz				10		10
$F_{Interferer}$ (offset)	MHz				10+0.0125 / -10-0.0125		15+0.0075 / -15-0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 7.5G.2 apply for the E-UTRA V2X sidelink reception and the requirements in subclause 7.5.3 apply for the E-UTRA downlink reception while all downlink carriers are active.

The normative reference for this requirement is TS 36.101 [2] clause 7.5.1G.

7.5G.2.4 Test Description

7.5G.2.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.5G.2.4.1-1. The details of the uplink, downlink and V2X reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.8.3 respectively.

Table 7.5G.2.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Mid range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			Lowest, 5MHz, Highest for uplink Lowest, Highest for V2X				
Test Parameters for Channel Bandwidths							
	Downlink		**Uplink Configuration**		**V2X Configuration**		
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz	QPSK	1	QPSK	1	10 MHz	QPSK	[48]
1.4 MHz	QPSK	5	QPSK	5	20 MHz	QPSK	[96]
3 MHz	QPSK	1	QPSK	1			
3 MHz	QPSK	4	QPSK	4			
5 MHz	QPSK	1	QPSK	1			
5 MHz	QPSK	8	QPSK	8			
10 MHz	QPSK	1	QPSK	1			
10 MHz	QPSK	12	QPSK	12			
15 MHz	QPSK	1	QPSK	1			
15 MHz	QPSK	16	QPSK	16			
20 MHz	QPSK	1	QPSK	1			
20 MHz	QPSK	18	QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 7.5G.2.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.5G.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.5G.2.4.3.

7.5G.2.4.2 Test Procedure

1. The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.5G.2.4.1-1 on E-UTRA Band. The SS sends downlink MAC padding bits on the DL RMC.
2. SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 7.5G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.
3. Set the Downlink signal level for V2X band and E-UTRA band to the value as defined in Table 7.5G.2.5-2 (Case 1). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power [TBD] for carrier frequency $f \leq 6.0$GHz, for at least the duration of the Throughput measurement.
4. Set the Interferer signal level to the value as defined in Table 7.5G.2.5-2 (Case 1) and frequency below and above the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.
5. Measure the mean power of the UE in the channel bandwidth for each test point in table 7.5G.1.5-2 according to the test configuration from Table 7.5G.2.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

6. Set the Downlink signal level for V2X band and E-UTRA band to the value as defined in Table 7.5G.2.5-3 (Case 2). Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power [TBD] for carrier frequency f ≤ 6.0GHz, for at least the duration of the Throughput measurement.

7. Set the Interferer signal level to the value as defined in Table 7.5G.2.5-3 (Case 2) and frequency below and above the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.5G.2.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.5G.2.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Table 7.5G.2.5-2, and also under the conditions specified in table 7.5G.2.5-3.

Table 7.5G.2.5-1: Adjacent channel selectivity for V2X

		Channel bandwidth					
Rx Parameter	**Units**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
ACS	dB				33.0		27

Table 7.5G.2.5-2: Test parameters for Adjacent channel selectivity for V2X, Case 1

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	DBm	$P_{REFSENS_V2X}$ + 14 dB					
$P_{Interferer}$	DBm				$P_{REFSENS_V2X}$ +45.5dB		$P_{REFSENS_V2X}$ +39.5dB
$BW_{Interferer}$	MHz				10		10
$F_{Interferer}$ (offset)	MHz				10+0.0125 / -10-0.0125		15+0.0075 / -15-0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.5G.2.5-3: Test parameters for Adjacent channel selectivity for V2X, Case 2

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	DBm				-53.5		-47.5
$P_{Interferer}$	DBm	-22					
$BW_{Interferer}$	MHz				10		10
$F_{Interferer}$ (offset)	MHz				10+0.0125 / -10-0.0125		15+0.0075 / -15-0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

7.5G.3 Adjacent channel selectivity (ACS) for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration table is investigating.
- Test procedure is TBD
- Message contents are TBD

7.5G.3.1 Test Purpose

The test purpose is the same as in clause 7.5G.1.1.

7.5G.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support Intra-band contiguous multi-carrier operation V2X Communication.

7.5G.3.3 Minimum Conformance Requirements

For intra-band contiguous multi-carrier operation the V2X UE shall fulfil the minimum requirement specified in Table 7.5G.3.3-1 to Table 7.5G.3.3-3 where the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2.

Table 7.5G.3.3-1: Adjacent channel selectivity for intra-band contiguous multi-carrier for V2X

		V2X Bandwidth Class				
Rx Parameter	**Units**	**B**	**C**	**D**	**E**	**F**
ACS	dB	30				

Table 7.5G.3.3-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	**Units**	**V2X Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC		REFSENS + 14 dB				
$P_{Interferer}$	dBm	Aggregated power + 28.5 dB				
$BW_{Interferer}$	MHz	10				
$F_{Interferer}$ (offset)	MHz	5 + F_{offset} / -5 - F_{offset}				
NOTE 1: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.						
NOTE 2: The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmissions are activated at the same time.						

Table 7.5G.3.3-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	-50.5 +10log10(N RB,c/ N RB agg)				
$P_{Interferer}$	dBm	-22				
$BW_{Interferer}$	MHz	10				
$F_{Interferer}$ (offset)	MHz	5+ F_{offset} / -5- F_{offset}				
NOTE 1: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5 \rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster. NOTE 2: The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmissions are activated at the same time.						

The normative reference for this requirement is TS 36.101 [2] clause 7.5.1G.

7.5G.3.4 Test Description

7.5G.3.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.5G.3.4.1-1. The details of the uplink, downlink and V2X reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.8.3 respectively.

Table 7.5G.3.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest N_{RB_agg}, Highest N_{RB_agg}	
Test Parameters for Channel Bandwidths			
V2X multi-carrier Configuration		**V2X PSSCH Allocation**	
CC1 N_{RB}	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**CC1 and CC2 RB Allocation**
10MHz	10MHz	QPSK	[48+48]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.92d.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.5G.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.5G.3.4.3.

7.5G.3.4.2 Test Procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.5G.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.

2. Set the Interferer signal level to the value as defined in Table 7.5G.3.5-2 (Case 1) and frequency below and above the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

3. Measure the mean power of the UE in the channel bandwidth for each test point in table 7.5G.3.5-2 according to the test configuration from Table 7.5G.3.4.1-1. The period of measurement shall be at least continuous duration of one sub-frame (1ms).

4. Set the Interferer signal level to the value as defined in Table 7.5G.3.5-3 (Case 2) and frequency below and above the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.5G.3.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.5G.3.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Table 7.5G.3.5-2, and also under the conditions specified in table 7.5G.3.5-3.

Table 7.5G.3.5-1: Adjacent channel selectivity for intra-band contiguous multi-carrier for V2X

		V2X Bandwidth Class				
Rx Parameter	**Units**	**B**	**C**	**D**	**E**	**F**
ACS	dB	30				

Table 7.5G.3.5-2 Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	**Units**	**V2X Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC		REFSENS + 14 dB				
$P_{Interferer}$	dBm	Aggregated power + 28.5 dB				
$BW_{Interferer}$	MHz	10				
$F_{Interferer}$ (offset)	MHz	5 + F_{offset} / -5 - F_{offset}				
NOTE 1: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5 \rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.						
NOTE 2: The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmission are activated at the same time						

Table 7.5G.3.5-3: Test parameters for Adjacent channel selectivity, Case 2

Rx Parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	-50.5 +10log$_{10}$($N_{RB,c}$/ $N_{RB\ agg}$)				
$P_{Interferer}$	dBm	-22				
$BW_{Interferer}$	MHz	10				
$F_{Interferer}$ (offset)	MHz	5+ F_{offset} / -5- F_{offset}				
NOTE 1: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the adjacent channel interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5 \rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.						
NOTE 2: The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmissions are activated at the same time.						

7.6 Blocking characteristics

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

7.6.1 In-band blocking

7.6.1.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of in-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.6.1.3 Minimum Conformance Requirements

The throughput shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.1.3-1 and 7.6.1.3-2. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.6.1.3-1: In band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9

$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{loffset, case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{loffset, case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.
Note 3: The REFSENS power level is specified in Table 7.3.3-1 and Table 7.3.3-1a for two and four antenna ports, respectively.

Table 7.6.1.3-2: In-band blocking

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset)	MHz	=-BW/2 – $F_{loffset,case\ 1}$ & =+BW/2 + $F_{loffset,case\ 1}$	≤-BW/2 – $F_{loffset,case\ 2}$ & ≥+BW/2 + $F_{loffset,case\ 2}$			-BW/2 - 11
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 48, 65, 66, 70	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15			
30	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15			F_{DL_low} – 11

NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band
NOTE 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -BW/2 - $F_{loffset, case\ 1}$ and
b. the carrier frequency +BW/2 + $F_{loffset, case\ 1}$
NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies

For the UE which supports inter band CA configuration in Table 7.3.3-1A, $P_{Interferer}$ power defined in Table 7.6.1.3-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.1.

7.6.1.4 Test Description

7.6.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.4.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to in Table 7.6.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.1.4.3.

7.6.1.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the signal generator for an interfering signal below the wanted signal in Case 1 according to Tables 7.6.1.5-1 and 7.6.1.5-2.

4. Set the downlink signal level according to the table 7.6.1.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1.5-1 for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the throughput measurement.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 3.

7. Repeat steps from 3 to 6, using interfering signals in Case 2 at step 3and 6. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1.4.2-1.

Table 7.6.1.4.2-1: Example for interferer frequencies

	Lower frequency	Upper frequency
Band 1 DL	2110 MHz	2170 MHz
Band 1 Midrange	2140 MHz	
Receive band wanted signal (BW 5MHz)	2137.5 MHz	2142.5 MHz
Interferer case 1	2129.9875 MHz	2150.0125 MHz
Interferer case 2 (inner frequency)	2124.9925 MHz	2155.0075 MHz
Interferer case 2 (outer frequency)	2099.9925 MHz	2180.0075 MHz
Outer limit for in band blocking	2095MHz	2185MHz
Number of test frequencies case 2	6	6
Number of test frequencies for Band 17(asymmetric!), BW 5MHz, case 2	0	2

7.6.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception

Table 7.6.1.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.1.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.6.1.5-1 and 7.6.1.5-2.

Table 7.6.1.5-1: In band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz

Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Ioffset, case 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset, case 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.6.1.5-2: In-band blocking

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset)	MHz	=-BW/2 – $F_{Ioffset,case 1}$ & =+BW/2 + $F_{Ioffset,case 1}$	≤-BW/2 – $F_{Ioffset,case 2}$ & ≥+BW/2 + $F_{Ioffset,case 2}$			-BW/2 - 11
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 65, 66, 70	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15			
30	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15			F_{DL_low} – 11
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset, case 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset, case 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies							

For the UE which supports inter band CA configuration in Table 7.3.3-1A, $P_{Interferer}$ power defined in Table 7.6.1.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A.

7.6.1_1 In-band blocking with 4 Rx antenna ports

7.6.1_1.1 Test Purpose

In-band blocking with 4 Rx antenna ports is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE 4 Rx receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of in-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.1_1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports.

7.6.1_1.3 Minimum Conformance Requirements

Same as in clause 7.6.1.3.

7.6.1_1.4 Test Description

7.6.1_1.4.1 Initial Conditions

Same as in clause 7.6.1.4.1 with following exceptions:

- Instead of Table 7.6.1.4.1-1→ use table 7.6.1_1.4-1
- Instead of Figure A.4→ use Figure A.81
- Instead of clause 7.6.1.4.3→ use clause 7.6.1_1.4.3

Table 7.6.1_1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	20	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						

7.6.1_1.4.2 Test Procedure

Same as in clause 7.6.1.4.2 with following exceptions:

- Instead of Table 7.6.1.4.1-1→ use Table 7.6.1_1.4.1-1
- Instead of Table 7.6.1.5-1→ use Table 7.6.1_1.5-1

7.6.1_1.4.3 Message Contents

Same as in clause 7.6.1.4.3.

7.6.1_1.5 Test Requirement

Same as in clause 7.6.1.5 with following exceptions:

- Instead of Table 7.6.1.5-1→ use Table 7.6.1_1.5-1

Table 7.6.1_1.5-1: In band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							
Note 3: The REFSENS power level is specified in Table 7.3_1.5-1.							

7.6.1A In-band blocking for CA

7.6.1A.0 Minimum conformance requirements

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the in-band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.6.1 for each component carrier while all downlink carriers are active. For the UE which supports inter band CA configuration in Table 7.3.3-1A, $P_{Interferer}$ power defined in Table 7.6.1.3-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A. For E-UTRA CA configurations including an operating band without uplink operation or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. The requirements for the component carrier configured in the operating band without uplink operation are specified in Table 7.6.1A.0-0, Table 7.6.1A.0-0a and Table 7.6.1A.0-0b.

Table 7.6.1A.0-0: In-band blocking for additional operating bands for carrier aggregation

E-UTRA band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{Ioffset,case\ 1}$ & $=+BW/2 + F_{Ioffset,case\ 1}$	$\leq -BW/2 - F_{Ioffset,case\ 2}$ & $\geq +BW/2 + F_{Ioffset,case\ 2}$
29, 32, 67, 69	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$
Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.				
Note 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$				
Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.				

Table 7.6.1A.0-0a: In band blocking parameters for additional operating bands for carrier aggregation

E-UTRA band	Rx parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46 (NOTE 3)	Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
								9
	$BW_{Interferer}$	MHz						20
	$F_{Ioffset,\ case\ 1}$	MHz						30+0.0125
	$F_{Ioffset,\ case\ 2}$	MHz						50+0.0075

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.
NOTE 3: The interferer consists of the Reference measurement channel specified in Annex A.3.2 (TBD)

Table 7.6.1A.0-0b: In-band blocking for additional operating bands for carrier aggregation

E-UTRA band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-50	-44
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{Ioffset,case\ 1}$ & $=+BW/2 + F_{Ioffset,case\ 1}$	$\leq -BW/2 - F_{Ioffset,case\ 2}$ & $\geq +BW/2 + F_{Ioffset,case\ 2}$
46	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 60$ to $F_{DL_high} + 60$

NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz or 60 MHz below or above the UE receive band.
NOTE 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and
b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$
NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.

For E-UTRA CA configurations listed in Table 7.3A.0-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the in-band blocking requirements of subclause 7.6.1A.0 do not apply.

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.6.1A.0-1 with the uplink configuration set according to Table 7.3A.0-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.3-2. The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Tables 7.6.1A.0-1 and Tables 7.6.1A.0-2 being on either side of the aggregated signal. The throughput of each carrier shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.1A.0-1 and 7.6.1A.0-2. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements also apply for an SCC assigned in the unpaired part with parameters specified in Tables 7.6.1A.0-1 and 7.6.1A.0-2.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink sub-blocks, each larger than or equal to 5 MHz, the in-band blocking requirements are defined with the uplink configuration in accordance with Table 7.3A.0-3. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclause 7.6.1.3 and in this subclause for single component carrier and two component carriers per sub-block, respectively. The requirements apply for in-gap and out-of-gap interferers while all downlink carriers are active..

Table 7.6.1A.0-1: In band blocking parameters

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F

Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12	13.8	15	16
$BW_{Interferer}$	MHz	5	5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz	7.5	7.5	7.5	7.5	7.5
$F_{Ioffset,\ case\ 2}$	MHz	12.5	12.5	12.5	12.5	12.5
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						

Table 7.6.1A.0-2: In-band blocking

CA configuration	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq-F_{offset}-F_{Ioffset,case\ 2}$ & $\geq+F_{offset}+F_{Ioffset,case\ 2}$
CA_1C, CA_2C, CA_3B, CA_3C, CA_5B, CA_7C, CA_8B, CA_12B, CA_23B, CA_27B, CA_38C, CA_39C, CA_40C, CA_40D, CA_40E, CA_41C, CA_41D, CA_41E, CA_42C, CA_42D, CA_42E, CA_42F, CA_43C, CA_48C, CA_48D, CA_48E, CA_48F, CA_66B, CA_66C, CA_70C	$F_{Interferer}$ (Range)	MHz	(Note 2)	$F_{DL_low}-15$ to $F_{DL_high}+15$

lote 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band

lote 2: For each carrier frequency the requirement is valid for two frequencies:
a) the carrier frequency $-F_{offset} - F_{Ioffset,\ case\ 1}$ and
b) the carrier frequency $+F_{offset} + F_{Ioffset,\ case\ 1}$

lote 3: F_{offset} is the frequency offset from the centre frequency of the adjacent CC being tested to the edge of aggregated channel bandwidth.

lote 4: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5\rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.

For combinations of intra-band and inter-band carrier aggregation with up to five downlink carriers (up to two non-contiguously sub-blocks per band and up to four contiguously aggregated carriers per band) and one uplink carrier assigned to one E-UTRA band, the requirement is defined with the uplink active in the band other than that supporting the downlink(s) under test. The uplink configuration shall be in accordance with Table 7.3A.0-3 when the uplink is active in the band supporting two non-contiguous component carriers, Table 7.3A.0-1 when the uplink is active in a band supporting two contiguous component carriers and in accordance with Table 7.3.3-2 when the uplink is active in a band supporting one carrier per band. The downlink PCC shall be configured closer to the uplink operating band than the downlink SCC(s) when the uplink is active in band(s) supporting contiguous aggregation of up to four component carriers. For these uplink configurations, the UE shall meet the in-band blocking requirements for intra-band non-contiguous carrier aggregation of two downlink sub-blocks with $\Delta R_{IBNC} = 0$ dB for all sub-block gaps (Table 7.3A.0-3) for the two non-contiguous downlink sub-blocks, the requirements for intra-band contiguous carrier aggregation for the contiguously aggregated downlink carriers and for any remaining component carrier(s) the requirements specified in subclause 7.6.1.3. All downlink carriers shall be active throughout the tests and the requirements for the downlinks shall be met with the single uplink carrier active in each band capable of uplink operation.

For contiguously aggregated component carriers configured in Band 46, the said requirements for intra-band contiguous carrier aggregation of downlink carriers are replaced by requirements in Table 7.6.1A.0-3 and 7.6.1A.0-4.

Table 7.6.1A.0-3: In band blocking parameters

E-UTRA Band	Rx Parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
				12	13.8	15	
	$BW_{Interferer}$	MHz		20	20	20	
	$F_{Ioffset,\ case\ 1}$	MHz		30	30	30	
	$F_{Ioffset,\ case\ 2}$	MHz		50	50	50	
NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 4dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A. NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.6.1A.0-4: In-band blocking

E-UTRA Band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-50	-44
	$F_{Interferer}$ (offset)	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq -F_{offset}-F_{Ioffset,case\ 2}$ & $\geq +F_{offset}+F_{Ioffset,case\ 2}$
46	$F_{Interferer}$ (Range)	MHz	(Note 2)	$F_{DL_low}-60$ to $F_{DL_high}+60$
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band. NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency $-F_{offset} - F_{Ioffset,\ case\ 1}$ and b. the carrier frequency $+F_{offset} + F_{Ioffset,\ case\ 1}$ NOTE 3: F_{offset} is the frequency offset from the centre frequency of the CC being tested to the edge of aggregated channel bandwidth. NOTE 4: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5\rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.				

The normative reference for this requirement is TS 36.101 [2] clause 7.6.1.1A.

7.6.1A.1 In-band blocking for CA (intra-band contiguous DL CA and UL CA)

7.6.1A.1.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels. The lack of in-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.1A.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

7.6.1A.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1A.0.

7.6.1A.1.4 Test Description

7.6.1A.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.6.1A.1.4.1-1. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.1A.1.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			Mid range				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 3)				
Test Parameters for CA Configurations							
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
50	25	QPSK	50+25	QPSK	25	P_25@25	S_0@0
50	50	QPSK	50+50	QPSK	25	P_25@25	S_0@0
50	100	QPSK	50+100	QPSK	150	P_50@0	S_100@0
75	50	QPSK	75+50	QPSK	75	P_75@0	S_0@0
75	75	QPSK	75+75	QPSK	75	P_75@0	S_0@0
75	75	QPSK	75+75	QPSK	129	P_75@0	S_54@0
75	75	QPSK	75+75	QPSK	150	P_75@0	S_75@0
100	25	QPSK	100+25	QPSK	50	P_50@50	S_0@0
100	25	QPSK	100+25	QPSK	125	P_100@0	S_25@0
100	50	QPSK	100+50	QPSK	75	P_75@25	S_0@0
100	50	QPSK	100+50	QPSK	150	P_100@0	S_50@0
100	75	QPSK	100+75	QPSK	175	P_100@0	S_75@0
100	100	QPSK	100+100	QPSK	50	P_50@50	S_0@0
100	100	QPSK	100+100	QPSK	75	P_75@25	S_0@0
100	100	QPSK	100+100	QPSK	130	P_100@0	S_30@0
100	100	QPSK	100+100	QPSK	200	P_100@0	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1. Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3A.0-1 is tested per CA Configuration Test CC combination. Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.34 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are for PCC initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.1A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.1A.1.4.3.

7.6.1A.1.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.1A.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.1A.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Tables 7.6.1A.1.5-1 and 7.6.1A.1.5-2.

7. Set the downlink signal level according to the table 7.6.1A.1.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the throughput measurement:
   The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.6.1A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
   or within (+0dB, -4 dB) of (target level in Table 7.6.1A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$) for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.
   The SCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.6.1A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
   or within (+0dB, -4 dB) of (target level in Table 7.6.1A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$) for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$.

8. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the aggregated component carriers in Case 1 at step 6.

10. Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1A.1.4.2-1.

Table 7.6.1A.1.4.2-1: Example for interferer frequencies

	Lower frequency	Upper frequency
Band 1 DL	2110 MHz	2170 MHz
Band 1 Midrange	PCC: 2132.5 MHz SCC: 2147.5 MHz	
Receive band wanted signal (CC Configuration / N_{RB_agg} 75 + 75)	PCC: 2125 MHz SCC: 2140 MHz	2140 MHz 2155 MHz
$F_{Interferer, case\ 1}$	2117.5000 MHz	2162.5000 MHz
$F_{Interferer, case\ 1}$(Offset)	15.0000 MHz	
$\lfloor F_{Interferer, case1}(\text{Offset})/0.015+0.5 \rfloor 0.015+0.0075$	15.0075 MHz	
Adjusted $F_{Interferer, case\ 1}$	2117.4925 MHz	2162.5075 MHz
Case 2, 1st (inner)		
$F_{Interferer, case\ 2}$	2112.5000 MHz	2167.5000 MHz
$F_{Interferer, case\ 2}$ (Offset)	20.0000 MHz	
$\lfloor F_{Interferer, case2}(\text{Offset})/0.015+0.5 \rfloor 0.015+0.0075$	20.0025 MHz	
Adjusted $F_{Interferer, case\ 2}$	2112.4975 MHz	2167.5025 MHz
Case 2, 2nd		
$F_{Interferer, case\ 2}$	2107.5000 MHz	2172.5000 MHz
$F_{Interferer, case\ 2}$ (Offset)	25.0000 MHz	
$\lfloor F_{Interferer, case2}(\text{Offset})/0.015+0.5 \rfloor 0.015+0.0075$	25.0125 MHz	
Adjusted $F_{Interferer, case\ 2}$	2107.4875 MHz	2172.5125 MHz
Case 2, 3rd		
$F_{Interferer, case\ 2}$	2102.5000 MHz	2177.5000 MHz
$F_{Interferer, case\ 2}$ (Offset)	30.0000 MHz	
$\lfloor F_{Interferer, case2}(\text{Offset})/0.015+0.5 \rfloor 0.015+0.0075$	30.0075 MHz	
Adjusted $F_{Interferer, case\ 2}$	2102.4925 MHz	2177.5075 MHz
Case 2, 4th (outer)		
$F_{Interferer, case\ 2}$	2097.5000 MHz	2182.5000 MHz
$F_{Interferer, case\ 2}$ (Offset)	35.0000 MHz	
$\lfloor F_{Interferer, case2}(\text{Offset})/0.015+0.5 \rfloor 0.015+0.0075$	35.0025 MHz	
Adjusted $F_{Interferer, case\ 2}$	2097.4975 MHz	2182.5025 MHz
Outer limit for in band blocking	2095MHz	2185MHz
Number of test frequencies case 2	4	4

7.6.1A.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.6.1A.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

Table 7.6.1A.1.4.3-2: UplinkPowerControlDedicatedSCell-r10

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT::= SEQUENCE {			
p0-UE-PUSCH-r10	0		
deltaMCS-Enabled-r10	en0		
accumulationEnabled-r10	TRUE		
pSRS-Offset-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
pSRS-OffsetAp-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
filterCoefficient-r10	fc8	larger filter length is used to reduce the RSRP measurement variation	
pathlossReferenceLinking-r10	sCell		
}			

7.6.1A.1.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.6.1A.1.5-1 and 7.6.1A.1.5-2.

Table 7.6.1A.1.5-1: In band blocking parameters

Rx Parameter	**Units**	**CA Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12			
$BW_{Interferer}$	MHz	5	5			
$F_{Ioffset,\ case\ 1}$	MHz	7.5	7.5			
$F_{Ioffset,\ case\ 2}$	MHz	12.5	12.5			
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two uplink carriers.						
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						

Table 7.6.1A.1.5-2: In-band blocking

CA configuration	**Parameter**	**Unit**	**Case 1**	**Case 2**
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq-F_{offset}-F_{Ioffset,case\ 2}$ & $\geq+F_{offset}+F_{Ioffset,case\ 2}$

CA_1C, CA_2C, CA_3C, CA_7C, CA_8B, CA_12B, CA_23B, CA_27B, CA_38C, CA_39C, CA_40C, CA_41C. CA_42C	$F_{Interferer}$ (Range)	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15

Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band

Note 2: For each carrier frequency the requirement is valid for two frequencies:
a) the carrier frequency $-F_{offset} - F_{Ioffset,\ case\ 1}$ and
b) the carrier frequency $+F_{offset} + F_{Ioffset,\ case\ 1}$

Note 3: F_{offset} is the frequency offset from the centre frequency of the adjacent CC being tested to the edge of aggregated channel bandwidth.

Note 4: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer} / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.1A.1.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.1A.2 In-band blocking for CA (intra-band contiguous DL CA without UL CA)

7.6.1A.2.1 Test Purpose

Same test purpose as in clause 7.6.1A.1.

7.6.1A.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA. This test case applies only for CA Configurations that do not support UL CA.

7.6.1A.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1A.0.

7.6.1A.2.4 Test Description

7.6.1A.2.4.1 Initial Conditions

Same initial conditions as in clause 7.6.1A.1.4.1 with the following exceptions:

- Instead of Table 7.6.1A.1.4.1-1 → use Table 7.6.1A.2.4.1-1.
- Instead of clause 7.6.1A.1.4.3 → use clause 7.6.1A.2.4.3.

Table 7.6.1A.2.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	B: Mid range C: Mid range (Note 4)
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest N_{RB_agg} Highest N_{RB_agg} (Notes 3, 4)

Test Parameters for CA Configurations

CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
6	25	QPSK	6+25	QPSK	6	P_6@0	-
15	50	QPSK	15+50	QPSK	15	P_15@0	-
25	25	QPSK	25+25	QPSK	20	P_20@0	-
25	25	QPSK	25+25	QPSK	25	P_25@0	-
25	50	QPSK	25+50	QPSK	20	P_20@0	-
25	100	QPSK	25+100	QPSK	25	P_25@0	-
50	25	QPSK	50+25	QPSK	25	P_25@25	-
50	50	QPSK	50+50	QPSK	25	P_25@25	-
50	50	QPSK	50+50	QPSK	50	P_50@0	-
50	75	QPSK	50+75	QPSK	50	P_50@0	-
75	25	QPSK	75+25	QPSK	75	P_75@0	-
75	50	QPSK	75+50	QPSK	75	P_75@0	-
75	75	QPSK	75+75	QPSK	75	P_75@0	-
100	25	QPSK	100+25	QPSK	50	P_50@50	-
100	25	QPSK	100+25	QPSK	100	P_100@0	-
100	50	QPSK	100+50	QPSK	75	P_75@25	-
100	50	QPSK	100+50	QPSK	100	P 100@0	-
100	75	QPSK	100+75	QPSK	100	P_100@0	-
100	100	QPSK	100+100	QPSK	50	P_50@50	-
100	100	QPSK	100+100	QPSK	75	P_75@25	-
100	100	QPSK	100+100	QPSK	100	P_100@0	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per CA Configuration Test CC combination.
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.
Note 4: For CA_70C all test frequency IDs shall be tested according to table 4.3.1.1.70A-1, in TS 36.508 [7].

7.6.1A.2.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1A.2.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.1A.2.4.1-1 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Tables 7.6.1A.1.5-1 and 7.6.1A.1.5-2.

7. Set the downlink signal level according to the table 7.6.1A.1.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1A.1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.

8. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the aggregated component carriers in Case 1 at step 6.

10. Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1A.1.4.2-1.

7.6.1A.2.4.3 Message Contents

Same message contents as in clause 7.6.1.4.3.

7.6.1A.2.5 Test Requirement

Same test requirement as in clause 7.6.1A.1.5 with the following exceptions:

- Instead of Table 7.6.1A.1.5-1 → use Table 7.6.1A.2.5-1.
- Instead of Table 7.6.1A.1.5-2 → use Table 7.6.1A.2.5-2.

Table 7.6.1A.2.5-1: In band blocking parameter

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12			
$BW_{Interferer}$	MHz	5	5			
$F_{Ioffset,\ case\ 1}$	MHz	7.5	7.5			
$F_{Ioffset,\ case\ 2}$	MHz	12.5	12.5			
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						

Table 7.6.1A.2.5-2: In-band blocking

CA configuration	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq-F_{offset}-F_{Ioffset,case\ 2}$ & $\geq+F_{offset}+F_{Ioffset,case\ 2}$

CA_1C, CA_2C, CA_3C, CA_5B, CA_7C, CA_12B, CA_23B, CA_27B, CA_38C, CA_39C, CA_40C, CA_41C, CA_42C, CA_66B, CA_66C, CA_70C	$F_{Interferer}$ (Range)	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15
Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band Note 2: For each carrier frequency the requirement is valid for two frequencies: a) the carrier frequency -F_{offset} - $F_{Ioffset,\ case\ 1}$ and b) the carrier frequency +F_{offset} + $F_{Ioffset,\ case\ 1}$ Note 3: F_{offset} is the frequency offset from the centre frequency of the adjacent CC being tested to the edge of aggregated channel bandwidth. Note 4: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer} / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.				

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.1A.2.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.1A.3 In-band blocking for CA (inter-band DL CA without UL CA)

7.6.1A.3.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below (60 MHz for band 46) to 15MHz above (60 MHz for band 46) the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

7.6.1A.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 2DL CA with FDD-TDD inter-band CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support DL LAA.

7.6.1A.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1A.0.

7.6.1A.3.4 Test Description

7.6.1A.3.4.1 Initial Conditions

Same initial conditions as in clause 7.6.1A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2.
- Instead of Table 7.6.1A.1.4.1-1 → use Table 7.6.1A.3.4.1-1.
- Instead of clause 7.6.1A.1.4.3 → use clause 7.6.1A.3.4.3.

Table 7.6.1A.3.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	A: Mid range for PCC and SCC
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE	Highest N_{RB_agg} for PCC and SCC

Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**			**UL Allocation**	
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC N_{RB_alloc}**
50	50	QPSK	50	50	QPSK	50
50	50	QPSK	50	50	QPSK	25
50	50	QPSK	50	50	QPSK	20
50	50	QPSK	50	50	QPSK	16
50	75	QPSK	50	75	QPSK	25
50	100	QPSK	50	100	QPSK	50
50	100	QPSK	50	100	QPSK	25
50	100	QPSK	50	100	QPSK	20
50	100	QPSK	50	100	QPSK	16
75	50	QPSK	75	50	QPSK	25
75	75	QPSK	75	75	QPSK	25
75	100	QPSK	75	100	QPSK	25
100	50	QPSK	100	50	QPSK	100
100	50	QPSK	100	50	QPSK	75
100	50	QPSK	100	50	QPSK	50
100	75	QPSK	100	75	QPSK	100
100	75	QPSK	100	75	QPSK	50
100	100	QPSK	100	100	QPSK	100
100	100	QPSK	100	100	QPSK	75
100	100	QPSK	100	100	QPSK	50
100	100	QPSK	100	100	QPSK	45
100	100	QPSK	100	100	QPSK	25
100	100	QPSK	100	100	QPSK	20

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.3.5-2 for UE supporting one uplink carrier is tested per Test CA configuration.
Note 3: The UL resource blocks shall be located as close as possible to the downlink PCC but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 4: The frequencies of PCC and SCC shall be switched and tested in each configuration, according to the UE declared capability for UL support (within CA operation) in the individual bands.

7.6.1A.3.4.2 Test Procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.1A.3.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

6. Set the parameters of the signal generator for an interfering signal below the SCC in Case 1 according to Tables 7.6.1.5-1 and 7.6.1.5-2, or 7.6.1.5-1 and 7.6.1A.3.5-0 for operating bands without uplink band (as noted in Table 5.2-1) , or 7.6.1A.3.5-0a and 7.6.1A.3.5-0b for operating band 46 without uplink band.

7. Set the downlink signal level according to the table 7.6.1A.3.5-1 or table 7.6.1A.3.5-0a for operating band 46. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1A.3.5-1 or table 7.6.1A.3.5-0a for operating band 46 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.

8. Measure the average throughput of SCC for duration sufficient to achieve statistical significance according to Annex G.2.

9. Repeat steps from 6 to 8, using an interfering signal above the SCC in Case 1 at step 6.

10. Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1.4.2-1.

7.6.1A.3.4.3 Message Contents

Same message contents as in clause 7.6.1.4.3.

7.6.1A.3.5 Test Requirement

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the in-band blocking requirements are defined with the uplink active on the band other than the band whose downlink is being tested i.e. the requirements are tested only for the SCell downlink. The UE shall meet the requirement for each component carrier, when operated as SCell, while both downlink carriers are active.

For band combinations including an operating band without uplink band (as noted in Table 5.2-1), the requirements for both downlinks shall be met with the uplink in the band capable of UL operation.

The throughput measured during the test procedure for each component carrier, when operated as SCell, shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.6.1A.3.5-1 and 7.6.1A.3.5-2 (originated from the single carrier Tables 7.6.1.5-1 and 7.6.1.5-2) and also Table 7.6.1A.3.5-0 for band combinations including an operating band without uplink operation or Table 7.6.1A.3.5-0a and Table 7.6.1A.3.5-0b for band combinations including operating band 46 without uplink operation.

Table 7.6.1A.3.5-0: In-band blocking for additional operating bands for carrier aggregation

E-UTRA band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset from SCC)	MHz	=-BW/2 – $F_{Ioffset,case\ 1}$ & =+BW/2 + $F_{Ioffset,case\ 1}$	≤-BW/2 – $F_{Ioffset,case\ 2}$ & ≥+BW/2 + $F_{Ioffset,case\ 2}$
29, 32, 69	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15

Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.
Note 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and
b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$
Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.

Table 7.6.1A.3.5-0a: In band blocking parameters for additional operating bands for carrier aggregation

E-UTRA band	Rx parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46 (NOTE 3)	Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					9
	$BW_{Interferer}$	MHz						20
	$F_{Ioffset,\ case\ 1}$	MHz						30+0.0125
	$F_{Ioffset,\ case\ 2}$	MHz						50+0.0075

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1 and set-up according to Annex C.3.1.
NOTE 3: The interferer consists of the Reference measurement channel specified in Annex A.3.2 (TBD).

Table 7.6.1A.3.5-0b: In-band blocking for additional operating bands for carrier aggregation

E-UTRA band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-50	-44
	$F_{Interferer}$ (offset)	MHz	=-BW/2 – $F_{Ioffset,case\ 1}$ & =+BW/2 + $F_{Ioffset,case\ 1}$	≤-BW/2 – $F_{Ioffset,case\ 2}$ & ≥+BW/2 + $F_{Ioffset,case\ 2}$
46	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 60 to F_{DL_high} + 60

NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz or 60 MHz below or above the UE receive band.
NOTE 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and
b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$
NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.

Table 7.6.1A.3.5-1: In band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9

Configuration, per CC							
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.6.1A.3.5-2: In-band blocking

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset from SCC)	MHz	$=-BW/2 - F_{Ioffset,case\ 1}$ & $=+BW/2 + F_{Ioffset,case\ 1}$	$\leq -BW/2 - F_{Ioffset,case\ 2}$ & $\geq +BW/2 + F_{Ioffset,case\ 2}$			-BW/2 - 11
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 66, 70	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			
30	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			$F_{DL_low} - 11$
Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band Note 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency $-BW/2 - F_{Ioffset,\ case\ 1}$ and b. the carrier frequency $+BW/2 + F_{Ioffset,\ case\ 1}$ Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies							

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.1A.3.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.1A.4 In-band blocking for CA (intra-band non-contiguous DL CA without UL CA)

7.6.1A.4.1 Test Purpose

Same as in clause 7.6.1A.1.1.

7.6.1A.4.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA but no UL CA.

7.6.1A.4.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1A.0.

7.6.1A.4.4 Test description

7.6.1A.4.4.1 Initial Conditions

Same as in clause 7.6.1A.1.4.1 with the following exceptions:

- Instead of Table 7.6.1A.1.4.1-1→ use Table 7.6.1A.4.4.1-1.

Table 7.6.1A.4.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			A: N/A (Range is not relevant)				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.			Refer to test point				
Test Parameters for CA Configurations							
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC RB allocations (L_{CRB} @ RB_{start})**

Test Parameters for CA_2A-2A Configurations							
1	100	25	35	QPSK	100+25	QPSK	P_16@57
2	100	100	20	QPSK	100+100	QPSK	P_16@57
Test Parameters for CA_3A-3A Configurations							
3	100	25	50	QPSK	100+25	QPSK	P_16@50
4	100	25	15	QPSK	100+25	QPSK	P_32@68
5	100	100	35	QPSK	100+100	QPSK	P_16@50
Test Parameters for CA_4A-4A Configurations							
6	50	25	30	QPSK	50+25	QPSK	P_50@0
7[4]	50	50	25	QPSK	50+50	QPSK	P_50@0
8[3]	100	25	20	QPSK	100+25	QPSK	P_100@0
9[3]	100	100	5	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_5A-5A Configurations							
10	50	25	10	QPSK	50+25	QPSK	P_12@38
11	50	50	5	QPSK	50+50	QPSK	P_12@38
Test Parameters for CA_7A-7A Configurations							
11	100	75	35	QPSK	100+75	QPSK	P_36@64
12	100	75	15	QPSK	100+75	QPSK	P_50@50
13	100	100	30	QPSK	100+100	QPSK	P_32@68
14	100	100	15	QPSK	100+100	QPSK	P_45@55
Test Parameters for CA_23A-23A Configurations							
15	50	25	5	QPSK	50+25	QPSK	P_50@0
Test Parameters for CA_25A-25A Configurations							
16	50	25	50	QPSK	50+25	QPSK	P_10@33
17	50	25	15	QPSK	50+25	QPSK	P_32@18
18[3]	50	50	45	QPSK	50+50	QPSK	P_10@33
19[3]	50	50	10	QPSK	50+50	QPSK	P_32@18
20[4]	100	25	40	QPSK	100+25	QPSK	P_12@62
21[4]	100	100	25	QPSK	100+100	QPSK	P_12@62
Test Parameters for CA_41A-41A Configurations							
22[4]	100	25	169	QPSK	100+25	QPSK	P_100@0
23[3]	100	50	164	QPSK	100+50	QPSK	P_100@0
24	100	100	154	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_42A-42A Configurations							
25	100	25	175	QPSK	100+25	QPSK	P_100@0
26	100	100	160	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_66A-66A Configurations							
27	100	25	65	QPSK	100+25	QPSK	P_100@0
28	100	100	50	QPSK	100+100	QPSK	P_100@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.

Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.

Note 3: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration

Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration

7.6.1A.4.4.2 Test Procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.1A.4.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.1A.4.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
6. Set the parameters of the signal generator for an interfering signal below the PCC in Case 1 according to Tables 7.6.1.5-1 and 7.6.1.5-2, excluding frequencies where the interferer centre frequency falls within SCC carrier $\pm(BW/2 + F_{Ioffset,case\ 1})$, where BW & offset refer to SCC.
7. Set the downlink signal level for PCC and SCC according to the table 7.6.1.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput of the PCC for duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using an interfering signal above the PCC in Case 1 at step 6.
10. Repeat steps from 6 to 9, using an interfering signal below and above the SCC in Case 1 and measuring SCC instead of PCC in step 8, excluding the frequencies where the interferer centre frequency falls within PCC carrier $\pm(BW/2 + F_{Ioffset,case\ 1})$, where BW & offset refer to PCC.
11. Repeat steps from 6 to 10**,** replacing references to Case 1 with references to Case 2. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1.4.2-1.

7.6.1A.4.4.3 Message Contents

Same message contents as in clause 7.6.1.4.3.

7.6.1A.4.5 Test Requirement

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, each larger than or equal to 5 MHz, the in-band blocking requirements are defined with the uplink configuration of the PCC being in accordance with Table 7.3A.0-3. The UE shall meet the requirements specified in tables 7.6.1A.4.5-1 and 7.6.1A.4.5-2 for each component carrier while both downlink carriers are active. The requirements for each component carrier are the same as single carrier requirements in Tables 7.6.1.5-1 and 7.6.1.5-2.

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.6.1A.4.5-1 and 7.6.1A.4.5-2.

Table 7.6.1A.4.5-1: In band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9

$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{loffset, case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{loffset, case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.6.1A.4.5-2: In-band blocking

CA Configuration	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{loffset,case\ 1}$ & $=+BW/2 + F_{loffset,case\ 1}$	$\leq -BW/2 - F_{loffset,case\ 2}$ & $\geq +BW/2 + F_{loffset,case\ 2}$
CA_2A-2A, CA_3A-3A, CA_4A-4A, CA_5A-5A, CA_7A-7A, CA_23A-23A, CA_25A-25A, CA_41A-41A, CA_42A-42A, CA_66A-66A	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$
Note1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band Note 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{loffset, case\ 1}$ and b. the carrier frequency +BW/2 + $F_{loffset, case\ 1}$ Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies				

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.1A.4.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.1A.5 In-band blocking for 3DL CA

7.6.1A.5.1 Test Purpose

Same test purpose as in clause 7.6.1A.1.

7.6.1A.5.2 Test Applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support 3DL with Intra-band contiguous CA or 3DL with Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 3DL with FDD-TDD CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 3DL CA involving Band 46.7.6.1A.5.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1A.0.

7.6.1A.5.4 Test Description

7.6.1A.5.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1A.5.4.1-1 through table 7.6.1A.5.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.1A.5.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3)	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for a CA_XD Configuration (Intra-band contiguous)												
1	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA Configuration (Inter-band)												
1	X	Mid	REFSENS	All RBs	Y	Mid	N/A	All RBs	Z	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Z	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XB-YA and CA_XC-YA Configuration (Intra-band contiguous + Inter-band)												
1	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
4	Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
Default Test Settings for CA_XA-YB and CA_XA-YC Configuration (Intra-band contiguous + Inter-band)												
1	Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
2	Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
3	X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
4	X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration, The applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band contiguous:** X corresponds to the band in the CA Configuration. E.g. for CA_41D, X=41
Note 5: **Inter-band:** X,Y,Z correspond to the 1st, 2nd and 3rd band in the CA Configuration. E.g. for CA_1A-3A-19A, X=1, Y=3, Z=19
Note 6: **Intra-band contiguous + Inter-band:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1C-3A, X=1 and Y=3
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 9: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 10: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.6.1A.5.4.1-2: Test Configuration Table W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	X	CC2	REFSENS	All RBs	Max	X	CC1	N/A	All RBs	-	Y	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	Y	Mid	REFSENS	All RBs	-	X	CC2	N/A	All RBs	Max	X	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Default Test Settings for CA_XA-YA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	Y	CC2	REFSENS	All RBs	Max	Y	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	X	Mid	REFSENS	All RBs	-	Y	CC2	N/A	All RBs	Max	Y	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Test Settings for CA_29A-66A-66A Configuration (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	29	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
Test Settings for a CA_41C-41A Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	41	CC3	100@0	All RBs	134.2	41	CC2	N/A	All RBs	-	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_41A-41C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
2	41	CC3	100@0	All RBs	-	41	CC2	**N/A**	All RBs	134.2	41	CC1	N/A	All RBs
	QPSK	QPSK		**100**		N/A	QPSK		100		N/A	QPSK		100
Group Test Settings for CA_66A-66A-XA or CA_XA-66A-66A Configurations (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
2	X	Mid	REFSENS	All RBs	-	66	CC1	N/A	All RBs	50	66	CC2	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_66A-66C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	66	CC1	100@0	All RBs	30.2	66	CC2	N/A	All RBs	-	66	CC3	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.

Note 2: **Intra-band non-contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.

Note 3: **Intra-band non-contiguous + Intra-band contiguous:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.

Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.

Note 5: **Intra-band non-contiguous + Inter-band:** X and Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A,X=2,Y=5

Note 6: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A,X=41.
Note 7: **Intra-band non-contiguous + Inter-band:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RE allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 10: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and DL Reference Measurement channels are set according to Table 7.6.1A.5.4.1-1 through Table 7.6.1A.5.4.1-2 as appropriate.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.1A.5.4.3.

7.6.1A.5.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.1A.5.4.3

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1A.5.4.1-1 through Table 7.6.1A.5.4.1-5 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.1A.5.4.1-1 through Table 7.6.1A.5.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6 Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6.1A.5.4.2-1.

7 Set the downlink signal level according to the Table 7.6.1A.5.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1A.5. 4.2-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.

8 Measure the average throughput for the carrier(s) indicated in Table 7.6.1A.5.4.2-1for duration sufficient to achieve statistical significance according to Annex G.2A.

9 Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to Table 7.6.1A.5. 4.2-1 in Case 1 at step 6.

10 Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1A.1.4.2-1.

11. Repeat steps 1 to 10 for all component carriers listed in Table 7.6.1A.5.4.2-1.

Table 7.6.1A.5.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2	7.6.1A.5.5-2 7.6.1A.5.5-3
	2		
Inter-band	1	SCC1	7.6.1A.5.5-1 7.6.1A.5.5-1a 7.6.1A.5.5-1b 7.6.1A.5.5-4 7.6.1A.5.5-5
		SCC2	
	2	SCC1	
		SCC2	
	3	SCC1	
		SCC2	
Intra-band contiguous + Inter-band	1	SCC2	7.6.1A.5.5-1 7.6.1A.5.5-1a 7.6.1A.5.5-1b 7.6.1A.5.5-4 7.6.1A.5.5-5
	2		
	3	SCC1, SCC2	7.6.1A.5.5-2 7.6.1A.5.5-3 7.6.1A.5.5-3a 7.6.1A.5.5-3b
	4		
Intra-band non-contiguous + Inter-band	1	SCC2	7.6.1A.5.5-1 7.6.1A.5.5-1a 7.6.1A.5.5-1b 7.6.1A.5.5-4 7.6.1A.5.5-5
	2	SCC1,	7.6.1A.5.5-1a 7.6.1A.5.5-1b 7.6.1A.5.5-4 7.6.1A.5.5-5
		SCC2	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.6.1A.5.5-4 7.6.1A.5.5-5
		SCC1, SCC2	7.6.1A.5.5-2 7.6.1A.5.5-3 7.6.1A.5.5-3a 7.6.1A.5.5-3b
	2	SCC2	7.6.1A.5.5-1a 7.6.1A.5.5-1b 7.6.1A.5.5-4 7.6.1A.5.5-5
		PCC, SCC1	7.6.1A.5.5-2 7.6.1A.5.5-3

Note 1: Test point ID for the particular CA configuration as defined in section 7.6.1A.5.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.6.1A.5.4.3 Message Contents

Same message contents as in clause 7.6.1.4.3 for without UL CA.

Same message contents as in clause 7.6.1A.1.4.3 for UL CA.

7.6.1A.5.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

Table 7.6.1A.5.5-1: In-band blocking for additional operating bands for carrier aggregation (inter-band)

E-UTRA band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset from SCC)	MHz	=-BW/2 – $F_{loffset,case\ 1}$ & =+BW/2 + $F_{loffset,case\ 1}$	≤-BW/2 – $F_{loffset,case\ 2}$ & ≥+BW/2 + $F_{loffset,case\ 2}$
29	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15

Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.
Note 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -BW/2 - $F_{loffset,\ case\ 1}$ and
b. the carrier frequency +BW/2 + $F_{loffset,\ case\ 1}$
Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.

Table 7.6.1A.5.5-1a: In band blocking parameters for additional operating bands for carrier aggregation

E-UTRA band	Rx parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46 (NOTE 3)	Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					9
	$BW_{Interferer}$	MHz						20
	$F_{loffset,\ case\ 1}$	MHz						30+0.0125
	$F_{loffset,\ case\ 2}$	MHz						50+0.0075

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.
NOTE 3: The interferer consists of the Reference measurement channel specified in Annex A.3.2 (TBD)

Table 7.6.1A.5.5-1b: In-band blocking for additional operating bands for carrier aggregation

E-UTRA band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-50	-44
	$F_{Interferer}$ (offset)	MHz	=-BW/2 – $F_{loffset,case\ 1}$ & =+BW/2 + $F_{loffset,case\ 1}$	≤-BW/2 – $F_{loffset,case\ 2}$ & ≥+BW/2 + $F_{loffset,case\ 2}$
46	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 60 to F_{DL_high} + 60

NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz or 60 MHz below or above the UE receive band.
NOTE 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -BW/2 - $F_{loffset,\ case\ 1}$ and
b. the carrier frequency +BW/2 + $F_{loffset,\ case\ 1}$
NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.

Table 7.6.1A.5.5-2: In band blocking parameter (intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F

Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12	13.8		
$BW_{Interferer}$	MHz	5	5	5		
$F_{Ioffset,\ case\ 1}$	MHz	7.5	7.5	7.5		
$F_{Ioffset,\ case\ 2}$	MHz	12.5	12.5	12.5		
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						

Table 7.6.1A.5.5-3: In-band blocking (intra-band contiguous)

CA configuration	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq-F_{offset}-F_{Ioffset,case\ 2}$ & $\geq+F_{offset}+F_{Ioffset,case\ 2}$
CA_1C, CA_2C, CA_3C, CA_7C, CA_12B, CA_23B, CA_27B, CA_38C, CA_39C, CA_40C, CA_41C, CA_40D, CA_41D, CA_42C, CA_66C	$F_{Interferer}$ (Range)	MHz	(Note 2)	$F_{DL_low}-15$ to $F_{DL_high}+15$
Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band Note 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency $-F_{offset}-F_{Ioffset,\ case\ 1}$ and b. the carrier frequency $+F_{offset}+F_{Ioffset,\ case\ 1}$ Note 3: F_{offset} is the frequency offset from the centre frequency of the adjacent CC being tested to the edge of aggregated channel bandwidth. Note 4: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5\rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.					

Table 7.6.1A.5.5-3a: In band blocking parameters (band 46, intra-band contiguous)

E-UTRA Band	Rx Parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
				12	13.8		
	$BW_{Interferer}$	MHz		20	20		
	$F_{Ioffset,\ case\ 1}$	MHz		30	30		
	$F_{Ioffset,\ case\ 2}$	MHz		50	50		
NOTE 1: In a band capable of uplink operation, the transmitter shall be set to 4dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A. NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.6.1A.5.5-3b: In-band blocking (band 46, intra-band contiguous)

E-UTRA Band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-50	-44
	$F_{Interferer}$ (offset)	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq-F_{offset}-F_{Ioffset,case\ 2}$ & $\geq+F_{offset}+F_{Ioffset,case\ 2}$

46	$F_{Interferer}$ (Range)	MHz	(Note 2)	F_{DL_low} – 60 to F_{DL_high} + 60

NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.
NOTE 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -F_{offset} - $F_{Ioffset,\ case\ 1}$ and
b. the carrier frequency +F_{offset} + $F_{Ioffset,\ case\ 1}$
NOTE 3: F_{offset} is the frequency offset from the centre frequency of the CC being tested to the edge of aggregated channel bandwidth.
NOTE 4: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.6.1A.5.5-4: In-band blocking parameters (inter-band, intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.

Table 7.6.1A.5.5-5: In-band blocking (inter-band, intra-band non-contiguous)

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset from SCC)	MHz	=-BW/2 – $F_{Ioffset,case\ 1}$ & =+BW/2 + $F_{Ioffset,case\ 1}$	≤-BW/2 – $F_{Ioffset,case\ 2}$ & ≥+BW/2 + $F_{Ioffset,case\ 2}$			-BW/2 - 11
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 66	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15			
30	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15			F_{DL_low} – 11

Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band
Note 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and
b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$
Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies
Note 4: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Tables 7.6.1A.5.5-1, 7.6.1A.5.5-3 and 7.6.1A.5.5-5 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C accordingly.

7.6.1A.6

7.6.1A.7 In-band blocking for 4DL CA

7.6.1A.7.1 Test Purpose

Same test purpose as in clause 7.6.1A.1.

7.6.1A.7.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 4DL with TDD Intra-band contiguous CA, or 4DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 4DL Intra-band non-contiguous CA + Inter-band CA or 4DL Intra-band non-contiguous + Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 4DL CA with FDD-TDD CA.

7.6.1A.7.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1A.0.

7.6.1A.7.4 Test Description

7.6.1A.7.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1A.7.4.1-1 through table 7.6.1A.7.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.1A.7.4.1-1: Test Configuration Table

Initial Conditions																
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC											
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.					For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns											
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Refer to “PCC NRB” and “SCCs NRB” columns											
Network signalling value					NS_01 by default											
Test Parameters for CA Configurations																
ID	**PCC**				**SCC1**				**SCC2**				**SCC3**			
	Band	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**	
	UL MOD	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**
Default Test Settings for a CA_XE Configuration (Intra-band contiguous)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA Configuration (Inter-band)																
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XB-YA-ZA and CA_XC-YA-ZA Configuration (Intra-band contiguous + Inter-band)																

Default Test Settings for CA_YA-XB-ZA and CA_YA-XC-ZA Configuration (Intra-band contiguous + Inter-band) Default Test Settings for CA_YA-ZA-XB and CA_YA-ZA-XC Configuration (Intra-band contiguous + Inter-band)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
Default Test Settings for CA_XC-YC Configuration (Intra-band contiguous + Inter-band(2))																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
3	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41E, X=41.
Note 6: **Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-8A,X=1,Y=3,Z=7,R=8.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 11: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.6.1A.7.4.1-2: Test Configuration Table with Wgap

Initial Conditions																				
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC, TL/VL, TL/VH, TH/VL, TH/VH														
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.						For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns														
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Highest N_{RB}														
Network signalling value						NS_01 by default														
Test Parameters for CA Configurations																				
ID	**PCC**				**W_{gap} [MHz]**	**SCC1**				**W_{gap} [MHz]**	**SCC2**				**W_{gap} [MHz]**	**SCC3**				
	Band	**Range**	**NRB**			**Band**	**Range**	**NRB**			**Band**	**Range**	**NRB**			**Band**	**Range**	**NRB**		
	UL MOD	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	
Default Test Settings for CA_XA-XA-YA-ZA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-XA-XA-ZA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																				
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
3	Z	Mid	REFSENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
Default Test Settings for CA_XA-XD/XD-XA/XC-XC Configurations (Intra-band non-contiguous + Intra-band contiguous)																				
TBD																				
Default Test Settings for CA_XA-XA-YA-YA Configurations (Intra-band non-contiguous + Intra-band non-contiguous)																				
1	X	CC4	REFSENS	ALL RBs	Max	X	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
2	Y	CC4	REFSENS	ALL RBs	Max	Y	CC3	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	

Note 1:	CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2:	Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3:	If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4:	**Intra-band non-contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-12A,X=2,Y=4,Z=12.
Note 5:	**Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A-41A,X=41.
Note 6:	**Intra-band non-contiguous + Intra-band non-contiguous:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-4A,X=2,Y=4.
Note 7:	REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8:	**Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 9:	The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and DL Reference Measurement channels are set according to Table 7.6.1A.7.4.1-1 through Table 7.6.1A.7.4.1-2 as appropriate.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.1A.7.4.3.

7.6.1A.7.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.1A.7.4.3

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1A.7.4.1-1 through Table 7.6.1A.7.4.1-6 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.1A.7.4.1-1 through Table 7.6.1A.7.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6 Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6.1A.7.4.2-1.

7 Set the downlink signal level according to the Table 7.6.1A.7.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1A.7.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.

8 Measure the average throughput for the carrier(s) indicated in Table 7.6.1A.7.4.2-1for duration sufficient to achieve statistical significance according to Annex G.2A.

9 Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to Table 7.6.1A.7.5-1 in Case 1 at step 6.

10 Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1A.1.4.2-1.

11. Repeat steps 1 to 10 for all component carriers listed in Table 7.6.1A.7.4.2-1.

Table 7.6.1A.7.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3	7.6.1A.7.5-2 7.6.1A.7.5-3
	2		
Inter-band	1	SCC1	7.6.1A.7.5-1
		SCC2	
		SCC3	
	2	SCC1	
		SCC2	
		SCC3	
	3	SCC1	
		SCC2	
		SCC3	
	4	SCC1	
		SCC2	
		SCC3	
Intra-band contiguous + Inter-band	1	SCC2 SCC3	7.6.1A.7.5-1
	2		
	3	SCC1, SCC2, SCC3	7.6.1A.7.5-1 7.6.1A.7.5-2 7.6.1A.7.5-3
	4		
	5	SCC1, SCC2, SCC3	7.6.1A.7.5-1 7.6.1A.7.5-2 7.6.1A.7.5-3
	6		
Intra-band contiguous + Inter-band(2)	1	SCC2 SCC3	7.6.1A.7.5-1 7.6.1A.7.5-2 7.6.1A.7.5-3
	2		
	3		
	4		
Intra-band non-contiguous + Inter-band	1	SCC2, SCC3	7.6.1A.7.5-1
	2	SCC1,	7.6.1A.7.5-4 7.6.1A.7.5-5
		SCC2	
		SCC3	
	3	SCC1	7.6.1A.7.5-4 7.6.1A.7.5-5
		SCC2	
		SCC3	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.6.1A.7.5-4 7.6.1A.7.5-5
		SCC1, SCC2, SCC3	7.6.1A.7.5-4 7.6.1A.7.5-5 7.6.1A.7.5-2 7.6.1A.7.5-3
	2	SCC2	7.6.1A.7.5-2 7.6.1A.7.5-3
		PCC, SCC1, SCC3	7.6.1A.7.5-4 7.6.1A.7.5-5 7.6.1A.7.5-2 7.6.1A.7.5-3
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC2	7.6.1A.7.5-4 7.6.1A.7.5-5
		SCC3	
	2	SCC2	
		SCC3	

Note 1: Test point ID for the particular CA configuration as defined in section 7.6.1A.7.4.1.

Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.

Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.6.1A.7.4.3 Message Contents

Same message contents as in clause 7.6.1.4.3 for without UL CA.

Same message contents as in clause 7.6.1A.1.4.3 for UL CA.

7.6.1A.7.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

Table 7.6.1A.7.5-1: In-band blocking for additional operating bands for carrier aggregation (inter-band)

E-UTRA band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset from SCC)	MHz	$=-BW/2 - F_{loffset,case\ 1}$ & $=+BW/2 + F_{loffset,case\ 1}$	$\leq -BW/2 - F_{loffset,case\ 2}$ & $\geq +BW/2 + F_{loffset,case\ 2}$
29, 32, 67, 69	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$

Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.
Note 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency $-BW/2 - F_{loffset,\ case\ 1}$ and
b. the carrier frequency $+BW/2 + F_{loffset,\ case\ 1}$
Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.

Table 7.6.1A.7.5-2: In band blocking parameter (intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12	13.8	15	
$BW_{Interferer}$	MHz	5	5	5	5	
$F_{loffset,\ case\ 1}$	MHz	7.5	7.5	7.5	7.5	
$F_{loffset,\ case\ 2}$	MHz	12.5	12.5	12.5	12.5	

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1

Table 7.6.1A.7.5-3: In-band blocking (intra-band contiguous)

CA configuration	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$	MHz	$=-F_{offset} - F_{loffset,case\ 1}$ & $=+F_{offset} + F_{loffset,case\ 1}$	$\leq -F_{offset} - F_{loffset,case\ 2}$ & $\geq +F_{offset} + F_{loffset,case\ 2}$

CA_1C, CA_2C, CA_3C, CA_5B, CA_7C, CA_8B, CA_12B, CA_23B, CA_27B, CA_38C, CA_39C, CA_40C, CA_41C, CA_40D, CA_41D, CA_42C, CA_42D, CA_42E, CA66B, CA_66C, CA_70C, CA_66D	$F_{Interferer}$ (Range)	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15

Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.
Note 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -F_{offset} - $F_{Ioffset,\ case\ 1}$ and
b. the carrier frequency +F_{offset} + $F_{Ioffset,\ case\ 1}$
Note 3: F_{offset} is the frequency offset from the centre frequency of the adjacent CC being tested to the edge of aggregated channel bandwidth.
Note 4: The $F_{interferer}$ (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

Table 7.6.1A.7.5-4: In-band blocking parameters (inter-band, intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.

Table 7.6.1A.7.5-5: In-band blocking (inter-band, intra-band non-contiguous)

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset from SCC)	MHz	=-BW/2 – $F_{Ioffset,case\ 1}$ & =+BW/2 + $F_{Ioffset,case\ 1}$	≤-BW/2 – $F_{Ioffset,case\ 2}$ & ≥+BW/2 + $F_{Ioffset,case\ 2}$			-BW/2 - 11

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 65, 66, 68, 70	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			
30	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			$F_{DL_low} - 11$
Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.							
Note 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$							
Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.							
Note 4: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.							

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Tables 7.6.1A.7.5-1, 7.6.1A.7.5-3 and 7.6.1A.7.5-5 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C accordingly.

7.6.1A.8 In-band blocking for 5DL CA

7.6.1A.8.1 Test Purpose

Same test purpose as in clause 7.6.1A.1.

7.6.1A.8.2 Test Applicability

This test case applies to all types of E-UTRA UE release 12 and forward that support 5DL with TDD Intra-band contiguous CA, or 5DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 5DL with Intra-band non-contiguous CA or 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA, or 5DL with Intra-band non-contiguous and Intra-band non-contiguous CA, or 5DL with Intra-band contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 5DL CA with FDD-TDD CA.

7.6.1A.8.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1A.0.

7.6.1A.8.4 Test Description

7.6.1A.8.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1A.8.4.1-1 through table 7.6.1A.8.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.1A.8.4.1-1: Test Configuration Table

Initial Conditions																				
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC																			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns																			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns																			
Network signalling value	NS_01 by default																			
Test Parameters for CA Configurations																				
ID	**PCC**				**SCC1**				**SCC2**				**SCC3**				**SCC4**			
	Band	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**	
	UL MOD	**DL MOD**	**ULalloc (Note 2,3,4)**	**DL alloc**	**UL MOD**	**DL MOD**	**UL alloc**	**DL alloc**	**UL MOD**	**UL MOD**	**DL MOD**	**UL alloc**	**UL MOD**	**DL MOD**	**UL alloc**	**DL alloc**	**UL MOD**	**DL MOD**	**UL alloc**	**DL alloc**
Default Test Settings for a CA_XF Configuration (Intra-band contiguous)																				
1	X	Mid/ CC1	REF SENS	X	Mid/ CC1	X	N/A	X	Mid/ CC1	X	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		QPSK	QPSK	QPSK		QPSK	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/ CC1	REF SENS	X	Mid/ CC1	X	N/A	X	Mid/ CC1	X	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		QPSK	QPSK	QPSK		QPSK	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA-SA Configuration (Inter-band)																				
1	X	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

4	R	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	S	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for a CA_XE-YA Configuration (Intra-band contiguous + Inter-band)																			
1	X	X	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

2	X	X	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Y	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Y	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
Default Test Settings for CA_XA-ZA-RA-YB and CA_XA-ZA-RA-YC Configuration (Intra-band contiguous + Inter-band)																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
7	R	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs

	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
8	R	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
Default Test Settings CA_XB-YB-ZA, CA_XB-YC-ZA, CA_XC-YB-ZA, and CA_XC-YC-ZA Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band) **Default Test Settings CA_ZA-XB-YB, CA_ZA-XB-YC, CA_ZA-XC-YB, and CA_ZA-XC-YC Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band)**																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41F, X=41.
Note 6: **Inter-band:** X,Y,Z,R,S correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-20A-42A,X=1,Y=3,Z=7,R=20,S=42.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.

Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.

Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.6.1A.8.4.1-2: Test Configuration Table with Wgap

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3				W_{gap} [MHz]	SCC4			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA-ZA-RA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-ZA-XA-XA-RA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-RA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																								
1	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REF SENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REF SENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
4	R	Mid	REF SENS	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XA-YD Configurations (Intra-band non-contiguous + Intra-band contiguous)																								
1	Y	CC3	REF SENS	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}
2	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XA-YA-ZA-ZA Configurations Intra-band non-contiguous + Intra-band non-contiguous																								
1	Z	CC2	REF SENS	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_ag}		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$

				g					agg					agg					agg					agg
2	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Y	Mid	REF SENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band non-contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-12A-66A,X=2,Y=5,Z=12,R=66.
Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X,Y corresponds to the band of the CA Configuration. E.g. for CA_5A-5A-66D,X=5,Y=66.
Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-66A-66A,X=2,Y=5,Z=66.
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_CC1} = N_{RB_CC2} for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and DL Reference Measurement channels are set according to Table 7.6.1A.8.4.1-1 through Table 7.6.1A.8.4.1-2 as appropriate.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.1A.8.4.3.

7.6.1A.8.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.1A.8.4.3

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1A.8.4.1-1 through Table 7.6.1A.8.4.1-6 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.1A.8.4.1-1 through Table 7.6.1A.8.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6 Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6.1A.8.4.2-1.

7 Set the downlink signal level according to the Table 7.6.1A.8.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1A.8.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.

8 Measure the average throughput for the carrier(s) indicated in Table 7.6.1A.8.4.2-1for duration sufficient to achieve statistical significance according to Annex G.2A.

9 Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to Table 7.6.1A.8.5-1 in Case 1 at step 6.

10 Repeat steps from 6 to 9, using interfering signals in Case 2 at step 6 and 9. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1A.1.4.2-1.

11. Repeat steps 1 to 10 for all component carriers listed in Table 7.6.1A.8.4.2-1.

Table 7.6.1A.8.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3,SCC4	7.6.1A.8.5-2
	2		7.6.1A.8.5-3
Inter-band	1	SCC1	7.6.1A.8.5-1 7.6.1A.8.5-4 7.6.1A.8.5-5
		SCC2	
		SCC3	
		SCC4	
	2	SCC1	
		SCC2	
		SCC3	
		SCC4	
	3	SCC1	
		SCC2	
		SCC3	
		SCC4	
	4	SCC1	
		SCC2	
		SCC3	
		SCC4	
	5	SCC1	
		SCC2	
		SCC3	
		SCC4	
Intra-band contiguous + Inter-band	1	SCC4	7.6.1A.8.5-1 7.6.1A.8.5-4 7.6.1A.8.5-5
	2		
	3	SCC1, SCC2, SCC3, SCC4	7.6.1A.8.5-1 7.6.1A.8.5-2 7.6.1A.8.5-3 7.6.1A.8.5-4 7.6.1A.8.5-5
	4		
Intra-band contiguous + Inter-band	1	SCC2 SCC3 SCC4	7.6.1A.8.5-1 7.6.1A.8.5-4 7.6.1A.8.5-5
	2		
	3	SCC1, SCC2, SCC3,SCC4	7.6.1A.8.5-1 7.6.1A.8.5-2 7.6.1A.8.5-3 7.6.1A.8.5-4 7.6.1A.8.5-5
	4		
	5	SCC1, SCC2, SCC3,SCC4	7.6.1A.8.5-1 7.6.1A.8.5-2 7.6.1A.8.5-3 7.6.1A.8.5-4 7.6.1A.8.5-5
	6		
	7	SCC1, SCC2, SCC3,SCC4	7.6.1A.8.5-1 7.6.1A.8.5-2 7.6.1A.8.5-3 7.6.1A.8.5-4 7.6.1A.8.5-5
	8		
Intra-band contiguous + Intra-band contiguous + Inter-band	1	SCC2, SCC3, SCC4	7.6.1A.8.5-1 7.6.1A.8.5-2 7.6.1A.8.5-3 7.6.1A.8.5-4 7.6.1A.8.5-5
	2		
	3		
	4		
	5	SCC1, SCC2, SCC3, SCC4	7.6.1A.8.5-1 7.6.1A.8.5-2 7.6.1A.8.5-3 7.6.1A.8.5-4 7.6.1A.8.5-5
	6		
Intra-band non-contiguous + Inter-band	1	SCC1, SCC2, SCC3, SCC4	7.6.1A.8.5-1 7.6.1A.8.5-4

	2	SCC1, SCC2, SCC3, SCC4	7.6.1A.8.5-5
	3	SCC1, SCC2, SCC3, SCC4	
	4	SCC1, SCC2, SCC3, SCC4	
Intra-band non-contiguous + Intra-band contiguous	1	PCC, SCC1, SCC2	7.6.1A.8.5-2 7.6.1A.8.5-3
		SCC3, SCC4	7.6.1A.8.5-1 7.6.1A.8.5-4 7.6.1A.8.5-5
	2	SCC1, SCC2, SCC3, SCC4	7.6.1A.8.5-1 7.6.1A.8.5-4 7.6.1A.8.5-5
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC1, SCC2, SCC3, SCC4	7.6.1A.8.5-1 7.6.1A.8.5-4 7.6.1A.8.5-5
	2		
	3		
Note 1: Test point ID for the particular CA configuration as defined in section 7.6.1A.8.4.1. Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on. Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.			

7.6.1A.8.4.3 Message Contents

Same message contents as in clause 7.6.1.4.3 for without UL CA.

Same message contents as in clause 7.6.1A.1.4.3 for UL CA.

7.6.1A.8.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

Table 7.6.1A.8.5-1: In-band blocking for additional operating bands for carrier aggregation (inter-band)

E-UTRA band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset from SCC)	MHz	=-BW/2 – $F_{Ioffset,case\ 1}$ & =+BW/2 + $F_{Ioffset,case\ 1}$	≤-BW/2 – $F_{Ioffset,case\ 2}$ & ≥+BW/2 + $F_{Ioffset,case\ 2}$
29, 32, 67, 69	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15
Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band. Note 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$ Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.				

Table 7.6.1A.8.5-2: In band blocking parameter (intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F

Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12	13.8	15	16
$BW_{Interferer}$	MHz	5	5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz	7.5	7.5	7.5	7.5	7.5
$F_{Ioffset,\ case\ 2}$	MHz	12.5	12.5	12.5	12.5	12.5
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1						

Table 7.6.1A.8.5-3: In-band blocking (intra-band contiguous)

CA configuration	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq-F_{offset}-F_{Ioffset,case\ 2}$ & $\geq+F_{offset}+F_{Ioffset,case\ 2}$
CA_1C, CA_2C, CA_3B, CA_3C, CA_5B, CA_7C, CA_8B, CA_12B, CA_23B, CA_27B, CA_38C, CA_39C, CA_40C, CA_40D, CA_40E, CA_41C, CA_41D, CA_41E, CA_42C, CA_42D, CA_42E, CA_42F, CA_43C, CA_48C, CA_48D, CA_48E, CA_48F, CA_66B, CA_66C, CA_70C, CA_66D	$F_{Interferer}$ (Range)	MHz	(Note 2)	$F_{DL_low}-15$ to $F_{DL_high}+15$
Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band. Note 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency $-F_{offset}-F_{Ioffset,\ case\ 1}$ and b. the carrier frequency $+F_{offset}+F_{Ioffset,\ case\ 1}$ Note 3: F_{offset} is the frequency offset from the centre frequency of the adjacent CC being tested to the edge of aggregated channel bandwidth. Note 4: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5\rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.				

Table 7.6.1A.8.5-4: In-band blocking parameters (inter-band, intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.6.1A.8.5-5: In-band blocking (inter-band, intra-band non-contiguous)

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38

	$F_{Interferer}$ (offset from SCC)	MHz	$=-BW/2 - F_{loffset,case\ 1}$ & $=+BW/2 + F_{loffset,case\ 1}$	$\leq -BW/2 - F_{loffset,case\ 2}$ & $\geq +BW/2 + F_{loffset,case\ 2}$			-BW/2 - 11
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 65, 66, 68, 70	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			
30	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			$F_{DL_low} - 11$
Note 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band. Note 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency $-BW/2 - F_{loffset,\ case\ 1}$ and b. the carrier frequency $+BW/2 + F_{loffset,\ case\ 1}$ Note 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies. Note 4: For intra-band non-contiguous + inter-band CA, $\Delta R_{IBNC} = 0$ dB for all sub-block gaps.							

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, PInterferer power defined in Tables 7.6.1A.8.5-1, 7.6.1A.8.5-3 and 7.6.1A.8.5-5 is increased by the amount given by ΔRIB,c in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C accordingly.

7.6.1B In-band blocking for UL-MIMO

7.6.1B.1 Test Purpose

In-band blocking for UL- MIMO is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE that support UL-MIMO receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of in-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.1B.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

7.6.1B.3 Minimum Conformance Requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in subclause 7.6 shall be met with the UL-MIMO configurations specified in Table 6.2.2B.3-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 36.101 [2] clause 7.6B.

7.6.1B.4 Test Description

7.6.1B.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1B.4.1-1. The details of the uplink and downlink reference

measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.1B.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth.						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.29.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to in Table 7.6.1B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.1B.4.3.

7.6.1B.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.1B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 7.6.1B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the signal generator for an interfering signal below the wanted signal in Case 1 according to Tables 7.6.1B.5-1 and 7.6.1B.5-2.

4. Set the downlink signal level according to the table 7.6.1B.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1B.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq 4.2$GHz, for at least the duration of the throughput measurement.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 3.

7. Repeat steps from 3 to 6, using interfering signals in Case 2 at step 3and 6. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1B.4.2-1.

8. Repeat steps from 3 to 5, using successively all interfering signals in Case 3 and Case 4 at step 3.

Table 7.6.1B.4.2-1: Example for interferer frequencies

	Lower frequency	Upper frequency
Band 1 DL	2110 MHz	2170 MHz
Band 1 Midrange	2140 MHz	
Receive band wanted signal (BW 5MHz)	2137.5 MHz	2142.5 MHz
Interferer case 1	2129.9875 MHz	2150.0125 MHz
Interferer case 2 (inner frequency)	2124.9925 MHz	2155.0075 MHz
Interferer case 2 (outer frequency)	2099.9925 MHz	2180.0075 MHz
Outer limit for in band blocking	2095MHz	2185MHz
Number of test frequencies case 2	6	6
Number of test frequencies for Band 17(asymmetric!), BW 5MHz, case 2	0	2

7.6.1B.4.3 Message Contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 7.6.1B.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.1B.5 Test Requirement

The throughput measurement derived in test procedure shall be $\geq 95\%$ of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.6.1B.5-1 and 7.6.1B.5-2.

Table 7.6.1B.5-1: In band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{loffset,\ case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{loffset,\ case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.							

Table 7.6.1B.5-2: In-band blocking

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{loffset,case\ 1}$ & $=+BW/2 + F_{loffset,case\ 1}$	$\leq -BW/2 - F_{loffset,case\ 2}$ & $\geq +BW/2 + F_{loffset,case\ 2}$			-BW/2 - 11
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 65, 66, 70	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			
30	$F_{Interferer}$	MHz	(Note 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			$F_{DL_low} - 11$
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band							
NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{loffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{loffset,\ case\ 1}$							
NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies							

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.1B.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.1D In-band blocking for ProSe

7.6.1D.0 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2.

Table 7.6.1D.0-1: In band blocking parameters for ProSe Direct Discovery

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below + P_{offset}					
				6	6	7	9
$BW_{Interferer}$	MHz			5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz			7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz			12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
P_{offset}	dB			10.9	13.9	15.7	16.9
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.6.1D.0-2: In band blocking parameters for ProSe Direct Communication

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below					
				6	6	7	9
$BW_{Interferer}$	MHz			5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz			7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz			12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.6.1D.0-3: In-band blocking for ProSe

E-UTRA ProSe band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset)	MHz	=-BW/2 – $F_{Ioffset,case\ 1}$ & =+BW/2 + $F_{Ioffset,case\ 1}$	≤-BW/2 – $F_{Ioffset,case\ 2}$ & ≥+BW/2 + $F_{Ioffset,case\ 2}$
2,3,4,7,14, 20,26,28,31	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band. NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.				

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Tables 7.6.1D.0-3 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.1.1D.

7.6.1D.1 In-band blocking for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Use of OCNG for Downlink has not been considered and is still FFS.

- Message exceptions content needs further investigation (some values still TBD).
- Test time is FFS.

7.6.1D.1.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the ProSe band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of in-band blocking ability will decrease the coverage area when other Sidelink transmitters exist (except in the adjacent channels and spurious response).

7.6.1D.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

7.6.1D.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1D.0.

7.6.1D.1.4 Test Description

7.6.1D.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA ProSe bands specified in table 5.4.2D.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1D.1.4.1-1. The details of the downlink, uplink and sidelink reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.6.

Table 7.6.1D.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range(Note 4)					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, Highest					
	Downlink Configuration (Note 2)		**Uplink Configuration (Note 2)**		**Sidelink Configuration (Reception) (Note 3)**	
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Mod'n	RB allocation
5MHz	QPSK	8	QPSK	8	QPSK	2
10MHz	QPSK	16	QPSK	16	QPSK	2
15MHz	QPSK	25	QPSK	25	QPSK	2
20MHz	QPSK	30	QPSK	30	QPSK	2
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA ProSe and Operating band, according to the applicability specified respectively in Table 5.4.2D.1-1 and Table 5.4.2.1-1. Note 2: After DRX configuration, DL-RMC (PDSCH) and DCI-0 for scheduling UL-RMC (PUSCH) are applied only in the DRX On subframes. Note 3: The RB start for the transmission of Sidelink RMC is RB#0. Note 4: Sidelink uses the frequencies defined for Uplink.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.70.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.6.1D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 7.6.1D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

7.6.1D.1.4.2 Test Procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 7.6.1D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Initialise the variables Ptot and Pok as 0.
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.3D.1.4.1-1. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.
6. SS transmits PSDCH to transmit the SL RMC according to Table 7.6.1D.1.4.1-1. Set the Sidelink signal level to the appropriate value defined in Table 7.6.1D.1.5-1.
7. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Tables 7.6.1D.1.5-1 and 7.6.1D.1.5-2.
8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable Ptot.
10. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".
11. SS calculates the variable Pok as (current counter value - counter value at last test iteration).
12. SS shall compute the throughput as following:

    TP = Pok / Ptot * 100%

13. Repeat steps from 6 to 12, using an interfering signal above the wanted signal in Case 1 at step 7.
14. Repeat steps from 6 to 13, using interfering signals in Case 2 at step 7 and 13. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1D.1.4.2-1.

Table 7.6.1D.1.4.2-1: Example for interferer frequencies

	Lower frequency	Upper frequency
Band 2 SL	1850 MHz	1910 MHz
Band 2 Midrange	1880 MHz	
Sidlink wanted signal (BW 5MHz)	1877.5 MHz	1882.5 MHz
Interferer case 1	1869.9875 MHz	1890.0125 MHz
Interferer case 2 (inner frequency)	1864.9925 MHz	1895.0075 MHz
Interferer case 2 (outer frequency)	1839.9925 MHz	1920.0075 MHz
Outer limit for in band blocking	1835 MHz	1925 MHz
Number of test frequencies case 2	6	6

7.6.1D.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 7.6.1D.1.4.3-1: ACTIVATE TEST MODE: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 7.6.1D.1.4.3-2: CLOSE UE TEST LOOP: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 7.6.1D.1.4.3-3: MAC-MainConfig-RBC: Reference sensitivity for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

7.6.1D.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Tables 7.6.1D.1.5-1 and 7.6.1D.1.5-2.

Table 7.6.1D.1.5-1: In band blocking parameters for ProSe Direct Discovery

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below + P_{offset}					
				6	6	7	9
$BW_{Interferer}$	MHz			5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz			7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz			12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
P_{offset}	dB			10.9	13.9	15.7	16.9
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.6.1D.1.5-2: In-band blocking for ProSe

E-UTRA ProSe band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset)	MHz	=-BW/2 – $F_{loffset,case\ 1}$ & =+BW/2 + $F_{loffset,case\ 1}$	≤-BW/2 – $F_{loffset,case\ 2}$ & ≥+BW/2 + $F_{loffset,case\ 2}$
2,3,4,7,14, 20,26,28,31	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band. NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{loffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{loffset,\ case\ 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.				

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.1D.1.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.1D.2 In-band blocking for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test description is TBD
- Test system uncertainties and test tolerances are TBD

7.6.1D.2.1 Test Purpose

Same test purpose as in clause 7.6.1D.1.1.

7.6.1D.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

7.6.1D.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.1D.0.

7.6.1D.2.4 Test Description

TBD

7.6.1D.2.5 Test Requirement

Same test requirement as in clause 7.6.1D.1.5 with the following exceptions:

- Instead of Table 7.6.1D.1.5-1 → use Table 7.6.1D.2.5-1.

Table 7.6.1D.2.5-1: In band blocking parameters for ProSe Direct Communication

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below					
				6	6	7	9
$BW_{Interferer}$	MHz			5	5	5	5
$F_{Ioffset, case\ 1}$	MHz			7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset, case\ 2}$	MHz			12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

7.6.1E In-band blocking for UE category 0

7.6.1E.1 Test Purpose

The same test purpose as in clause 7.6.1.

7.6.1E.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward of UE category 0.

7.6.1E.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.6.1.3.

7.6.1E.4 Test Description

7.6.1E.4.1 Initial Conditions

Same initial conditions as in clause 7.6.1.4.1 with the following exceptions:

- Instead of Table 7.6.1.4.1-1 → use Table 7.6.1E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.4 using only main UE Tx/Rx antenna.

Table 7.6.1E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD and HD-FDD	**TDD**		**FDD and HD-FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	14	14	QPSK	15	15
5MHz	QPSK	14	14	QPSK	25	25
5MHz	QPSK	14	N/A	QPSK	20	N/A
10MHz	QPSK	14	14	QPSK	36	36
10MHz	QPSK	14	N/A	QPSK	25	N/A
10MHz	QPSK	14	N/A	QPSK	20	N/A
15MHz	QPSK	14	14	QPSK	36	36
15MHz	QPSK	14	N/A	QPSK	20	N/A
20MHz	QPSK	14	14	QPSK	36	36
20MHz	QPSK	14	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3E.3-3 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1). Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used. Note 4: Downlink RB position shall be RBstart = 0.						

7.6.1E.4.2 Test Procedure

Same test procedure as in clause 7.6.1.4.2

7.6.1E.4.3 Message Contents

Same message contents as in clause 7.6.1.4.3

7.6.1E.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Tables 7.6.1E.5-1 and 7.6.1E.5-2.

Table 7.6.1E.5-1: In band blocking parameters

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{loffset, case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{loffset, case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5E. Note 2: The interferer consists of the Reference measurement channel specified in clause A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in clauses A.5.1.1/A.5.2.1 and set-up according to clause C.3.1.							

Table 7.6.1E.5-2: In-band blocking

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset)	MHz	=-BW/2 – $F_{loffset,case\ 1}$ & =+BW/2 + $F_{loffset,case\ 1}$	≤-BW/2 – $F_{loffset,case\ 2}$ & ≥+BW/2 + $F_{loffset,case\ 2}$			-BW/2 - 11
2, 3, 4, 5, 8, 13, 20, 39, 41	$F_{Interferer}$	MHz	(Note 2)	F_{DL_low} – 15 to F_{DL_high} + 15			

NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.
NOTE 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -BW/2 - $F_{loffset,\ case\ 1}$ and
b. the carrier frequency +BW/2 + $F_{loffset,\ case\ 1}$.
NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.

7.6.1F In-band blocking for category NB1

7.6.1F.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of in-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.1F.2 Test Applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category NB1.

7.6.1F.3 Minimum Conformance Requirements

Category NB1 UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A.3.2 with parameters specified in Table 7.6.1F.3-1.

Table 7.6.1F.3-1: In-band blocking parameters for category NB1

IBB1 test Parameters	
Category NB1 signal power (P_{wanted}) / dBm	REFSENS + 6 dB
Interferer	E-UTRA
Interferer signal power ($P_{Interferer}$) / dBm	- 56 dBm
Interferer bandwidth	5 MHz
Interferer offset from category NB1 channel edge	+7.5 MHz + 0.005 MHz and -7.5 MHz - 0.005 MHz
IBB2 test Parameters	
Category NB1 signal power (P_{wanted}) / dBm	REFSENS + 6 dB
Interferer	E-UTRA
Interferer signal power ($P_{Interferer}$) / dBm	- 44 dBm
Interferer bandwidth	5 MHz
Interferer offset range from category NB1 channel edge	From +12.5 MHz to F_{DL_high} + 15 MHz and From -12.5 MHz to F_{DL_low} - 15 MHz

The normative reference for this requirement is TS 36.101 [2] clause 7.6.1.1F.

7.6.1F.4 Test Description

7.6.1F.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 7.6.1F.4.1-1. The details of the downlink reference measurement channels (RMCs) are specified in Annex A.3. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 7.6.1F.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] clause 8.1.1			NC		
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defined in Annex K.1.1		
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Modulation	Subcarriers	Modulation	N_{tones}	Subcarrier spacing
1	QPSK	12	BPSK	1@0	15 kHz

1. Connect the SS to the UE antenna connector as shown in TS 36.508 [7] Annex A, Figure A.4 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.2, and NPUSCH Format 2 is used to carry ACK/NACK on the uplink.
4. The DL Reference Measurement channel is set according to Table 7.6.1F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 7.6.1F.4.3.

7.6.1F.4.2 Test Procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.6.1F.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send HARQ feedback based on information contained in DCI format N1.
2. Set the downlink signal level according to the table 7.6.1F.5-1.
3. Set the parameters of the signal generator for an interfering signal below the wanted signal in IBB1 according to Table 7.6.1F.5-1.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
5. Repeat steps from 3 to 4, using an interfering signal above the wanted signal in IBB1 at step 3.
6. Repeat steps from 3 to 5, using interfering signals in IBB2 at step 3 and 5. The ranges of IBB2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1F.4.2-1.

Table 7.6.1F.4.2-1: Example for interferer frequencies

	Lower frequency	Upper frequency
Band 1 DL	2110 MHz	2170 MHz
Band 1 Midrange	2140 MHz	
Receive band wanted signal (BW 200KHz)	2139.9 MHz	2140.1 MHz
Interferer IBB1	2132.395 MHz	2147.605 MHz
Interferer IBB2	2127.4 MHz	2152.6 MHz
Outer limit for in band blocking	2095MHz	2185MHz

7.6.1F.4.3 Message Contents

Message contents are according to TS 36.508 [7] clause 8.1.6.

7.6.1F.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Tables 7.6.1F.5-1.

Table 7.6.1F.5-1: In-band blocking parameters for category NB1

IBB1 test Parameters	
Category NB1 signal power (P_{wanted}) / dBm	REFSENS + 6 dB
Interferer	E-UTRA
Interferer signal power ($P_{Interferer}$) / dBm	- 56 dBm
Interferer bandwidth	5 MHz
Interferer offset from category NB1 channel edge	+7.5 MHz + 0.005 MHz and -7.5 MHz - 0.005 MHz
IBB2 test Parameters	
Category NB1 signal power (P_{wanted}) / dBm	REFSENS + 6 dB
Interferer	E-UTRA
Interferer signal power ($P_{Interferer}$) / dBm	- 44 dBm
Interferer bandwidth	5 MHz
Interferer offset range from category NB1 channel edge	From +12.5 MHz to F_{DL_high} + 15 MHz and From -12.5 MHz to F_{DL_low} - 15 MHz

7.6.1G In-band blocking for V2X Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- UE test mode is FFS

7.6.1G.1 In-band blocking for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

7.6.1G.1.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the V2X band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of in-band blocking ability will decrease the coverage area when other Sidelink transmitters exist (except in the adjacent channels and spurious response).

7.6.1G.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.6.1G.1.3 Minimum Conformance Requirements

The V2X UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters defined in Table 7.6.1G.1.3-1 and Table 7.6.1G.1.3-2.

Table 7.6.1G.1.3-1: In band blocking parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
$BW_{Interferer}$	MHz				10		10
$F_{Ioffset,\ case\ 1}$	MHz				15+0.0025		15+0.005
$F_{Ioffset,\ case\ 2}$	MHz				25+0.0075		25+0.0025
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211							

Table 7.6.1G.1.3-2: In-band blocking

E-UTRA V2X band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{Ioffset,case\ 1}$ & $=+BW/2 + F_{Ioffset,case\ 1}$	$\leq -BW/2 - F_{Ioffset,case\ 2}$ & $\geq +BW/2 + F_{Ioffset,case\ 2}$
47	$F_{Interferer}$	MHz	(NOTE 2)	$F_{DL_low} - 30$ to $F_{DL_high} + 30$
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies				

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 7.6.1G apply for the E-UTRA V2X sidelink reception and the requirements in subclause 7.6.1.1 apply for the E-UTRA downlink reception while all downlink carriers are active.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.1.1G.

7.6.1G.1.4 Test Description

7.6.1G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A. 8.3. GNSS simulator is configured as Table C.2-8 in Annex C.2.

Table 7.6.1 G.1.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1				Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1				Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1				Lowest, 5MHz, Highest for uplink Lowest, Highest for V2X			
Test Parameters for Channel Bandwidths							
	Downlink		**Uplink Configuration**		**V2X Configuration**		
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz	QPSK	1	QPSK	1	10 MHz	QPSK	[48]
1.4 MHz	QPSK	5	QPSK	5	20 MHz	QPSK	[96]
3 MHz	QPSK	1	QPSK	1			
3 MHz	QPSK	4	QPSK	4			
5 MHz	QPSK	1	QPSK	1			
5 MHz	QPSK	8	QPSK	8			
10 MHz	QPSK	1	QPSK	1			
10 MHz	QPSK	12	QPSK	12			
15 MHz	QPSK	1	QPSK	1			
15 MHz	QPSK	16	QPSK	16			
20 MHz	QPSK	1	QPSK	1			
20 MHz	QPSK	18	QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.							

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.92a.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 7.6.1 G.1.4.3.
3. The V2X reference measurement channel is set according to Table 7.6.1 G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode – FFS.

7.6.1G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.6.1G.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Set the parameters of the signal generator for an interfering signal below the wanted signal in Case 1 according to Tables 7.6.1G.1.5-1 and 7.6.1G.1.5-2.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].
4. Repeat step 3, using an interfering signal above the wanted signal in Case 1 at step 2.
5. Repeat step 3, using interfering signals in Case 2 at step2 and 4. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1G.1.5-2.

7.6.1G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.10.

7.6.1G.1.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Tables 7.6.1G.1.5-1 and 7.6.1G.1.5-2.

Table 7.6.1G.1.5-1: In band blocking parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
$BW_{Interferer}$	MHz				10		10
$F_{Ioffset,\ case\ 1}$	MHz				15+0.0025		15+0.005
$F_{Ioffset,\ case\ 2}$	MHz				25+0.0075		25+0.0025
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

Table 7.6.1G.1.5-2: In-band blocking

E-UTRA V2X band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-56	-44
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{Ioffset,case\ 1}$ & $=+BW/2 + F_{Ioffset,case\ 1}$	$\leq -BW/2 - F_{Ioffset,case\ 2}$ & $\geq +BW/2 + F_{Ioffset,case\ 2}$
47	$F_{Interferer}$	MHz	(NOTE 2)	$F_{DL_low} - 30$ to $F_{DL_high} + 30$
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies				

7.6.1G.2 In-band blocking for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration table is investigating.
- Test procedure is TBD
- Message contents are TBD

7.6.1G.2.1 Test Purpose

Same as in clause 7.6.1G.1.1.

7.6.1G.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.6.1G.2.3 Minimum Conformance Requirements

The V2X UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters defined in Table 7.6.1G.2.3-1 and Table 7.6.1G.2.3-2.

Table 7.6.1G.2.3-1: In band blocking parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
$BW_{Interferer}$	MHz				10		10
$F_{Ioffset,\ case\ 1}$	MHz				15+0.0025		15+0.005
$F_{Ioffset,\ case\ 2}$	MHz				25+0.0075		25+0.0025
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211							

Table 7.6.1G.2.3-2: In-band blocking

E-UTRA V2X band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-44	-44
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{Ioffset,case\ 1}$ & $=+BW/2 + F_{Ioffset,case\ 1}$	$\leq -BW/2 - F_{Ioffset,case\ 2}$ & $\geq +BW/2 + F_{Ioffset,case\ 2}$
47	$F_{Interferer}$	MHz	(NOTE 2)	$F_{DL_low} - 30$ to $F_{DL_high} + 30$
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies.				

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 7.6.1G.2.3 apply for the E-UTRA V2X sidelink reception and the requirements in subclause 7.6.1.3 apply for the E-UTRA downlink reception while all downlink carriers are active.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.1.1G.

7.6.1G.2.4 Test Description

7.6.1G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1G.2.4.1-1. The details of the uplink, downlink and V2X reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.8.3 respectively.

Table 7.6.1G.2.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1				Normal, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1				Mid range			
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1				Lowest, 5MHz, Highest for uplink Lowest, Highest for V2X			
Test Parameters for Channel Bandwidths							
	Downlink		**Uplink Configuration**		**V2X Configuration**		
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz	QPSK	1	QPSK	1	10 MHz	QPSK	[48]
1.4 MHz	QPSK	5	QPSK	5	20 MHz	QPSK	[96]
3 MHz	QPSK	1	QPSK	1			
3 MHz	QPSK	4	QPSK	4			
5 MHz	QPSK	1	QPSK	1			
5 MHz	QPSK	8	QPSK	8			
10 MHz	QPSK	1	QPSK	1			
10 MHz	QPSK	12	QPSK	12			
15 MHz	QPSK	1	QPSK	1			
15 MHz	QPSK	16	QPSK	16			
20 MHz	QPSK	1	QPSK	1			
20 MHz	QPSK	18	QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.6.1G.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.6.1G.2.4.3.

7.6.1G.2.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.6.1G.2.4.1-1 on E-UTRA Band. The SS sends downlink MAC padding bits on the DL RMC.
2. SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 7.6.1G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.
3. Set the parameters of the signal generator for an interfering signal below the V2X band in Case 1 according to Tables 7.6.1G.2.5-1 and 7.6.1G.2.5-2.
4. Set the downlink signal level according to the table 7.6.1G.2.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power [TBD] for carrier frequency $f \leq 6.0$GHz, for at least the duration of the throughput measurement.
5. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex [TBD].
6. Repeat steps from 3 to 5, using an interfering signal above the V2X band in Case 1 at step 6.
7. Repeat steps from 3 to 6, using interfering signals in Case 2 at step 3 and 6. The ranges of case 2 are covered in steps equal to the interferer bandwidth.

7.6.1G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.6.1G.2.5 Test Requirement

Same test requirement as in clause 7.6.1G.2.3 with the following exceptions:

- Instead of Table 7.6.1G.2.3-1 → use Table 7.6.1G.2.5-1.
- Instead of Table 7.6.1G.2.3-2 → use Table 7.6.1G.2.5-2.

Table 7.6.1G.2.5-1: In band blocking parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
$BW_{Interferer}$	MHz				10		10
$F_{Ioffset,\ case\ 1}$	MHz				15+0.0025		15+0.005
$F_{Ioffset,\ case\ 2}$	MHz				25+0.0075		25+0.0025
NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211							

Table 7.6.1G.2.5-2: In-band blocking

E-UTRA V2X band	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-44	-44
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{Ioffset,case\ 1}$ & $=+BW/2 + F_{Ioffset,case\ 1}$	$\leq -BW/2 - F_{Ioffset,case\ 2}$ & $\geq +BW/2 + F_{Ioffset,case\ 2}$
47	$F_{Interferer}$	MHz	(NOTE 2)	$F_{DL_low} - 30$ to $F_{DL_high} + 30$
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset,\ case\ 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies				

7.6.1G.3 In-band blocking for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration table is investigating.
- Test procedure is TBD
- Message contents are TBD

7.6.1G.3.1 Test Purpose

Same as in clause 7.6.1G.1.1.

7.6.1G.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support Intra-band contiguous multi-carrier operation V2X Communication.

7.6.1G.3.3 Minimum Conformance Requirements

For intra-band contiguous multi-carrier operation the V2X UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters defined in Table 7.6.1G.3.3-1 and Table 7.6.1G.3.3-2.

Table 7.6.1G.3.3-1: In band blocking parameters for intra-band contiguous multi-carrier for V2X

Rx Parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + V2X Bandwidth Class specific value below				
		9				
$BW_{Interferer}$	MHz	10				
$F_{Ioffset,\ case\ 1}$	MHz	15				
$F_{Ioffset,\ case\ 2}$	MHz	25				

Table 7.6.1G.3.3-2: In-band blocking for intra-band contiguous multi-carrier for V2X

V2X multi-carrier configuration	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-44	-44
	$F_{Interferer}$ (offset)	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq -F_{offset}-F_{Ioffset,case\ 2}$ & $\geq +F_{offset}+F_{Ioffset,case\ 2}$
V2X_47B	$F_{Interferer}$ (Range)	MHz	(NOTE 2)	$F_{DL_low}-30$ to $F_{DL_high}+30$

NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 30 MHz below or above the UE receive band

NOTE 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -Foffset - FIoffset, case 1 and
b. the carrier frequency +Foffset + FIoffset, case 1

NOTE 3: Foffset is the frequency offset from the centre frequency of the CC being tested to the edge of aggregated channel bandwidth.

NOTE 4: The Finterferer (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5\rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.

NOTE 5: The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmission are activated at the same time

The normative reference for this requirement is TS 36.101 [2] clause 7.6.1.1G.

7.6.1G.3.4 Test Description

7.6.1G.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in Table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1G.3.4.1-1. The details of the uplink, downlink and V2X reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.8.3 respectively.

Table 7.6.1G.3.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest N_{RB_agg}, Highest N_{RB_agg}	
Test Parameters for Channel Bandwidths			
V2X multi-carrier Configuration		**V2X PSSCH Allocation**	
CC1 N_{RB}	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**CC1 and CC2 RB Allocation**
10MHz	10MHz	QPSK	[48+48]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.92d.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.6.1G.3.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.6.1G.3.4.3.

7.6.1G.3.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.6.1G.3.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
3. Set the parameters of the signal generator for an interfering signal below the V2X band in Case 1 according to Tables 7.6.1G.3.5-1 and 7.6.1G.3.5-2.
4. Set the downlink signal level according to the table 7.6.1G.3.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power [TBD] for carrier frequency $f \leq 6.0$GHz, for at least the duration of the throughput measurement.
5. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex [TBD].
6. Repeat steps from 3 to 5, using an interfering signal above the V2X band in Case 1 at step 6.
7. Repeat steps from 3 to 6, using interfering signals in Case 2 at step 3 and 6. The ranges of case 2 are covered in steps equal to the interferer bandwidth.

7.6.1G.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.TBD

7.6.1G.3.5 Test Requirement

Same test requirement as in clause 7.6.1G.3.3 with the following exceptions:

- Instead of Table 7.6.1G.3.3 -1 → use Table 7.6.1G.3.5 -1.
- Instead of Table 7.6.1G.3.3 -2 → use Table 7.6.1G.3.5-2.

Table 7.6.1G.3.5-1: In band blocking parameters for intra-band contiguous multi-carrier for V2X

Rx Parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + V2X Bandwidth Class specific value below				
		9				
$BW_{Interferer}$	MHz	10				
$F_{Ioffset,\ case\ 1}$	MHz	15				
$F_{Ioffset,\ case\ 2}$	MHz	25				

Table 7.6.1G.3.5-2: In-band blocking for intra-band contiguous multi-carrier for V2X

V2X multi-carrier configuration	Parameter	Unit	Case 1	Case 2
	$P_{Interferer}$	dBm	-44	-44
	$F_{Interferer}$ (offset)	MHz	$=-F_{offset}-F_{Ioffset,case\ 1}$ & $=+F_{offset}+F_{Ioffset,case\ 1}$	$\leq -F_{offset}-F_{Ioffset,case\ 2}$ & $\geq +F_{offset}+F_{Ioffset,case\ 2}$
V2X_47B	$F_{Interferer}$ (Range)	MHz	(NOTE 2)	$F_{DL_low}-30$ to $F_{DL_high}+30$

NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 30 MHz below or above the UE receive band

NOTE 2: For each carrier frequency the requirement is valid for two frequencies:
a. the carrier frequency -Foffset - FIoffset, case 1 and
b. the carrier frequency +Foffset + FIoffset, case 1

NOTE 3: Foffset is the frequency offset from the centre frequency of the CC being tested to the edge of aggregated channel bandwidth.

NOTE 4: The Finterferer (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015+0.5\rfloor 0.015+0.0075$ MHz to be offset from the sub-carrier raster.

NOTE 5: The requirement is applied for 2 carrier intra-concurrent receptions when 2 carrier transmission are activated at the same time

7.6.1EA In-band blocking for UE category M1

7.6.1EA.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the category M1 UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels.

The lack of in-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.1EA.2 Test Applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category M1.

7.6.1EA.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.1EA.3-1 and 7.6.1EA.3-2. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.6.1EA.3-1: In band blocking parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Ioffset, case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset, case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075
NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in subclause 6.2.5EA. NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1. NOTE 3: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2 should be used as REFSENS for the power in Transmission Bandwidth Configuration. NOTE 4: For DL category M1 UE, the parameters for the applicable channel bandwidth apply.							

Table 7.6.1EA.3-2: In-band blocking

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset)	MHz	$=-BW/2 - F_{Ioffset,case\ 1}$ & $=+BW/2 + F_{Ioffset,case\ 1}$	$\leq -BW/2 - F_{Ioffset,case\ 2}$ & $\geq +BW/2 + F_{Ioffset,case\ 2}$			-BW/2 - 11
1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 18, 19, 20, 21, 26, 27, 28, 31, 39, 41	$F_{Interferer}$	MHz	(NOTE 2)	$F_{DL_low} - 15$ to $F_{DL_high} + 15$			
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{Ioffset, case\ 1}$ and b. the carrier frequency +BW/2 + $F_{Ioffset, case\ 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies							

The normative reference for this requirement is TS 36.101 [2] clause 7.6.1.

7.6.1EA.4 Test Description

7.6.1EA.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for CAT M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1EA.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 7.6.1EA.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz						
Test Parameters for Channel Bandwidths and Narrowband positions							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation		
		FDD	TDD		FDD and HD-FDD	TDD	Narrowband index (Note 1)
5MHz	QPSK	4	4	QPSK	6	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.4 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.6.1EA.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.6.1EA.4.3.

7.6.1EA.4.2 Test Procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 7.6.1EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The SS sends one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.

2. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 7.6.1EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the signal generator for an interfering signal below the wanted signal in Case 1 according to Tables 7.6.1EA.5-1 and 7.6.1EA.5-2.

4. Set the downlink signal level according to the table 7.6.1EA.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.1EA.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.

5. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 3.

7. Repeat steps from 3 to 6, using interfering signals in Case 2 at step 3 and 6. The ranges of case 2 are covered in steps equal to the interferer bandwidth. The test frequencies are chosen in analogy to table 7.6.1EA.4.2-1.

Table 7.6.1EA.4.2-1: Example for interferer frequencies

	Lower frequency	Upper frequency
Band 1 DL	2110 MHz	2170 MHz
Band 1 Midrange	2140 MHz	
Receive band wanted signal (BW 5MHz)	2137.5 MHz	2142.5 MHz
Interferer case 1	2129.9875 MHz	2150.0125 MHz
Interferer case 2 (inner frequency)	2124.9925 MHz	2155.0075 MHz
Interferer case 2 (outer frequency)	2099.9925 MHz	2180.0075 MHz
Outer limit for in band blocking	2095MHz	2185MHz
Number of test frequencies case 2	6	6

7.6.1EA.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA and the following exception

Table 7.6.1EA.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-UE-PUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.1EA.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.6.1EA.5-1 and 7.6.1EA.5-2.

Table 7.6.1EA.5-1: In band blocking parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
$BW_{Interferer}$	MHz	1.4	3	5	5	5	5
$F_{Ioffset,\ case\ 1}$	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
$F_{Ioffset,\ case\ 2}$	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.0125	12.5+0.0025	12.5+0.0075

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in subclause 6.2.5EA.
NOTE 2: The interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.
NOTE 3: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2 should be used as REFSENS for the power in Transmission Bandwidth Configuration.
NOTE 4: For DL category M1 UE, the parameters for the applicable channel bandwidth apply.

Table 7.6.1EA.5-2: In-band blocking

E-UTRA band	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
	$P_{Interferer}$	dBm	-56	-44	Void	Void	-38
	$F_{Interferer}$ (offset)	MHz	=-BW/2 – $F_{loffset,case\ 1}$ & =+BW/2 + $F_{loffset,case\ 1}$	≤-BW/2 – $F_{loffset,case\ 2}$ & ≥+BW/2 + $F_{loffset,case\ 2}$			-BW/2 - 11
1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 18, 19, 20, 21, 26, 27, 28, 31, 39, 41	$F_{Interferer}$	MHz	(NOTE 2)	F_{DL_low} – 15 to F_{DL_high} + 15			
NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - $F_{loffset,\ case\ 1}$ and b. the carrier frequency +BW/2 + $F_{loffset,\ case\ 1}$ NOTE 3: $F_{Interferer}$ range values for unwanted modulated interfering signal are interferer centre frequencies							

7.6.2 Out-of-band blocking

7.6.2.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5.1 and sub-clause 7.6.1 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.6.2.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.2.3-1 and 7.6.2.3-2. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

For Table 7.6.2.3-2 in frequency range 1, 2 and 3, up to $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (see Figure 5.4.2-1). For these exceptions the requirements of clause 7.7 Spurious Response are applicable.

For Table 7.6.2.3-2 in frequency range 4, up to $\max(8,\ \lceil(N_{RB}+2\cdot L_{CRBs})/8\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configurations (see Figure 5.4.2-1) and L_{CRBs} is the number of resource blocks allocated in the uplink. For these exceptions the requirements of clause 7.7 Spurious Response are applicable.

Table 7.6.2.3-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz

Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: The REFSENS power level is specified in Table 7.3.3-1 and Table 7.3.3-1a for two and four antenna ports, respectively.							

Table 7.6.2.3-2: Out of band blocking

E-UTRA band	Parameter	Units	Frequency			
			range 1	range 2	range 3	range 4
	$P_{Interferer}$	dBm	-44	-30	-15	-15
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 (Note 2), 43 (Note 2), 44, 45, 48 (NOTE 2), 65, 66, 70	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz	-
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz	-
2, 5, 12, 17	$F_{Interferer}$	MHz	-	-	-	F_{UL_low} - F_{UL_high}
Note 1: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS.						
Note 2: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.						
Note 3: For the UE that supports both Band 4 and Band 66, the out-of-blocking frequency range for Band 4 is defined relative to F_{DL_low} and F_{DL_high} of Band 66.						

The normative reference for this requirement is TS 36.101 [2] clause 7.6.2.

7.6.2.4 Test Description

7.6.2.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.2.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	One frequency chosen arbitrarily from low or high range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.5.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.2.4.3.

7.6.2.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.2.5-2. The frequency step size is 1MHz.

4. Set the downlink signal level according to the table 7.6.2.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2.5-1 for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the throughput measurement.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Record the frequencies for which the throughput doesn't meet the requirements.

7. Repeat steps from 3 to 6, using an interfering signal above the wanted signal at step 3.

7.6.2.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.6.2.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.2.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.6.2.5-1 and 7.6.2.5-2.

For frequency range 1, 2, and 3, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7 Spurious Response are applicable.

For frequency range 4, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(8,\ \lceil(N_{RB}+2\cdot L_{CRBs})/8\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7 Spurious Response are applicable.

Table 7.6.2.5-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.6.2.5-2: Out of band blocking

E-UTRA band	Parameter	Units	Frequency			
			range 1	range 2	range 3	range 4
	$P_{Interferer}$	dBm	-44	-30	-15	-15
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 (Note 3), 43 (Note 3), 44, 45, 65, 66, 70	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz	-
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz	-
2, 5, 12, 17	$F_{Interferer}$	MHz	-	-	-	F_{UL_low} - F_{UL_high}
Note 1: Range 3 shall be tested only with the highest channel bandwidth.						
Note 2: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS.						
Note 3: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.						
Note 4: For the UE that supports both Band 4 and Band 66, the out-of-blocking frequency range for Band 4 is defined relative to F_{DL_low} and F_{DL_high} of Band 66.						

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.2.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.2_1 Out-of-band blocking with 4 Rx antenna ports

7.6.2_1.1 Test Purpose

Out-of-band band blocking with 4 Rx antenna ports is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE 4 Rx receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5_1.1 and sub-clause 7.6.1_1.1 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2_1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports.

7.6.2_1.3 Minimum Conformance Requirements

Same as in clause 7.6.2.3.

7.6.2_1.4 Test Description

7.6.2_1.4.1 Initial Conditions

Same as in clause 7.6.2.4.1 with following exceptions:

- Instead of Table 7.6.2.4.1-1→ use table 7.6.2_1.4.1-1
- Instead of Figure A.4→ use Figure A.81
- Instead of clause 7.6.2.4.3→ use clause 7.6.2_1.4.3

Table 7.6.2_1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	One frequency chosen arbitrarily from low or high range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	20	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1. Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1). Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						

7.6.2_1.4.2 Test Procedure

Same as in clause 7.6.2.4.2 with following exceptions:

- Instead of Table 7.6.2.4.1-1→ use Table 7.6.2_1.4.1-1
- Instead of Table 7.6.2.5-1→ use Table 7.6.2_1.5-1

7.6.2_1.4.3 Message Contents

Same as in clause 7.6.2.4.3.

7.6.2_1.5 Test Requirement

Same as in clause 7.6.2.5 with following exceptions:

- Instead of Table 7.6.2.5-1→ use Table 7.6.2_1.5-1

Table 7.6.2_1.5-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: The REFSENS power level is specified in Table 7.3_1.5-1.							

7.6.2A Out-of-band blocking for CA

7.6.2A.0 Minimum conformance requirements

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band, the out-of-band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The throughput in the downlink measured shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.2.3-1 and 7.6.2A.0-0. For E-UTRA CA configurations including an operating band without uplink operation (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the uplink active in the band(s) capable of UL operation. The UE shall meet these requirements for each component carrier while all downlink carriers are active.

For inter-band carrier aggregation with one component carrier per operating band and the uplink active in two E-UTRA bands, the out-of-band blocking requirements specified above shall be met with the transmitter power for the uplink set to 7 dB below $P_{CMAX_L,c}$ for each serving cell *c*.

For E-UTRA CA configurations including an operating band without uplink band or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. For E-UTRA CA configurations listed in Table 7.3A.0-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the out-of-band blocking requirements of subclause 7.6.2A.0 do not apply.

Table 7.6.2A.0-0: Out-of-band blocking for inter-band carrier aggregation

Parameter	Unit	Range 1	Range 2	Range 3
P_W	dBm	Table 7.6.2.3-1 for all component carriers		
$P_{interferer}$	dBm	$-44 + \Delta R_{IB,c}$	$-30 + \Delta R_{IB,c}$	$-15 + \Delta R_{IB,c}$
$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL_Low(j)} < -15$ or $15 < f - F_{DL_High(j)} < 60$	$-85 < f - F_{DL_Low(j)} \le -60$ or $60 \le f - F_{DL_High(j)} < 85$	$1 \le f \le F_{DL_Low(1)} - 85$ or $F_{DL_High(j)} + 85 \le f \le F_{DL_Low(j+1)} - 85$ with $j < X$ or $F_{DL_High(X)} + 85 \le f \le 12750$

Note 1: $F_{DL_Low(j)}$ and $F_{DL_High(j)}$ denote the respective lower and upper frequency limits of the operating band containing carrier j, j = 1,…,X, with carriers numbered in increasing order of carrier frequency and X the number of component carriers in the band combination (X ≤ 5 for the present version of this specification).

Note 2: For $F_{DL_Low(j+1)} - F_{DL_High(j)} < 145$ MHz and $F_{Interferer}$ in $F_{DL_High(j)} < f < F_{DL_Low(j+1)}$, $F_{Interferer}$ can be in both Range 1 and Range 2. Then the lower of the $P_{Interferer}$ applies.

Note 3: For $F_{DL_Low(j)} - 15$ MHz ≤ f ≤ $F_{DL_High(j)} + 15$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5.1A and 7.6.1.1A shall be applied for carrier j.

Note 4: $\Delta R_{IB,c}$ according to Table 7.3.3-1A applies when serving cell c is measured.

Note 5 For inter-band CA combinations containing Bands 42 or 43, the interferer with respect to Band 42 or Band 43 shall have power level ($P_{Interferer}$) for Range 3 modified to $-20 + \Delta R_{IB,c}$ dBm for $F_{Interferer} > 2800$ MHz and $F_{Interferer} < 4400$ MHz.

NOTE 6: For inter-band CA combinations containing Bands 7 and 38 simultaneously, for $F_{Interferer}$ Bands 7 and 38 are considered as one single band as follows: $F_{DL_Low} = 2570$ MHz and $F_{DL_High} = 2690$ MHz. For Range 2, the following applies for F_{DL_Low}: $-95 < f - F_{DL_Low} \le -60$ or $60 \le f - F_{DL_High} < 85$. For Range 3 the following applies $1 \le f \le F_{DL_Low} - 95$ or $F_{DL_High} + 85 \le f \le 12750$.

NOTE 7: For CA_20A-28A the $F_{DL_low(1)}$ is given by the lower limit of the restricted operating frequency range in Band 28 and $F_{DL_high(2)}$ by Band 20 (Table 5.2A-2).

Table 7.6.2A.0-0a: out-of-band blocking for inter-band carrier aggregation with band 46 and with one active uplink

Parameter	Unit	Range 1	Range 2	Range 3
P_{wanted}	dBm	Table 7.6.2.1-1 for all component carriers		
$P_{interferer}$	dBm	$-44 + \Delta R_{IB,c}$	$-30 + \Delta R_{IB,c}$	$-15 + \Delta R_{IB,c}$ (NOTE 5)
$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL_Low(j)} < -15$ with $j \le K$ or $15 < f - F_{DL_High(j)} < 60$ with $j \le K$	$-85 < f - F_{DL_Low(j)} \le -60$ or $60 \le f - F_{DL_High(j)} < 85$	$1 \le f \le F_{DL_Low(j)} - 85$ or $F_{DL_High(j)} + 85 \le f \le 12750$

NOTE 1: $F_{DL_Low(j)}$ and $F_{DL_High(j)}$, j = 1,…,K,…N, denote the respective lower and upper frequency limits of the (non-overlapping) operating bands of the CA configuration numbered in increasing order of frequency, with N the number of bands in the band combination and K the number of bands with $F_{DL_High} \le 3800$ MHz.

NOTE 2: For $F_{DL_Low(j)} - 15$ MHz ≤ f ≤ $F_{DL_High(j)} + 15$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5.1A and 7.6.1.1A shall be applied for carrier j ≤ K.

NOTE 3: For $F_{DL_Low(j)} - 60$ MHz ≤ f ≤ $F_{DL_High(j)} + 60$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5.1A and 7.6.1.1A shall be applied for carrier K < j ≤ N.

NOTE 4: RIB,c according to Table 7.3.1-1A applies when serving cell c is measured.

NOTE 5: The power level ($P_{Interferer}$) for Range 3 is modified to -20 dBm for $F_{Interferer} > 4400$ MHz except for band combinations with Band 42 or Band 43 for which $P_{Interferer}$ for Range 3 is modified to -20 dBm for $F_{Interferer} > 2800$ MHz.

For Table 7.6.2A.0-0 in frequency ranges 1, 2 and 3, up to $\max(24, 6 \cdot \lceil N_{RB} \cdot / 6 \rceil)$ exceptions per downlink are allowed for spurious response frequencies for one active uplink when measured using a step size of 1 MHz.

For Table 7.6.2A.0-0 in frequency ranges 1, 2 and 3, up to $2 \cdot \max(24,6 \cdot \lceil N_{RB} \cdot / 6 \rceil)$ exceptions per downlink are allowed for spurious response frequencies for two active uplinks when measured using a step size of 1 MHz. For these exceptions the requirements in clause 7.7A.0 apply.

For intra-band contiguous carrier aggregations the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.6.2A.0-1 with the uplink configuration set according to Table 7.3A.0-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.3-2.

The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Tables 7.6.2A.0-1 and Tables 7.6.2A.0-2 being on either side of the aggregated signal. The throughput of each carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.2A.0-1 and 7.6.2A.0-2. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements also apply for an SCC assigned in the unpaired part with parameters specified in Tables 7.6.2A.0-1 and 7.6.2A.0-2.

For Table 7.6.2A.0-2 in frequency range 1, 2 and 3, up to $\max(24,6 \cdot \lceil N_{RB} \cdot / 6 \rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7 Spurious response are applicable.

Table 7.6.2A.0-1: Out-of-band blocking parameters

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9	9	9	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.						

Table 7.6.2A.0-2: Out of band blocking

CA configuration	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
CA_1C, CA_2C, CA_3B, CA_3C, CA_5B, CA_7C, CA_8B, CA_12B, CA_23B, CA_27B, CA_38C, CA_40C, CA_40D, CA_40E, CA_41C, CA_41D, CA_41E, CA_42C[1], CA_42D[1], CA_42E[1], CA_42F[1], CA_43C[1], CA_48C[1], CA_48D[1], CA_48E[1], CA_48F[1], CA_66B, CA_66C, CA_66D, CA_70C	$F_{Interferer}$ (CW)	MHz	F_{DL_low} - 15 to F_{DL_low} - 60	F_{DL_low} - 60 to F_{DL_low} - 85	F_{DL_low} - 85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
Note 1: For CA_42C, the power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.					

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink sub-blocks, the out-of-band blocking requirements are defined with the uplink configuration in accordance with table 7.3A.0-3. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclauses 7.6.2.3 and 7.6.2A.0 for one component carrier and two component carriers per sub-block, respectively. The requirements apply with all downlink carriers active.

For Table 7.6.2.3-2 in frequency range 1, 2 and 3, up to $\max(24,6 \cdot \lceil N_{RB} \cdot / 6 \rceil)$ exceptions per assigned E-UTRA channel per sub-block of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7A.4.3 spurious response are applicable.

For Table 7.6.2.3-2 in frequency range 4, up to $\max(8, \lceil (N_{RB} + 2 \cdot L_{CRBs})/8 \rceil)$ exceptions per assigned E-UTRA channel per sub-block of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.4.3 spurious response are applicable.

For intra-band non-contiguous carrier aggregation with two uplink carriers and two downlink carriers, the out-of-band blocking requirements are defined with the uplink configuration of the PCC and SCC being in accordance with Table 7.3A.0-4 and powers of both carriers set to $P_{CMAX_L,c} - 7$ dBm. The UE shall meet the requirements specified in subclause 7.6.2A.0 for each component carrier while both downlink carriers are active.

For Table 7.6.2.3-2 in frequency range 1, 2 and 3, up to $2 \cdot \max(24, 6 \cdot \lceil N_{RB} \cdot /6 \rceil)$ exceptions per assigned E-UTRA channel per sub-block of the E-UTRA CA configuration are allowed for spurious response frequencies for two active uplinks in the same operating band when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7 spurious response are applicable.

For Table 7.6.2.3-2 in frequency range 4, up to $2 \cdot \max(8, \lceil (N_{RB} + 2 \cdot L_{CRBs})/8 \rceil)$ exceptions per assigned E-UTRA channel per sub-block of the E-UTRA CA configuration are allowed for spurious response frequencies for two active uplinks in the same operating band when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7 spurious response are applicable.

For combinations of intra-band and inter-band carrier aggregation with up to five downlink carriers (up to two non-contiguously sub-blocks per band and up to four contiguously aggregated carriers per band) and the uplink assigned to one E-UTRA band, the requirement is defined with the uplink active a band other than that supporting the downlink(s) under test. The uplink configuration shall be in accordance with Table 7.3A.0-3 when the uplink is active in the band supporting two non-contiguous component carriers, Table 7.3A.0-1 when the uplink is active in a band supporting two contiguous component carriers and in accordance with Table 7.3.3-2 when the uplink is active in a band supporting one carrier per band. The downlink PCC shall be configured closer to the uplink operating band than the downlink SCC(s) when the uplink is active in band(s) supporting contiguous aggregation of up to four component carriers. For the two non-contiguous component carriers within the same band, P_{wanted} in Table 7.6.2A.0-0 is set using $\Delta R_{IBNC} = 0$ dB for all sub-block gaps (Table 7.3A.0-3) while a band supporting contiguously aggregated carriers the out-of-band blocking parameters in Table 7.6.2.3-1 are replaced by those specified in Table 7.6.2A.0-1. For each downlink the UE shall meet the out-of-band blocking requirements applicable for inter-band carrier aggregation with one component carrier per operating band but with up to four component carriers assigned to the same band with the following exception. All downlink carriers shall be active throughout the tests and the requirements for the downlinks shall be met with the single uplink carrier active in each band capable of UL operation.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.2.1A.

7.6.2A.1 Out-of-band blocking for CA (intra-band contiguous DL CA and UL CA)

7.6.2A.1.1 Test Purpose

Out-of-band blocking for CA is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels in aggregated signals.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5A and sub-clause 7.6.1A shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2A.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

7.6.2A.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2A.0.

7.6.2A.1.4 Test Description

7.6.2A.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.6.2A.1.4.1-1. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.2A.1.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			Mid range				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE			Highest N_{RB_agg} (Note 3)				
Test Parameters for CA Configurations							
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
50	50	QPSK	50+50	QPSK	25	P_25@25	S_0@0
100	75	QPSK	100+75	QPSK	175	P_100@0	S_75@0
100	100	QPSK	100+100	QPSK	50	P_50@50	S_0@0
100	100	QPSK	100+100	QPSK	75	P_75@25	S_0@0
100	100	QPSK	100+100	QPSK	130	P_100@0	S_30@0
100	100	QPSK	100+100	QPSK	200	P_100@0	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3A.0-1 is tested per CA Configuration Test CC combination.							
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.34 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Table 7.6.2A.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.2A.1.4.3.

7.6.2A.1.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.2A.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the parameters of the CW signal generator for an interfering signal below the CA Band according to Table 7.6.2A.1.5-2. The frequency step size is 1MHz.

7. Set the downlink signal level according to the table 7.6.2A.1.5-1 for both carriers. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the throughput measurement:
The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.6.2A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.6.2A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$) for carrier frequency $3.0\text{GHz} < f \leq 4.2$GHz.
The SCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.6.2A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.6.2A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$) for carrier frequency $3.0\text{GHz} < f \leq 4.2$GHz.

8. Measure the average throughput for all the carrier(s) indicated in the Table 7.6.2A.7.4.2-1 simultaneously for duration sufficient to achieve statistical significance according to Annex G.2. Note that the statistical decision for each component carrier should be postponed until the statistical decisions for all component carriers are obtained simultaneously according to table G.2.4-1.

9. Record the frequencies for which the throughput doesn't meet the requirements.

10. Repeat steps from 6 to 9, using an interfering signal above the CA Band at step 5.

7.6.2A.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.6.2A.1.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

Table 7.6.2A.1.4.3-2: UplinkPowerControlDedicatedSCell-r10

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH-r10	0		
deltaMCS-Enabled-r10	en0		
accumulationEnabled-r10	TRUE		
pSRS-Offset-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
pSRS-OffsetAp-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
filterCoefficient-r10	fc8	larger filter length is used to reduce the RSRP measurement variation	
pathlossReferenceLinking-r10	sCell		
}			

7.6.2A.1.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.6.2A.1.5-1 and 7.6.2A.1.5-2.

For Table 7.6.2A.1.5-2 in frequency range 1, 2 and 3, up to $\max(24,6\cdot\lceil N_{RB}\cdot/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the allocated number of resource blocks in the frequency channel. For these exceptions the requirements of subclause 7.7A Spurious response for CA are applicable.

Table 7.6.2A.1.5-1: Out-of-band blocking parameters

Rx Parameter	**Units**	**CA Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9			
NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A. NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.						

Table 7.6.2A.1.5-2: Out of band blocking

CA configuration	**Parameter**	**Units**	**Frequency**		
			range 1	**range 2**	**range 3**
	$P_{Interferer}$	dBm	-44	-30	-15
CA_1C, CA_2C, CA_3C, CA_7C, CA_8B, CA_12B, CA_23B, CA_27B, CA_38C, CA_39C, CA_40C,CA_41C, CA_42C (note)	$F_{Interferer}$ (CW)	MHz	F_{DL_low} - 15 to F_{DL_low} - 60	F_{DL_low} - 60 to F_{DL_low} - 85	F_{DL_low} - 85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} +	F_{DL_high} +60 to F_{DL_high}	F_{DL_high} +85 to +12750

			60	+85	MHz
Note: For CA_42C, the power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.					

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.2A.1.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.2A.2 Out-of-band blocking for CA (intra-band contiguous DL CA without UL CA)

7.6.2A.2.1 Test Purpose

Same test purpose as 7.6.2A.1.

7.6.2A.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA. This test case applies only for CA Configurations that do not support UL CA.

7.6.2A.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2A.0.

7.6.2A.2.4 Test Description

7.6.2A.2.4.1 Initial Conditions

Same initial conditions as in clause 7.6.2A.1.4.1 with the following exceptions:

- Instead of Table 7.6.2A.1.4.1-1 → use Table 7.6.2A.2.4.1-1.
- Instead of clause 7.6.2A.1.4.3 → use clause 7.6.2A.2.4.3.

Table 7.6.2A.2.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1		NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2		B: Mid range C: Mid range					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE		Highest N_{RB_agg} (Note 3)					
Test Parameters for CA Configurations							
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
15	50	QPSK	15+50	QPSK	15	P_15@0	-
25	50	QPSK	25+50	QPSK	20	P_20@0	-
50	50	QPSK	50+50	QPSK	25	P_25@25	-
50	50	QPSK	50+50	QPSK	50	P_50@0	-
75	25	QPSK	75+25	QPSK	75	P_75@0	
75	50	QPSK	75+50	QPSK	75	P_75@0	
100	75	QPSK	100+75	QPSK	100	P_100@0	-
100	100	QPSK	100+100	QPSK	50	P_50@0	-
100	100	QPSK	100+100	QPSK	75	P_75@0	-
100	100	QPSK	100+100	QPSK	100	P 100@0	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per CA Configuration Test CC combination.							
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.							
Note 4: For CA_70C 75+50 shall be tested.							

7.6.2A.2.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.2.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.2.4.1-1 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the parameters of the CW signal generator for an interfering signal below the CA Band according to Table 7.6.2A.1.5-2. The frequency step size is 1MHz.

7. Set the downlink signal level according to the table 7.6.2A.1.5-1 for both carriers. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2A.1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.

8. Measure the average throughput for all the carrier(s) indicated in the Table 7.6.2A.7.4.2-1 simultaneously for duration sufficient to achieve statistical significance according to Annex G.2. Note that the statistical decision for each component carrier should be postponed until the statistical decisions for all component carriers are obtained simultaneously according to table G.2.4-1.

9. Record the frequencies for which the throughput doesn't meet the requirements.

10. Repeat steps from 6 to 9, using an interfering signal above the CA Band at step 5.

7.6.2A.2.4.3 Message Contents

Same message contents as in clause 7.6.2.4.3.

7.6.2A.2.5 Test Requirement

Same test requirement as in clause 7.6.2A.1.5 with the following exceptions:

- Instead of Table 7.6.2A.1.5-1 → use Table 7.6.2A.2.5-1.
- Instead of Table 7.6.2A.1.5-2 → use Table 7.6.2A.2.5-2.

Table 7.6.2A.2.5-1: Out-of-band blocking parameters

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9			
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.						

Table 7.6.2A.2.5-2: Out of band blocking

CA configuration	Parameter	Units	Frequency		
			range 1	range 2	range 3
	$P_{Interferer}$	dBm	-44	-30	-15
CA_1C, CA_2C, CA_3C, CA_5B, CA_7C, CA_12B, CA_23B, CA_27B, CA_38C, CA_39C, CA_40C, CA_41C, CA_42C (note) , CA_66B, CA_66C, CA_70C	$F_{Interferer}$ (CW)	MHz	F_{DL_low} - 15 to F_{DL_low} - 60	F_{DL_low} - 60 to F_{DL_low} - 85	F_{DL_low} - 85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
Note: For CA_42C, the power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.					

For the UE which supports inter band CA configuration in Tables 7.3.3-1A**,** 7.3.3-1B and 7.3.3-1C $P_{Interferer}$ power defined in Table 7.6.2A.2.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.2A.3 Out-of-band blocking for CA (inter-band DL CA without UL CA)

Editor's notes: This clause is incomplete for Band 46. The following aspects are either missing or not yet determined.

- Test system uncertainties are missing in annex F.

7.6.2A.3.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above (60 MHz for band 46) the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above (60 MHz for band 46) the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5.1 and sub-clause 7.6.1 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2A.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 2DL CA with FDD-TDD inter-band CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support DL LAA.

7.6.2A.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2A.0.

7.6.2A.3.4 Test Description

7.6.2A.3.4.1 Initial Conditions

Same initial conditions as in clause 7.6.2A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2.
- Instead of Table 7.6.2A.1.4.1-1 → use Table 7.6.2A.3.4.1-1.
- Instead of clause 7.6.2A.1.4.3 → use clause 7.6.2A.3.4.3.

Table 7.6.2A.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1		NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2		A: Mid range for PCC and SCC				
Test CC Combination setting b(N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE		Highest N_{RB_agg} for PCC and SCC				
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**			**UL Allocation**	
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC N_{RB_alloc}**
50	50	QPSK	50	50	QPSK	50
50	50	QPSK	50	50	QPSK	25
50	50	QPSK	50	50	QPSK	20
50	50	QPSK	50	50	QPSK	16
50	75	QPSK	50	75	QPSK	25
50	100	QPSK	50	100	QPSK	50
50	100	QPSK	50	100	QPSK	25
50	100	QPSK	50	100	QPSK	20
50	100	QPSK	50	100	QPSK	16
75	25	QPSK	75	25	QPSK	75
75	25	QPSK	75	25	QPSK	20
75	50	QPSK	75	50	QPSK	25
75	100	QPSK	75	100	QPSK	25
75	75	QPSK	75	75	QPSK	25
100	50	QPSK	100	50	QPSK	100
100	50	QPSK	100	50	QPSK	75
100	50	QPSK	100	50	QPSK	50
100	75	QPSK	100	75	QPSK	100
100	75	QPSK	100	75	QPSK	50
100	100	QPSK	100	100	QPSK	100
100	100	QPSK	100	100	QPSK	75
100	100	QPSK	100	100	QPSK	50
100	100	QPSK	100	100	QPSK	45
100	100	QPSK	100	100	QPSK	25
100	100	QPSK	100	100	QPSK	20

Note 1:	CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2:	Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.3.5-2 for UE supporting one uplink carrier is tested per Test CA configuration.
Note 3:	The UL resource blocks shall be located as close as possible to the downlink PCC but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 4:	The frequencies of PCC and SCC shall be switched and tested in each configuration (given UL is supported in PCC band as per Table 5.2-1).

7.6.2A.3.4.2 Test Procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.3.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
6. Set the parameters of the signal generator for an interfering signal below the SCC's operating band according to Table 7.6.2 A.3.5-2, or Table 7.6.2A.3.5-2a for operating band 46 without uplink band. The frequency step size is 1 MHz.
7. Set the downlink signal level according to the table 7.6.2A.3.5-1 for both carriers. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2A.3.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput of SCC for duration sufficient to achieve statistical significance according to Annex G.2.
9. Record the frequencies for which the throughput doesn't meet the requirements.
10. Repeat steps from 6 to 9, using an interfering signal above the SCC's operating band at step 6.
11. Switch the SCell into PCell and repeat steps 1 to 10, except for operating bands without uplink band (as noted in Table 5.2-1).

7.6.2A.3.4.3 Message Contents

Same message contents as in clause 7.6.2.4.3.

7.6.2A.3.5 Test Requirement

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the out-of-band blocking requirements are defined with the uplink active on the band other than the band whose downlink is being tested i.e. the requirements are tested only for the SCell downlink. The UE shall meet the requirement for each component carrier, when operated as SCell, while both downlink carriers are active.

Except for the spurious response frequencies recorded at step 9, the throughput measured during the test procedure for each component carrier, when operated as SCell, shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.2A.3.5-1 (originated from the single carrier Table 7.6.2.5-1) and 7.6.2.3.5-2.

For frequency range 1, 2, and 3, the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions per downlink in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.3 Spurious Response are applicable.

Table 7.6.2A.3.5-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.6.2A.3.5-2: Out-of-band blocking for inter-band carrier aggregation with one uplink carrier

Parameter	Unit	Range 1	Range 2	Range 3
P_w	dBm	Table 7.6.2A.3.5-1 for both component carriers		
$P_{interferer}$	dBm	$-44 + \Delta R_{IB,c}$	$-30 + \Delta R_{IB,c}$	$-15 + \Delta R_{IB,c}$
$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL_Low(1)} < -15$ or $-60 < f - F_{DL_Low(2)} < -15$ or $15 < f - F_{DL_High(1)} < 60$ or $15 < f - F_{DL_High(2)} < 60$	$-85 < f - F_{DL_Low(1)} \le -60$ or $-85 < f - F_{DL_Low(2)} \le -60$ or $60 \le f - F_{DL_High(1)} < 85$ or $60 \le f - F_{DL_High(2)} < 85$	$1 \le f \le F_{DL_Low(1)} - 85$ or $F_{DL_High(1)} + 85 \le f \le F_{DL_Low(2)} - 85$ or $F_{DL_High(2)} + 85 \le f \le 12750$
Note 1: $F_{DL_Low(1)}$ and $F_{DL_High(1)}$ denote the respective lower and upper frequency limits of the lower operating band, $F_{DL_Low(2)}$ and $F_{DL_High(2)}$ the respective lower and upper frequency limits of the upper operating band.				
Note 2: For $F_{DL_Low(2)} - F_{DL_High(1)} < 145$ MHz and FInterferer in $F_{DL_High(1)} < f < F_{DL_Low(2)}$, $F_{Interferer}$ can be in both Range 1 and Range 2. Then the lower of the $P_{Interferer}$ applies.				
Note 3: For $F_{DL_Low(1)} - 15$ MHz $\le f \le F_{DL_High(1)} + 15$ MHz and $F_{DL_Low(2)} - 15$ MHz $\le f \le F_{DL_High(2)} + 15$ MHz the appropriate adjacent channel selectivity and in-band blocking in the respective subclauses 7.5A.1.5 and 7.6.1A.5 shall be applied.				
Note 4: $\Delta R_{IB,c}$ according to Table 7.3.3-1A applies when serving cell c is measured.				
Note 5 For inter-band CA combinations containing Bands 42 or 43, the interferer with respect to Band 42 or Band 43 shall have power level ($P_{Interferer}$) for Range 3 modified to $-20 + \Delta R_{IB,c}$ dBm for $F_{Interferer} > 2800$ MHz and $F_{Interferer} < 4400$ MHz.				
Note 6: For inter-band CA combinations containing Bands 7 and 38 simultaneously, for $F_{Interferer}$ Bands 7 and 38 are considered as one single band as follows: $F_{DL_Low} = 2570$ MHz and $F_{DL_High} = 2690$ MHz. For Range 2, the following applies for F_{DL_Low}: $-95 < f - F_{DL_Low} \le -60$ or $60 \le f - F_{DL_High} < 85$. For Range 3 the following applies $1 \le f \le F_{DL_Low} - 95$ or $F_{DL_High} + 85 \le f \le 12750$.				
Note 7: For CA_20A-28A the $F_{DL_low(1)}$ is given by the lower limit of the restricted operating frequency range in Band 28 and $F_{DL_high(2)}$ by Band 20 (Table 5.2A-2).				

Table 7.6.2A.3.5-2a: Out-of-band blocking for inter-band carrier aggregation with band 46 and with one active uplink

Parameter	Unit	Range 1	Range 2	Range 3
P_{wanted}	dBm	Table 7.6.2A.3.5-1 for both component carriers		
$P_{interferer}$	dBm	$-44 + \Delta R_{IB,c}$	$-30 + \Delta R_{IB,c}$	$-15 + \Delta R_{IB,c}$ (NOTE 5)
$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL_Low(1)} < -15$ or $15 < f - F_{DL_High(1)} < 60$	$-85 < f - F_{DL_Low(1)} \le -60$ or $-85 < f - F_{DL_Low(2)} \le -60$ or $60 \le f - F_{DL_High(1)} < 85$ or $60 \le f - F_{DL_High(2)} < 85$	$1 \le f \le F_{DL_Low(1)} - 85$ or $1 \le f \le F_{DL_Low(2)} - 85$ or $F_{DL_High(1)} + 85 \le f \le 12750$ or $F_{DL_High(2)} + 85 \le f \le 12750$

NOTE 1: $F_{DL_Low(1)}$ and $F_{DL_High(1)}$ denote the respective lower and upper frequency limits of the lower operating band, $F_{DL_Low(2)}$ and $F_{DL_High(2)}$ the respective lower and upper frequency limits of the upper operating band.
NOTE 2: For $F_{DL_Low(1)} - 15$ MHz ≤ f ≤ $F_{DL_High(1)} + 15$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5.1A and 7.6.1.1A shall be applied.
NOTE 3: For $F_{DL_Low(2)} - 60$ MHz ≤ f ≤ $F_{DL_High(2)} + 60$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5.1A and 7.6.1.1A shall be applied.
NOTE 4: RIB,c according to Table 7.3.1-1A applies when serving cell c is measured.
NOTE 5: The power level ($P_{Interferer}$) for Range 3 is modified to -20 dBm for $F_{Interferer}$ > 4400 MHz except for band combinations with Band 42 or Band 43 for which $P_{Interferer}$ for Range 3 is modified to -20 dBm for $F_{Interferer}$ > 2800 MHz.

7.6.2A.4 Out-of-band blocking for CA (intra-band non-contiguous DL CA without UL CA)

7.6.2A.4.1 Test Purpose

Same as in clause 7.6.2A.1.1.

7.6.2A.4.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA but no UL CA.

7.6.2A.4.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2A.0.

7.6.2A.4.4 Test description

7.6.2A.4.4.1 Initial Conditions

Same as in clause 7.6.2A.1.4.1 with the following exceptions:

- Instead of Table 7.6.2A.1.4.1-1→ use Table 7.6.2A.4.4.1-1.

Table 7.6.2A.4.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1				NC			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2.				A: N/A (Range is not relevant)			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.				Refer to test point			
Test Parameters for CA Configurations							
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC RB allocations (L_{CRB} @ RB_{start})**
Test Parameters for CA_2A-2A Configurations							
1	100	100	20	QPSK	100+100	QPSK	P_16@57
Test Parameters for CA_3A-3A Configurations							
2	100	100	35	QPSK	100+100	QPSK	P_16@50
Test Parameters for CA_4A-4A Configurations							
3[4]	50	50	25	QPSK	50+50	QPSK	P_50@0
4[3]	100	100	5	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_5A-5A Configurations							
5	50	50	5	QPSK	50+50	QPSK	P_12@38
Test Parameters for CA_7A-7A Configurations							
6	100	100	15	QPSK	100+100	QPSK	P_45@55
Test Parameters for CA_23A-23A Configurations							
7	50	25	5	QPSK	50+25	QPSK	P_50@0
Test Parameters for CA_25A-25A Configurations							
8[3]	50	50	10	QPSK	50+50	QPSK	P_32@18
9[4]	100	100	25	QPSK	100+100	QPSK	P_12@62
Test Parameters for CA_41A-41A Configurations							
10	100	100	154	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_42A-42A Configurations							
11	100	100	160	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_66A-66A Configurations							
12	100	100	50	QPSK	100+100	QPSK	P_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.							
Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.							
Note 3: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration							
Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration							

7.6.2A.4.4.2 Test Procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.2A.4.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.4.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

6. Set the parameters of the signal generator for an interfering signal below the CA band according to Table 7.6.2.5-2. The frequency step size is 1 MHz.

7. Set the downlink signal level according to the table 7.6.2.5-1 for both carriers. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2.5-1 for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the throughput measurement.

8. Measure the average throughput for all the carrier(s) indicated in the Table 7.6.2A.7.4.2-1 simultaneously for duration sufficient to achieve statistical significance according to Annex G.2. Note that the statistical decision for each component carrier should be postponed until the statistical decisions for all component carriers are obtained simultaneously according to table G.2.4-1.

9. Record the frequencies for which the throughput doesn't meet the requirements.

10. Repeat steps from 6 to 9, using an interfering signal above the CA band at step 6.

7.6.2A.4.4.3 Message Contents

Same message contents as in clause 7.6.2.4.3.

7.6.2A.4.5 Test Requirement

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the out-of-band blocking requirements are defined with the uplink configuration of the PCC being in accordance with table 7.3.1A-3.The UE shall meet the requirements specified in tables 7.6.2A.4.5-1 and 7.6.2A.4.5-2 for each component carrier while both downlink carriers are active.

The out-of-band blocking parameters in tables 7.6.2A.4.5-1 and 7.6.2A.4.5-2 for each component carrier are the same as single carrier requirements in Tables 7.6.2.5-1 and 7.6.2.5-2.

For Table 7.6.2A.4.5-2 in frequency range 1, 2 and 3, the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(24, 6 \cdot \lceil N_{RB} \cdot / 6 \rceil)$ exceptions per assigned E-UTRA channel per sub-block gap of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7A.4 spurious response are applicable.

For Table 7.6.2A.4.5-2 in frequency range 4 the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(8, \lceil (N_{RB} + 2 \cdot L_{CRBs}) / 8 \rceil)$ exceptions per assigned E-UTRA channel per sub-block gap of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.4 spurious response are applicable.

Table 7.6.2A.4.5-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9

Note 1:	The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2:	The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.

Table 7.6.2A.4.5-2: Out of band blocking

E-UTRA band	Parameter	Units	Frequency			
			range 1	range 2	range 3	range 4
	$P_{Interferer}$	dBm	-44	-30	-15	-15
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 (Note 4), 43 (Note 4),44, 66	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz	-
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz	-
2, 5, 12, 17	$F_{Interferer}$	MHz	-	-	-	F_{UL_low} - F_{UL_high}
Note 1: Range 3 shall be tested only with the highest channel bandwidth. Note 2: For the UE which supports both Band 11 and Band 21 the out of band blocking is FFS. Note 3: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz. Note 4: For the UE that supports both Band 4 and Band 66, the out-of-blocking frequency range for Band 4 is defined relative to F_{DL_low} and F_{DL_high} of Band 66.							

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.2A.4.5-2 is increased by the amount given by $\Delta_{RIB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.2A.5 Out-of-band blocking for 3DL CA

7.6.2A.5.1 Test Purpose

Same test purpose as in clause 7.6.2A.3.1.

7.6.2A.5.2 Test Applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support 3DL with Intra-band contiguous CA or 3DL with Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 3DL with FDD-TDD CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 3DL CA involving Band 46.

7.6.2A.5.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2A.0.

7.6.2A.5.4 Test Description

7.6.2A.5.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2A.5.4.1-1 through table

7.6.2A.5.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.2A.5.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to "PCC N_{RB}" and "SCCs N_{RB} " columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3)	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for a CA_XD Configuration (Intra-band contiguous)												
1	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA Configuration (Inter-band)												
1	X	Mid	REFSENS	All RBs	Y	Mid	N/A	All RBs	Z	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Z	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XB-YA and CA_XC-YA Configuration (Intra-band contiguous + Inter-band)												
1	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for CA_XA-YB and CA_XA-YC Configuration (Intra-band contiguous + Inter-band)												
1	Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
2	X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band contiguous:** X corresponds to the band in the CA Configuration. E.g. for CA_41D, X=41
Note 5: **Inter-band:** X,Y,Z correspond to the 1st, 2nd and 3rd band in the CA Configuration. E.g. for CA_1A-3A-19A, X=1, Y=3, Z=19
Note 6: **Intra-band contiguous + Inter-band:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1C-3A, X=1 and Y=3
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 9: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 10: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.6.2A.5.4.1-2: Test Configuration Table with W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	X	CC2	REFSENS	All RBs	Max	X	CC1	N/A	All RBs	-	Y	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	Y	Mid	REFSENS	All RBs	-	X	CC2	N/A	All RBs	Max	X	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Default Test Settings for CA_XA-YA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	Y	CC2	REFSENS	All RBs	Max	Y	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	X	Mid	REFSENS	All RBs	-	Y	CC2	N/A	All RBs	Max	Y	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Test Settings for CA_29A-66A-66A Configuration (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	29	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
Test Settings for a CA_41C-41A Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	41	CC3	100@0	All RBs	134.2	41	CC2	N/A	All RBs	-	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_41A-41C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
2	41	CC3	100@0	All RBs	-	41	CC2	N/A	All RBs	134.2	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Group Test Settings for CA_66A-66A-XA or CA_XA-66A-66A Configurations (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
2	X	Mid	REFSENS	All RBs	-	66	CC1	N/A	All RBs	50	66	CC2	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_66A-66C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	66	CC1	100@0	All RBs	30.2	66	CC2	N/A	All RBs	-	66	CC3	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.

Note 2: **Intra-band non-contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.

Note 3: **Intra-band non-contiguous + Intra-band contiguous:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.

Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.

Note 5: **Intra-band non-contiguous + Inter-band:** X and Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A,X=2,Y=5

Note 6: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A,X=41.
Note 7: **Intra-band non-contiguous + Inter-band:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RE allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.
Note 10: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.2A.5.4.1-1 through Table 7.6.2A.5.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.2A.5.4.3.

7.6.2A.5.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.2A.5.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.5.4.1-1 through Table 7.6.2A.5.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.5.4.1-1 through Table 7.6.2A.5.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below the lowest CA Band according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.5.4.2-1. The frequency step size is 1MHz. Use the highest $\Delta R_{IB,c}$ among CA bands for $P_{interferer}$ calculation.
7. Set the downlink signal level according to the table indicated in the column "Table with transmission parameters to select" of Table 7.6.2A.5.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2A.5.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput for all the carrier(s) indicated in the Table 7.6.2A.7.4.2-1 simultaneously for duration sufficient to achieve statistical significance according to Annex G.2. Note that the statistical decision for each component carrier should be postponed until the statistical decisions for all component carriers are obtained simultaneously according to table G.2.4-1.
9. Record the frequencies for which the throughput doesn't meet the requirements and for each frequency, the carriers for which the throughput was not met.
10. Repeat steps 6 to 8 for each recorded frequency-carrier pair, with exception of pairs for which $\Delta R_{IB,c}$ is the same as ΔR_{IB} used in Step 6. In Step 6 use only recorded frequencies for interferer placement and use $\Delta R_{IB,c}$ relevant to

recorded carrier for $P_{interferer}$ calculation. Remove the frequency-carrier pairs that meet the throughput requirements from the record.

11. If the CA Configuration includes multiple bands, repeat steps from 6 to 10 using an interfering signal in each gap between the CA bands, according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.5.4.2-1.

12. Repeat steps from 6 to 10, using an interfering signal above the highest CA Band according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.5.4.2-1.

13. Repeat steps 1 to 12 for each row of "Throughput measured on" column listed in the Table 7.6.2A.5.4.2-1.

Table 7.6.2A.5.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with transmission parameters to select	Table with interferer parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2	7.6.2A.5.5-1	7.6.2A.5.5-2
	2			
Inter-band	1	SCC1, SCC2	7.6.2A.5.5-3	7.6.2A.5.5-4
	2	SCC1, SCC2		
	3	SCC1, SCC2		
Intra-band contiguous + Inter-band	1	SCC2	7.6.2A.5.5-3	7.6.2A.5.5-4 (Note 4)
	2	SCC1, SCC2	7.6.2A.5.5-1	7.6.2A.5.5-2 (Note 5)
Intra-band non-contiguous + Inter-band	1	SCC2	7.6.2A.5.5-3	7.6.2A.5.5-4 (Note 6)
	2	SCC1,	7.6.2A.5.5-3	7.6.2A.5.5-5 (Note 5)
		SCC2		
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.6.2A.5.5-3	7.6.2A.5.5-5 (Note 4)
		SCC1, SCC2	7.6.2A.5.5-1	7.6.2A.5.5-2 (Note 6)
	2	SCC2	7.6.2A.5.5-3	7.6.2A.5.5-5 (Note 4)
		PCC, SCC1	7.6.2A.5.5-1	7.6.2A.5.5-2 (Note 6)

Note 1: Test point ID for the particular CA configuration as defined in section 7.6.2A.5.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.
Note 4: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.5.5-2. When interferer position is closer than 15 MHz from other CC block interferer is OFF.
Note 5: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.5.5-4. When interferer position is closer than 15 MHz from other CC block interferer is OFF.
Note 6: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.5.5-5. When interferer position is closer than 15 MHz from other CC block interferer is OFF.

7.6.2A.5.4.3 Message Contents

Same message contents as in clause 7.6.2.4.3 for without UL CA.

Same message contents as in clause 7.6.2A.1.4.3 for UL CA.

7.6.2A.5.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

For Table 7.6.2A.5.5-2 in frequency range 1, 2 and 3, up to $\max(24,6\cdot\lceil N_{RB}\cdot/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the allocated number of resource blocks in the frequency channel. For these exceptions the requirements of subclause 7.7A.5 Spurious Response for CA are applicable.

Table 7.6.2A.5.5-1: Out-of-band blocking parameters (intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9	9		
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.						

Table 7.6.2A.5.5-2: Out of band blocking (intra-band contiguous)

CA configuration	Parameter	Units	Frequency		
			range 1	range 2	range 3
	$P_{Interferer}$	dBm	-44	-30	-15
CA_1C, CA_2C, CA_3C, CA_7C , CA_12B, CA_23B, CA_27B, CA_38C, CA_40C, CA_41C, CA_40D, CA_42C (Note) , CA_66C	$F_{Interferer}$ (CW)	MHz	F_{DL_low} - 15 to F_{DL_low} - 60	F_{DL_low} - 60 to F_{DL_low} - 85	F_{DL_low} - 85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
Note: For CA_42C, the power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.					

For Table 7.6.2A.5.5-4 frequency range 1, 2, and 3, the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions per downlink in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.5 Spurious Response for CA are applicable.

Table 7.6.2A.5.5-3: Out-of-band blocking parameters (inter-band, intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.6.2A.5.5-4: Out-of-band blocking for inter-band carrier aggregation with one uplink carrier

Parameter	Unit	Range 1	Range 2	Range 3
P_{wanted}	dBm	Table 7.6.2A.5.5-3 for all component carriers		
$P_{interferer}$	dBm	$-44 + \Delta R_{IB,c}$	$-30 + \Delta R_{IB,c}$	$-15 + \Delta R_{IB,c}$
$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL_Low(j)} < -15$ or $15 < f - F_{DL_High(j)} < 60$	$-85 < f - F_{DL_Low(j)} \le -60$ or $60 \le f - F_{DL_High(j)} < 85$	$1 \le f \le F_{DL_Low(j)} - 85$ or $F_{DL_High(j)} + 85 \le f \le F_{DL_Low(j+1)} - 85$ or $F_{DL_High(X)} + 85 \le f \le 12750$

Note 1: $F_{DL_Low(j)}$ and $F_{DL_High(j)}$ denote the respective lower and upper frequency limits of the operating band containing carrier *j*, *j* = 1,…,X, with carriers numbered in increasing order of carrier frequency and X the number of component carriers in the band combination (X = 2 or X = 3 for the present version of this specification).

Note 2: For $F_{DL_Low(j+1)} - F_{DL_High(j)} < 145$ MHz and $F_{Interferer}$ in $F_{DL_High(j)} < f < F_{DL_Low(j+1)}$, $F_{Interferer}$ can be in both Range 1 and Range 2. Then the lower of the $P_{Interferer}$ applies.

Note 3: For $F_{DL_Low(j)} - 15$ MHz $\le f \le F_{DL_High(j)} + 15$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5A.5.5 and 7.6.1A.5.5 shall be applied for carrier *j*.

Note 4: $\Delta R_{IB,c}$ according to Table 7.3.3-1A applies when serving cell c is measured.

Note 5: For inter-band CA combinations containing Bands 42 or 43, the interferer with respect to Band 42 or Band 43 shall have power level ($P_{Interferer}$) for Range 3 modified to $-20 + \Delta R_{IB,c}$ dBm for $F_{Interferer} > 2800$ MHz and $F_{Interferer} < 4400$ MHz.

Table 7.6.2A.5.5-4a: Out-of-band blocking for inter-band carrier aggregation with band 46 and with one active uplink

Parameter	Unit	Range 1	Range 2	Range 3
P_{wanted}	dBm	Table 7.6.2A.5.5-3 for all component carriers		
$P_{interferer}$	dBm	$-44 + \Delta R_{IB,c}$	$-30 + \Delta R_{IB,c}$	$-15 + \Delta R_{IB,c}$ (NOTE 5)
$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL_Low(j)} < -15$ with $j \le K$ or $15 < f - F_{DL_High(j)} < 60$ with $j \le K$	$-85 < f - F_{DL_Low(j)} \le -60$ or $60 \le f - F_{DL_High(j)} < 85$	$1 \le f \le F_{DL_Low(j)} - 85$ or $F_{DL_High(j)} + 85 \le f \le 12750$

NOTE 1: $F_{DL_Low(j)}$ and $F_{DL_High(j)}$, *j* = 1,…,K,…N, denote the respective lower and upper frequency limits of the (non-overlapping) operating bands of the CA configuration numbered in increasing order of frequency, with N the number of bands in the band combination and K the number of bands with $F_{DL_High} \le 3800$ MHz.

NOTE 2: For $F_{DL_Low(j)} - 15$ MHz $\le f \le F_{DL_High(j)} + 15$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5A.5.5 and 7.6.1A.5.5 shall be applied for carrier $j \le K$.

NOTE 3: For $F_{DL_Low(j)} - 60$ MHz $\le f \le F_{DL_High(j)} + 60$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5A.5.5 and 7.6.1A.5.5 shall be applied for carrier $K < j \le N$.

NOTE 4: $\Delta R_{IB,c}$ according to Table 7.3.3-1A applies when serving cell *c* is measured.

NOTE 5: The power level ($P_{Interferer}$) for Range 3 is modified to -20 dBm for $F_{Interferer} > 4400$ MHz except for band combinations with Band 42 or Band 43 for which $P_{Interferer}$ for Range 3 is modified to -20 dBm for $F_{Interferer} > 2800$ MHz.

For Table 7.6.2A.5.5-5 in frequency range 1, 2 and 3, the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(24, 6 \cdot \lceil N_{RB} \cdot / 6 \rceil)$ exceptions per assigned E-UTRA channel per sub-block gap of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7A.5 spurious response for CA are applicable.

For Table 7.6.2A.5.5-5 in frequency range 4 the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(8, \lceil (N_{RB} + 2 \cdot L_{CRBs}) / 8 \rceil)$ exceptions per assigned E-UTRA channel per sub-block gap of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.5 spurious response for CA are applicable.

Table 7.6.2A.5.5-5: Out of band blocking (intra-band non-contiguous)

E-UTRA band	Parameter	Units	Frequency			
			range 1	range 2	range 3	range 4

	$P_{Interferer}$	dBm	-44	-30	-15	-15
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 (Note 4), 43 (Note 4), 44, 66	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz	-
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz	-
2, 5, 12, 17	$F_{Interferer}$	MHz	-	-	-	F_{UL_low} - F_{UL_high}
Note 1: Range 3 shall be tested only with the highest channel bandwidth. Note 2: For the UE which supports both Band 11 and Band 21 the out of band blocking is FFS. Note 3: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps. Note 4: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.						

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Tables 7.6.2A.5.5 2, 7.6.2A.5.5-4 and 7.6.2A.5.5-5 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C accordingly.

7.6.2A.6

7.6.2A.7 Out-of-band blocking for 4DL CA

7.6.2A.7.1 Test Purpose

Same test purpose as in clause 7.6.2A.1.

7.6.2A.7.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 4DL with TDD Intra-band contiguous CA, or 4DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 4DL Intra-band non-contiguous CA + Inter-band CA or 4DL Intra-band non-contiguous + Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 4DL CA with FDD-TDD CA.

7.6.2A.7.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2A.0.

7.6.2A.7.4 Test Description

7.6.2A.7.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2A.7.4.1-1 through table 7.6.2A.7.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.2A.7.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC N_{RB}" and “SCCs N_{RB} ” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for a CA_XE Configuration (Intra-band contiguous)																
1	X	Mid/ CC1	REFSENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/ CC1	REFSENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA Configuration (Inter-band)																
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XB-YA-ZA and CA_XC-YA-ZA Configuration (Intra-band contiguous + Inter-band)																

Default Test Settings for CA_YA-XB-ZA and CA_YA-XC-ZA Configuration (Intra-band contiguous + Inter-band) Default Test Settings for CA_YA-ZA-XB and CA_YA-ZA-XC Configuration (Intra-band contiguous + Inter-band)																
1	X	Mid/ CC1	REFSENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XC-YC Configuration (Intra-band contiguous + Inter-band(2))																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41E, X=41.
Note 6: **Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-8A,X=1,Y=3,Z=7,R=8.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.
Note 11: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

Table 7.6.2A.7.4.1-2: Test Configuration Table with Wgap

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for CA_XA-XA-YA-ZA Configurations (Intra-band non-contiguous + Inter-band)																			
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REFSENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-ZA-YA-YA Configurations Intra-band non-contiguous + Inter-band																			
1	Y	CC2	REFSENS	ALL RBs	Max	Y	CC1	N/A	ALL RBs	-	X	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	X	Mid	REFSENS	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REFSENS	ALL RBs	-	X	Mid	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

Default Test Settings for CA_XA-XD/XD-XA/XC-XC Configurations (Intra-band non-contiguous + Intra-band contiguous)

TBD

Default Test Settings for CA_XA-XA-YA-YA Configurations (Intra-band non-contiguous + Intra-band non-contiguous)

1	X	CC4	REFSENS	ALL RBs	Max	X	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	CC4	REFSENS	ALL RBs	Max	Y	CC3	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.

Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.

Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.

Note 4: **Intra-band non-contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-12A,X=2,Y=4,Z=12.

Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A-41A,X=41.

Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-4A,X=2,Y=4.

Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.

Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

Note 9: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.2A.7.4.1-1 through Table 7.6.2A.7.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.2A.7.4.3.

7.6.2A.7.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.2A.7.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.7.4.1-1 through Table 7.6.2A.7.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.7.4.1-1 through Table 7.6.2A.7.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below the lowest CA Band according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.7.4.2-1. The frequency step size is 1MHz. Use the highest $\Delta R_{IB,c}$ among CA bands for $P_{interferer}$ calculation.
7. Set the downlink signal level according to the table indicated in the column "Table with transmission parameters to select" of Table 7.6.2A.7.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2A.7.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput for all the carrier(s) indicated in the Table 7.6.2A.7.4.2-1 simultaneously for duration sufficient to achieve statistical significance according to Annex G.2. Note that the statistical decision for each component carrier should be postponed until the statistical decisions for all component carriers are obtained simultaneously according to table G.2.4-1.
9. Record the frequencies for which the throughput doesn't meet the requirements and for each frequency, the carriers for which the throughput was not met.
10. Repeat steps 6 to 8 for each recorded frequency-carrier pair, with exception of pairs for which $\Delta R_{IB,c}$ is the same as ΔR_{IB} used in Step 6. In Step 6 use only recorded frequencies for interferer placement and use $\Delta R_{IB,c}$ relevant to recorded carrier for $P_{interferer}$ calculation. Remove the frequency-carrier pairs that meet the throughput requirements from the record.
11. If the CA Configuration includes multiple bands, repeat steps from 6 to 10 using an interfering signal in each gap between the CA bands, according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.7.4.2-1.
12. Repeat steps from 6 to 10, using an interfering signal above the highest CA Band according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.7.4.2-1.
13. Repeat steps 1 to 12 for each row of "Throughput measured on" column listed in the Table 7.6.2A.7.4.2-1.

Table 7.6.2A.7.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with transmission parameters to select	Table with interferer parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2, SCC3	7.6.2A.7.5-1	7.6.2A.7.5-2
Inter-band	1	SCC1, SCC2, SCC3	7.6.2A.7.5-3	7.6.2A.7.5-4
	2	SCC1, SCC2, SCC3		
	3	SCC1, SCC2, SCC3		
	4	SCC1, SCC2, SCC3		
Intra-band contiguous + Inter-band	1	SCC2, SCC3	7.6.2A.7.5-3	7.6.2A.7.5-4 (Note 4)
	2	SCC1, SCC2	7.6.2A.7.5-1	7.6.2A.7.5-2 (Note 5)
		SCC3	7.6.2A.7.5-3	7.6.2A.7.5-4 (Note 4)
	3	SCC1	7.6.2A.7.5-3	7.6.2A.7.5-4 (Note 4)
		SCC2, SCC3	7.6.2A.7.5-1	7.6.2A.7.5-2 (Note 5)
Intra-band contiguous + Inter-band(2)	1	SCC2, SCC3	7.6.2A.7.5-1	7.6.2A.7.5-2 (Note 5)
	2	SCC2, SCC3	7.6.2A.7.5-1	7.6.2A.7.5-2 (Note 5)
Intra-band non-contiguous + Inter-band	1	SCC2, SCC3	7.6.2A.7.5-3	7.6.2A.7.5-4 (Note 6)
	2	SCC1, SCC2	7.6.2A.7.5-3	7.6.2A.7.5-5 (Note 5)
		SCC3	7.6.2A.7.5-3	7.6.2A.7.5-4 (Note 6)
	3	SCC1	7.6.2A.7.5-3	7.6.2A.7.5-4 (Note 6)
		SCC2, SCC3	7.6.2A.7.5-3	7.6.2A.7.5-5 (Note 5)
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.6.2A.7.5-3	7.6.2A.7.5-5 (Note 4)
		SCC1, SCC2, SCC3	7.6.2A.7.5-1	7.6.2A.7.5-2 (Note 6)
	2	SCC2	7.6.2A.7.5-3	7.6.2A.7.5-5 (Note 4)
		PCC, SCC1, SCC3	7.6.2A.7.5-1	7.6.2A.7.5-2 (Note 6)
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC2, SCC3	7.6.2A.7.5-3	7.6.2A.7.5-5
	2			

Note 1: Test point ID for the particular CA configuration as defined in section 7.6.2A.7.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.
Note 4: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.7.5-2. When interferer position is closer than 15 MHz from other CC block interferer is OFF.
Note 5: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.7.5-4. When interferer position is closer than 15 MHz from other CC block interferer is OFF.
Note 6: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.7.5-5. When interferer position is closer than 15 MHz from other CC block interferer is OFF.

7.6.2A.7.4.3 Message Contents

Same message contents as in clause 7.6.2.4.3 for without UL CA.

Same message contents as in clause 7.6.2A.1.4.3 for UL CA.

7.6.2A.7.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

For Table 7.6.2A.7.5-2 in frequency range 1, 2 and 3, up to $\max(24,6\cdot\lceil N_{RB}\cdot/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the allocated number of resource blocks in the frequency channel. For these exceptions the requirements of subclause 7.7A.5 Spurious Response for CA are applicable.

Table 7.6.2A.7.5-1: Out-of-band blocking parameters (intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9	9	9	
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.						

Table 7.6.2A.7.5-2: Out of band blocking (intra-band contiguous)

CA configuration	Parameter	Units	Frequency		
			range 1	range 2	range 3
	$P_{Interferer}$	dBm	-44	-30	-15
CA_1C, CA_2C, CA_3C, CA_5B, CA_7C , CA_8B, CA_12B, CA_23B, CA_27B, CA_38C, CA_40C, CA_41C, CA_40D, CA_42C[1], CA_42D[1], CA_42E[1], CA_66B, CA_66C, CA_66D, CA_70C	$F_{Interferer}$ (CW)	MHz	F_{DL_low} - 15 to F_{DL_low} - 60	F_{DL_low} - 60 to F_{DL_low} - 85	F_{DL_low} - 85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
Note 1: The power level of the interferer ($P_{Interferer}$) for this CA configuration for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.					

For Table 7.6.2A.7.5-4 frequency range 1, 2, and 3, the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(24, \ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions per downlink in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.5 Spurious Response for CA are applicable.

Table 7.6.2A.7.5-3: Out-of-band blocking parameters (inter-band, intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. NOTE 3: The REFSENS power level is specified in Table 7.3.1-1 and Table 7.3.1-1a for two and four antenna ports, respectively.							

Table 7.6.2A.7.5-4: Out-of-band blocking for inter-band carrier aggregation with one uplink carrier

Parameter	Unit	Range 1	Range 2	Range 3
P_{wanted}	dBm	Table 7.6.2A.7.5-3 for all component carriers		
$P_{interferer}$	dBm	$-44 + \Delta R_{IB,c}$	$-30 + \Delta R_{IB,c}$	$-15 + \Delta R_{IB,c}$
$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL_Low(j)} < -15$ or $15 < f - F_{DL_High(j)} < 60$	$-85 < f - F_{DL_Low(j)} \le -60$ or $60 \le f - F_{DL_High(j)} < 85$	$1 \le f \le F_{DL_Low(j)} - 85$ or $F_{DL_High(j)} + 85 \le f \le F_{DL_Low(j+1)} - 85$ with $j < X$ or $F_{DL_High(X)} + 85 \le f \le 12750$

Note 1: $F_{DL_Low(j)}$ and $F_{DL_High(j)}$ denote the respective lower and upper frequency limits of the operating band containing carrier j, j = 1,…,X, with carriers numbered in increasing order of carrier frequency and X the number of component carriers in the band combination (X ≤ 5 for the present version of this specification).

Note 2: For $F_{DL_Low(j+1)} - F_{DL_High(j)} < 145$ MHz and $F_{Interferer}$ in $F_{DL_High(j)} < f < F_{DL_Low(j+1)}$, $F_{Interferer}$ can be in both Range 1 and Range 2. Then the lower of the $P_{Interferer}$ applies.

Note 3: For $F_{DL_Low(j)} - 15$ MHz ≤ f ≤ $F_{DL_High(j)} + 15$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5A.5.5 and 7.6.1A.5.5 shall be applied for carrier j.

Note 4: $\Delta R_{IB,c}$ according to Table 7.3.3-1A applies when serving cell c is measured.

Note 5: For inter-band CA combinations containing Bands 42 or 43, the interferer with respect to Band 42 or Band 43 shall have power level ($P_{Interferer}$) for Range 3 modified to $-20 + \Delta R_{IB,c}$ dBm for $F_{Interferer} > 2800$ MHz and $F_{Interferer} < 4400$ MHz.

Note 6: For inter-band CA combinations containing Bands 7 and 38 simultaneously, for $F_{Interferer}$ Bands 7 and 38 are considered as one single band as follows: $F_{DL_Low} = 2570$ MHz and $F_{DL_High} = 2690$ MHz. For Range 2, the following applies for F_{DL_Low}: $-95 < f - F_{DL_Low} \le -60$ or $60 \le f - F_{DL_High} < 85$. For Range 3 the following applies $1 \le f \le F_{DL_Low} - 95$ or $F_{DL_High} + 85 \le f \le 12750$.

For Table 7.6.2A.7.5-5 in frequency range 1, 2 and 3, the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(24, 6 \cdot \lceil N_{RB} \cdot / 6 \rceil)$ exceptions per assigned E-UTRA channel per sub-block gap of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7A.5 spurious response for CA are applicable.

For Table 7.6.2A.7.5-5 in frequency range 4 the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(8, \lceil (N_{RB} + 2 \cdot L_{CRBs}) / 8 \rceil)$ exceptions per assigned E-UTRA channel per sub-block gap of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.5 spurious response for CA are applicable.

Table 7.6.2A.7.5-5: Out of band blocking (intra-band non-contiguous)

E-UTRA band	Parameter	Units	Frequency			
			range 1	range 2	range 3	range 4
	$P_{Interferer}$	dBm	-44	-30	-15	-15
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 (NOTE 2), 43 (NOTE 2), 44, 45, 65, 66, 68, 70	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz	-
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz	-
2, 5, 12, 17	$F_{Interferer}$	MHz	-	-	-	F_{UL_low} - F_{UL_high}

NOTE 1: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS.
NOTE 2: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.
NOTE 3: For the UE that supports both Band 4 and Band 66, the out-of-blocking frequency range for Band 4 is defined relative to F_{DL_low} and F_{DL_high} of Band 66.
NOTE 4: For a UE supporting CA_20A-28A the requirements for Band 20 and Band 28 apply with F_{DL_low} given by the lower limit of the restricted operating frequency range in Band 28 and F_{DL_high} by Band 20 (Table 5.5A-2).

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Tables 7.6.2A.7.5 2, 7.6.2A.7.5-4 and 7.6.2A.7.5-5 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C accordingly.

7.6.2A.8 Out-of-band blocking for 5DL CA

7.6.2A.8.1 Test Purpose

Same test purpose as in clause 7.6.2A.1.

7.6.2A.8.2 Test Applicability

This test case applies to all types of E-UTRA UE release 12 and forward that support 5DL with TDD Intra-band contiguous CA, or 5DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 5DL with Intra-band non-contiguous CA or 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA, or 5DL with Intra-band non-contiguous and Intra-band non-contiguous CA, or 5DL with Intra-band contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 5DL CA with FDD-TDD CA.

7.6.2A.8.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2A.0.

7.6.2A.8.4 Test Description

7.6.2A.8.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2A.8.4.1-1 through table 7.6.2A.8.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.2A.8.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3				SCC4			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	UL MOD	DL MOD	UL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for a CA_XF Configuration (Intra-band contiguous)																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC5	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC5	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA-SA Configuration (Inter-band)																				
1	X	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	S	Mid	REF	ALL	X	Mid	N/A	ALL	Y	Mid	N/A	ALL	Z	Mid	N/A	ALL	R	Mid	N/A	ALL

			SENS	RBs				RBs				RBs				RBs				RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for a CA_XE-YA Configuration (Intra-band contiguous + Inter-band)																			
1	X	Mid/ CC1	REF SENSE	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REF SENSE	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XA-ZA-RA-YB and CA_XA-ZA-RA-YC Configuration (Intra-band contiguous + Inter-band)																			
1	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid	REF SENS	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
Default Test Settings CA_XB-YB-ZA, CA_XB-YC-ZA, CA_XC-YB-ZA, and CA_XC-YC-ZA Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band) **Default Test Settings CA_ZA-XB-YB, CA_ZA-XB-YC, CA_ZA-XC-YB, and CA_ZA-XC-YC Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band)**																			
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.																			

Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41F, X=41.
Note 6: **Inter-band:** X,Y,Z,R,S correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-20A-42A,X=1,Y=3,Z=7,R=20,S=42.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.6.2A.8.4.1-2: Test Configuration Table with Wgap

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3				W_{gap} [MHz]	SCC4			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA-ZA-RA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-ZA-XA-XA-RA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-RA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																								
1	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REF SENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REF SENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
4	R	Mid	REF SENS	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XA-YD Configurations (Intra-band non-contiguous + Intra-band contiguous)																								
1	Y	CC3	REF SENS	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}
2	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XA-YA-ZA-ZA Configurations Intra-band non-contiguous + Intra-band non-contiguous																								
1	Z	CC2	REF SENS	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_ag}		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$

				$_{g}$					$_{agg}$					$_{agg}$					$_{agg}$					$_{agg}$
2	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Y	Mid	REF SENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band non-contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-12A-66A,X=2,Y=5,Z=12,R=66.
Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X,Y corresponds to the band of the CA Configuration. E.g. for CA_5A-5A-66D,X=5,Y=66.
Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-66A-66A,X=2,Y=5,Z=66.
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_CC1} = N_{RB_CC2} for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.2A.8.4.1-1 through Table 7.6.2A.8.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.2A.8.4.3.

7.6.2A.8.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.2A.8.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.8.4.1-1 through Table 7.6.2A.8.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.8.4.1-1 through Table 7.6.2A.8.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below the lowest CA Band according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.8.4.2-1. The frequency step size is 1MHz. Use the highest $\Delta R_{IB,c}$ among CA bands for $P_{interferer}$ calculation.
7. Set the downlink signal level according to the table indicated in the column "Table with transmission parameters to select" of Table 7.6.2A.8.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2A.8.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput for all the carrier(s) indicated in the Table 7.6.2A.7.4.2-1 simultaneously for duration sufficient to achieve statistical significance according to Annex G.2. Note that the statistical decision for each component carrier should be postponed until the statistical decisions for all component carriers are obtained simultaneously according to table G.2.4-1.
9. Record the frequencies for which the throughput doesn't meet the requirements and for each frequency, the carriers for which the throughput was not met.
10. Repeat steps 6 to 8 for each recorded frequency-carrier pair, with exception of pairs for which $\Delta R_{IB,c}$ is the same as ΔR_{IB} used in Step 6. In Step 6 use only recorded frequencies for interferer placement and use $\Delta R_{IB,c}$ relevant to recorded carrier for $P_{interferer}$ calculation. Remove the frequency-carrier pairs that meet the throughput requirements from the record.
11. If the CA Configuration includes multiple bands, repeat steps from 6 to 10 using an interfering signal in each gap between the CA bands, according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.8.4.2-1.
12. Repeat steps from 6 to 10, using an interfering signal above the highest CA Band according to the table indicated in the column "Table with interferer parameters to select" of Table 7.6.2A.8.4.2-1.
13. Repeat steps 1 to 12 for each row of "Throughput measured on" column listed in the Table 7.6.2A.8.4.2-1.

Table 7.6.2A.8.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with transmission parameters to select	Table with interferer parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2, SCC3, SCC4	7.6.2A.8.5-1	7.6.2A.8.5-2
Inter-band	1	SCC1, SCC2, SCC3, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4
	2	SCC1, SCC2, SCC3, SCC4		
	3	SCC1, SCC2, SCC3, SCC4		
	4	SCC1, SCC2, SCC3, SCC4		
Intra-band contiguous + Inter-band	1	SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 4)
	2	SCC1, SCC2, SCC3, SCC4	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 5)
Intra-band contiguous + Inter-band	1	SCC2, SCC3, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 4)
	2	SCC1, SCC2	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 5)
		SCC3, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 4)
	3	SCC2, SCC3	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 5)
		SCC1, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 4)
	4	SCC2, SCC3	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 5)
		SCC1, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 4)
Intra-band contiguous + Intra-band contiguous	1	SCC2, SCC3	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 5)
		SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 4)
	2	SCC2, SCC3	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 5)
		SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 4)
	3	SCC1, SCC2, SCC3, SCC4	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 5)
Intra-band non-contiguous + Inter-band	1	SCC1	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 5)
		SCC2, SCC3, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 6)
	2	SCC1, SCC2	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 5)
		SCC3, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 6)
	3	SCC2, SCC3	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 5)
		SCC1, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 6)
	4	SCC3, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 5)
		SCC1, SCC2	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 6)
Intra-band non-contiguous + Intra-band contiguous	1	SCC3, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 4)
		PCC, SCC1, SCC2	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 6)
	2	PCC, SCC1	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 4)
		SCC2, SCC3, SCC4	7.6.2A.8.5-1	7.6.2A.8.5-2 (Note 6)
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC1, SCC2, SCC3	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 5)
		SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 6)
	2	SCC1, SCC2, SCC3	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 5)
		SCC4	7.6.2A.8.5-3	7.6.2A.8.5-4 (Note 6)
	3	SCC1, SCC2, SCC3, SCC4	7.6.2A.8.5-3	7.6.2A.8.5-5 (Note 5)

Note 1: Test point ID for the particular CA configuration as defined in section 7.6.2A.8.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.
Note 4: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.8.5-2. When interferer position is closer than 15 MHz from other CC block interferer is OFF.
Note 5: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.8.5-4. When interferer position is closer than 15 MHz from other CC block interferer is OFF.
Note 6: When interferer position is within range 1 or 2 frequency of other CC block, Pinterfer is selected from table 7.6.2A.8.5-5. When interferer position is closer than 15 MHz from other CC block interferer is OFF.

7.6.2A.8.4.3 Message Contents

Same message contents as in clause 7.6.2.4.3 for without UL CA.

Same message contents as in clause 7.6.2A.1.4.3 for UL CA.

7.6.2A.8.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

For Table 7.6.2A.8.5-2 in frequency range 1, 2 and 3, up to $\max(24,6\cdot\lceil N_{RB}\cdot/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the allocated number of resource blocks in the frequency channel. For these exceptions the requirements of subclause 7.7A.8 Spurious Response for CA are applicable.

Table 7.6.2A.8.5-1: Out-of-band blocking parameters (intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9	9	9	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.						

Table 7.6.2A.8.5-2: Out of band blocking (intra-band contiguous)

CA configuration	Parameter	Units	Frequency		
			range 1	range 2	range 3
	$P_{Interferer}$	dBm	-44	-30	-15
CA_1C, CA_2C, CA_3B, CA_3C, CA_5B, CA_7C , CA_8B, CA_12B, CA_23B, CA_27B, CA_38C, CA_40C, CA_40D, CA_40E, CA_41C, CA_41D, CA_41E, CA_42C[1], CA_42D[1], CA_42E[1], CA_42F[1], CA_43C[1], CA_48C[1], CA_48D[1], CA_48E[1], CA_48F[1], CA_66B, CA_66C, CA_66D, CA_70C	$F_{Interferer}$ (CW)	MHz	F_{DL_low} - 15 to F_{DL_low} - 60	F_{DL_low} - 60 to F_{DL_low} - 85	F_{DL_low} - 85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
Note 1: The power level of the interferer ($P_{Interferer}$) for this CA configuration for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.					

For Table 7.6.2A.8.5-4 frequency range 1, 2, and 3, the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions per downlink in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.5 Spurious Response for CA are applicable.

Table 7.6.2A.8.5-3: Out-of-band blocking parameters (inter-band, intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. Note 3: The REFSENS power level is specified in Table 7.3.1-1 and Table 7.3.1-1a for two and four antenna ports, respectively.							

Table 7.6.2A.8.5-4: Out-of-band blocking for inter-band carrier aggregation with one uplink carrier

Parameter	Unit	Range 1	Range 2	Range 3
P_{wanted}	dBm	Table 7.6.2A.8.5-3 for all component carriers		
$P_{interferer}$	dBm	$-44 + \Delta R_{IB,c}$	$-30 + \Delta R_{IB,c}$	$-15 + \Delta R_{IB,c}$
$F_{interferer}$ (CW)	MHz	$-60 < f - F_{DL_Low(j)} < -15$ or $15 < f - F_{DL_High(j)} < 60$	$-85 < f - F_{DL_Low(j)} \le -60$ or $60 \le f - F_{DL_High(j)} < 85$	$1 \le f \le F_{DL_Low(j)} - 85$ or $F_{DL_High(j)} + 85 \le f \le F_{DL_Low(j+1)} - 85$ with $j < X$ or $F_{DL_High(X)} + 85 \le f \le 12750$

Note 1: $F_{DL_Low(j)}$ and $F_{DL_High(j)}$ denote the respective lower and upper frequency limits of the operating band containing carrier j, j = 1,…,X, with carriers numbered in increasing order of carrier frequency and X the number of component carriers in the band combination (X ≤ 5 for the present version of this specification).

Note 2: For $F_{DL_Low(j+1)} - F_{DL_High(j)} < 145$ MHz and $F_{Interferer}$ in $F_{DL_High(j)} < f < F_{DL_Low(j+1)}$, $F_{Interferer}$ can be in both Range 1 and Range 2. Then the lower of the $P_{Interferer}$ applies.

Note 3: For $F_{DL_Low(j)} - 15$ MHz ≤ f ≤ $F_{DL_High(j)} + 15$ MHz the appropriate adjacent channel selectivity and in-band blocking requirements in the respective subclauses 7.5A.5.5 and 7.6.1A.5.5 shall be applied for carrier j.

Note 4: $\Delta R_{IB,c}$ according to Table 7.3.3-1A applies when serving cell c is measured.

Note 5: For inter-band CA combinations containing Bands 42 or 43, the interferer with respect to Band 42 or Band 43 shall have power level ($P_{Interferer}$) for Range 3 modified to $-20 + \Delta R_{IB,c}$ dBm for $F_{Interferer} > 2800$ MHz and $F_{Interferer} < 4400$ MHz.

Note 6: For inter-band CA combinations containing Bands 7 and 38 simultaneously, for $F_{Interferer}$ Bands 7 and 38 are considered as one single band as follows: $F_{DL_Low} = 2570$ MHz and $F_{DL_High} = 2690$ MHz. For Range 2, the following applies for F_{DL_Low}: $-95 < f - F_{DL_Low} \le -60$ or $60 \le f - F_{DL_High} < 85$. For Range 3 the following applies $1 \le f \le F_{DL_Low} - 95$ or $F_{DL_High} + 85 \le f \le 12750$.

For Table 7.6.2A.8.5-5 in frequency range 1, 2 and 3, the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(24, 6 \cdot \lceil N_{RB} \cdot / 6 \rceil)$ exceptions per assigned E-UTRA channel per sub-block gap of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7A.8 spurious response for CA are applicable.

For Table 7.6.2A.8.5-5 in frequency range 4 the number of spurious response frequencies recorded in the step 9 of the test procedure shall not exceed $\max(8, \lceil (N_{RB} + 2 \cdot L_{CRBs}) / 8 \rceil)$ exceptions per assigned E-UTRA channel per sub-block gap of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7A.8 spurious response for CA are applicable.

Table 7.6.2A.8.5-5: Out of band blocking (intra-band non-contiguous)

E-UTRA band	Parameter	Units	Frequency			
			range 1	range 2	range 3	range 4
	$P_{Interferer}$	dBm	-44	-30	-15	-15
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42 (NOTE 2), 43 (NOTE 2), 44, 45, 65, 66, 68, 70	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz	-
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz	-
2, 5, 12, 17	$F_{Interferer}$	MHz	-	-	-	F_{UL_low} - F_{UL_high}

Note 1:	For the UE which supports both Band 11 and Band 21 the out of blocking is FFS.
Note 2:	The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.
Note 3:	For the UE that supports both Band 4 and Band 66, the out-of-blocking frequency range for Band 4 is defined relative to F_{DL_low} and F_{DL_high} of Band 66.
Note 4:	For a UE supporting CA_20A-28A the requirements for Band 20 and Band 28 apply with F_{DL_low} given by the lower limit of the restricted operating frequency range in Band 28 and F_{DL_high} by Band 20 (Table 5.5A-2).

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Tables 7.6.2A.8.5 2, 7.6.2A.8.5-4 and 7.6.2A.8.5-5 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C accordingly.

7.6.2B Out-of-band blocking for UL-MIMO

7.6.2B.1 Test Purpose

Out-of-band band blocking for UL-MIMO is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE that support UL- MIMO receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE that support UL-MIMO receive band the appropriate in-band blocking for UL-MIMO or adjacent channel selectivity for UL-MIMO in sub-clause 7.5.3 and sub-clause 7.6.1.3 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2B.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

7.6.2B.3 Minimum Conformance Requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in subclause 7.6 shall be met with the UL-MIMO configurations specified in Table 6.2.2B.3-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 36.101 [2] clause 7.6B.

7.6.2B.4 Test Description

7.6.2B.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2B.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.2B.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	One frequency chosen arbitrarily from low or high range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth.						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, in Figure A.30.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.2B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.2B.4.3.

7.6.2B.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 7.6.2B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.2B.5-2. The frequency step size is 1MHz.

4. Set the downlink signal level according to the table 7.6.2B.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2B.5-1 for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the throughput measurement.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Record the frequencies for which the throughput doesn't meet the requirements.

7. Repeat steps from 3 to 6, using an interfering signal above the wanted signal at step 3.

7.6.2B.4.3 Message Contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception.

Table 7.6.2B.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.2B.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.6.2B.5-1 and 7.6.2B.5-2.

For frequency range 1, 2, and 3, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7 Spurious Response are applicable.

For frequency range 4, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(8,\ \lceil(N_{RB}+2\cdot L_{CRBs})/8\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7 Spurious Response are applicable.

Table 7.6.2B.5-1: Out-of-band blocking parameters

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.6.2B.5-2: Out of band blocking

E-UTRA band	Parameter	Units	Frequency			
			range 1	range 2	range 3	range 4
	$P_{Interferer}$	dBm	-44	-30	-15	-15
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 65, 66, 70	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz	-
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz	-
2, 5, 12, 17	$F_{Interferer}$	MHz	-	-	-	F_{UL_low} - F_{UL_high}

Note 1: Range 3 shall be tested only with the highest channel bandwidth.
Note 2: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS.
Note 3: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz.
Note 4: For the UE that supports both Band 4 and Band 66, the out-of-blocking frequency range for Band 4 is defined relative to F_{DL_low} and F_{DL_high} of Band 66.

7.6.2D Out-of-band blocking for ProSe

7.6.2D.0 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Tables 7.6.2.1D.0-1, 7.6.2.1D.0-2 and 7.6.2.1D.0-3.

For Table 7.6.2D.0-3 in frequency range 1, 2 and 3, up to $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (see Figure 5.4.2-1). For these exceptions the requirements of subclause 7.7D Spurious response are applicable.

For Table 7.6.2D.0-3 in frequency range 4, up to $\max(8,\ \lceil(N_{RB}+2\cdot L_{CRBs})/8\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configurations (see Figure 5.6-1) and L_{CRBs} is the number of resource blocks allocated in the uplink. For these exceptions the requirements of clause 7.7D spurious response are applicable.

Table 7.6.2D.0-1: Out-of-band blocking parameters for ProSe Direct Discovery

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below + P_{offset}					
				6	6	7	9
P_{offset}	dB			10.9	13.9	15.7	16.9
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

Table 7.6.2D.0-2: Out-of-band blocking parameters for ProSe Direct Communication

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below					
				6	6	7	9
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

Table 7.6.2D.0-3: Out of band blocking for ProSe

E-UTRA ProSe band	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
2,3,4,7,14, 20,26,28,31	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE 1: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS.					

The normative reference for this requirement is TS 36.101 [2] clause 7.6.2.1D.

7.6.2D.1 Out-of-band blocking for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Use of OCNG for Downlink has not been considered and is still FFS.
- Message exceptions content needs further investigation (some values still TBD).
- Test time is FFS.

7.6.2D.1.1 Test Purpose

Out-of-band blocking for ProSe is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the ProSe band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels in aggregated signals.

For the first 15 MHz below or above the ProSe band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5D and sub-clause 7.6.1D shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2D.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

7.6.2D.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2D.0.

7.6.2D.1.4 Test Description

7.6.2D.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA ProSe bands specified in table 5.4.2D.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2D.1.4.1-1. The details of the downlink, uplink and sidelink reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.6.

Table 7.6.2D.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range (Note 4)					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Highest					
	Downlink Configuration (Note 2)		**Uplink Configuration (Note 2)**		**Sidelink Configuration (Reception) (Note 3)**	
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Mod'n	RB allocation
5MHz	QPSK	8	QPSK	8	QPSK	2
10MHz	QPSK	16	QPSK	16	QPSK	2
15MHz	QPSK	25	QPSK	25	QPSK	2
20MHz	QPSK	30	QPSK	30	QPSK	2
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA ProSe and Operating band, according to the applicability specified respectively in Table 5.4.2D.1-1 and Table 5.4.2.1-1.						
Note 2: After DRX configuration, DL-RMC (PDSCH) and DCI-0 for scheduling UL-RMC (PUSCH) are applied only in the DRX On subframes.						
Note 3: The RB start for the transmission of Sidelink RMC is RB#0.						
Note 4: Sidelink uses the frequencies defined for Uplink.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.71
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.2D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 7.6.2D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

7.6.2D.1.4.2 Test Procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 7.6.2D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Initialise the variables Ptot and Pok as 0.
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.3D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2D.1.4.1-1. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below the Sidelink Band according to Table 7.6.2D.1.5-2. The frequency step size is 1MHz.

7. SS transmits PSDCH to transmit the SL RMC according to Table 7.6.2D.1.4.1-1. Set the Sidelink signal level to the appropriate value defined in Table 7.6.2D.1.5-1.

8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable Ptot.

9. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".

10. SS calculates the variable Pok as (current counter value - counter value at last test iteration).

11. SS shall compute the throughput as following:

    TP = Pok / Ptot * 100%

12. Record the frequencies for which the throughput doesn't meet the requirements.

13. Repeat steps from 6 to 12, using an interfering signal above the Sidelink Band at step 6.

7.6.2D.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 7.6.2D.1.4.3-1: ACTIVATE TEST MODE: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 7.6.2D.1.4.3-2: CLOSE UE TEST LOOP: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 7.6.2D.1.4.3-3: MAC-MainConfig-RBC: Reference sensitivity for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

7.6.2D.1.5 Test Requirement

Except for the spurious response frequencies recorded in step 12 of the test procedure, the throughput measurement of the sidelink derived in the test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Table 7.6.2D.1.5-1 and 7.6.2D.1.5-2.

For Table 7.6.2D.1.5-2 in frequency range 1, 2 and 3, up to $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (see Figure 5.6-1). For these exceptions the requirements of subclause 7.7D Spurious response are applicable.

Table 7.6.2D.1.5-1: Out-of-band blocking parameters for ProSe Direct Discovery

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below + P_{offset}					
				6	6	7	9
P_{offset}	dB			10.9	13.9	15.7	16.9
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

Table 7.6.2D.1.5-2: Out of band blocking for ProSe

E-UTRA ProSe band	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
2,3,4,7,14, 20,26,28,31	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE 1: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS.					

7.6.2D.2 Out-of-band blocking for Prose Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test description is TBD

7.6.2D.2.1 Test Purpose

Same test purpose as 7.6.2D.1.1.

7.6.2D.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

7.6.2D.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.2D.0.

7.6.2D.2.4 Test Description

TBD

7.6.2D.2.5 Test Requirement

Same test requirement as in clause 7.6.2D.1.5 with the following exceptions:

- Instead of Table 7.6.2D.1.5-1 → use Table 7.6.2D.2.5-1.
- Instead of Table 7.6.2D.1.5-2 → use Table 7.6.2D.2.5-2.

Table 7.6.2D.2.5-1: Out-of-band blocking parameters for ProSe Direct Communication

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below					
				6	6	7	9
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

Table 7.6.2D.2.5-2: Out of band blocking for ProSe

E-UTRA ProSe band	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
2,3,4,7,14, 20,26,28,31	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE 1: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS.					

7.6.2E Out-of-band blocking for UE category 0

7.6.2E.1 Test Purpose

Same test purpose as in clause 7.6.2.1.

7.6.2E.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward of UE category 0.

7.6.2E.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.6.2.3.

7.6.2E.4 Test Description

7.6.2E.4.1 Initial Conditions

Same initial conditions as in clause 7.6.2.4.1 with the following exceptions:

- Instead of Table 7.6.2.4.1-1 → use Table 7.6.2E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.5 using only main UE Tx/Rx antenna.

Table 7.6.2E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	One frequency chosen arbitrarily from low or high range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD and HD-FDD	**TDD**		**FDD and HD-FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	14	14	QPSK	15	15
5MHz	QPSK	14	14	QPSK	25	25
5MHz	QPSK	14	N/A	QPSK	20	N/A
10MHz	QPSK	14	14	QPSK	36	36
10MHz	QPSK	14	N/A	QPSK	25	N/A
10MHz	QPSK	14	N/A	QPSK	20	N/A
15MHz	QPSK	14	14	QPSK	36	36
15MHz	QPSK	14	N/A	QPSK	20	N/A
20MHz	QPSK	14	14	QPSK	36	36
20MHz	QPSK	14	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3E.3-3 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Downlink RB position shall be RB_{start} = 0.						

7.6.2E.4.2 Test Procedure

Same test procedure as in clause 7.6.2.4.2

7.6.2E.4.3 Message Contents

Same message contents as in clause 7.6.2.4.3

7.6.2E.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Tables 7.6.2E.5-1 and 7.6.2E.5-2.

For frequency range 1, 2, and 3, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7E Spurious Response are applicable.

For frequency range 4, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(8,\ \lceil(N_{RB}+2\cdot L_{CRBs})/8\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7E Spurious Response are applicable..

Table 7.6.2E.5-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9

Bandwidth Configuration							
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5E.							
Note 2: The reference measurement channel is specified in clause A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in clauses A.5.1.1/A.5.2.1.							

Table 7.6.2E.5-2: Out of band blocking

E-UTRA band	Parameter	Units	Frequency			
			range 1	range 2	range 3	range 4
	$P_{Interferer}$	dBm	-44	-30	-15	-15
2, 3, 4, 5, 8, 13, 20, 39, 41	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz	-
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz	-
2, 5,	$F_{Interferer}$	MHz	-	-	-	F_{UL_low} - F_{UL_high}
Note 1: Range 3 shall be tested only with the highest channel bandwidth.						

7.6.2G Out-of-band blocking for V2X Communication

7.6.2G.1 Out-of-band blocking for V2X Communication/ Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test tolerance is FFS7.6.2G.1.1 Test Purpose

Out-of-band blocking for V2X is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the V2X band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels in aggregated signals.

For the first 15 MHz below or above the V2X band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5G and sub-clause 7.6.1G shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2G.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.6.2G.1.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Tables 7.6.2G.3-1, 7.6.2G.3-2.

For Table 7.6.2G.3-2 in frequency range 1, 2 and 3, up to $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (see Figure 5.4.2-1). For these exceptions the requirements of subclause 7.7G Spurious response are applicable.

Table 7.6.2G.1.3-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
NOTE 1: Reference measurement channel is specified in TS 36.101 [2] Annex A.8.2.							

Table 7.6.2G.1.3-2: Out of band blocking

E-UTRA V2X band	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
47	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -30 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +30 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 4400 MHz.					

NOTE: it is FFS how to accommodate the blocking level of -30dBm in Region 1.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.2.1G.

7.6.2G.1.4 Test Description

7.6.2G.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3, and reference GNSS configuration as defined in Table C.2-8. in Annex C.2.

Table 7.6.2G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.89.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 7.6.2G.1.4.3.
3. The V2X reference measurement channel is set according to Table 7.6.2G.1.4.1-1.

4. Propagation conditions are set according to Annex B.0.
5. UE test mode – State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C.

7.6.2G.1.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Set the downlink signal level according to the table 7.6.2G.1.5-1.
3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.2G.1.5-2. The frequency step size is 1MHz.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
5. Record the frequencies for which the throughput doesn't meet the requirements.
6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 3.

7.6.2G.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.6.2G.1.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Tables 7.6.2G.1.5-1 and 7.6.2G.1.5-2

For Table 7.6.2G.1.5-2 in frequency range 1, 2 and 3, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7G spurious response are applicable..

Table 7.6.2G.1.5-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
NOTE 1: Reference measurement channel is specified in TS 36.101 [2] Annex A.8.2.							

Table 7.6.2G.1.5-2: Out of band blocking

E-UTRA V2X band	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
47	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -30 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +30 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 4400 MHz.					

7.6.2G.2 Out-of-band blocking for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test tolerance is TBD.

- Connection diagram is TBD.

7.6.2G.2.1 Test Purpose

Same as in clause 7.6.2G.1.1..

7.6.2G.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.6.2G.2.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Tables 7.6.2G.2.3-1, 7.6.2G.2.3-2.

For Table 7.6.2G.2.3-2 in frequency range 1, 2 and 3, up to $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (see Figure 5.4.2-1). For these exceptions the requirements of subclause 7.7G Spurious response are applicable.

Table 7.6.2G.2.3-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
NOTE 1: Reference measurement channel is specified in TS 36.101 [2] Annex A.8.2.							

Table 7.6.2G.2.3-2: Out of band blocking

E-UTRA V2X band	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
47	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -30 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +30 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 4400 MHz.					

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, the requirements in subclause 7.6.2G.2.3 apply for the E-UTRA V2X sidelink reception and the requirements in subclause 7.6.2.3 apply for the E-UTRA downlink reception while all downlink carriers are active.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.2.1G.

7.6.2G.2.4 Test Description

7.6.2G.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2G.2.4.1-1. The details of the uplink, downlink and V2X reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.8.3 respectively.

Table 7.6.2G.2.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			Normal, TL/VL, TL/VH, TH/VL, TH/VH				
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1			Mid range				
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1			Lowest, 5MHz, Highest for uplink Lowest, Highest for V2X				
Test Parameters for Channel Bandwidths							
	Downlink		**Uplink Configuration**		**V2X Configuration**		
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz	QPSK	1	QPSK	1	10 MHz	QPSK	[48]
1.4 MHz	QPSK	5	QPSK	5	20 MHz	QPSK	[96]
3 MHz	QPSK	1	QPSK	1			
3 MHz	QPSK	4	QPSK	4			
5 MHz	QPSK	1	QPSK	1			
5 MHz	QPSK	8	QPSK	8			
10 MHz	QPSK	1	QPSK	1			
10 MHz	QPSK	12	QPSK	12			
15 MHz	QPSK	1	QPSK	1			
15 MHz	QPSK	16	QPSK	16			
20 MHz	QPSK	1	QPSK	1			
20 MHz	QPSK	18	QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 7.6.2G.2.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4. The UL and V2X Reference Measurement Channels are set according to Table 7.6.2G.2.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.6.2G.2.4.3.

7.6.2G.2.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.6.2G.2.4.1-1 on E-UTRA Band. The SS sends downlink MAC padding bits on the DL RMC.

2. SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 7.6.2G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.

3. Set the downlink signal level according to the table 7.6.2G.2.5-1.

4. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.2G.2.5-2. The frequency step size is 1MHz.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
6. Record the frequencies for which the throughput doesn't meet the requirements.
7. Repeat steps from 4 to 6, using an interfering signal above the wanted signal at step 4.

7.6.2G.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.6.2G.2.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Tables 7.6.2G.2.5-1 and 7.6.2G.2.5-2

For Table 7.6.2G.2.5-2 in frequency range 1, 2 and 3, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(24, \quad 6\cdot\lceil N_{RB}/6\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7G spurious response are applicable..

Table 7.6.2G.2.5-1: Out-of-band blocking parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
NOTE 1: Reference measurement channel is specified in TS 36.101 [2] Annex A.8.2.							

Table 7.6.2G.2.5-2: Out of band blocking

E-UTRA V2X band	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
47	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -30 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +30 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 4400 MHz.					

7.6.2G.3 Out-of-band blocking for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test tolerance is FFS.

7.6.2G.3.1 Test Purpose

Same as in clause 7.6.2G.1.1..

7.6.2G.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.6.2G.3.3 Minimum Conformance Requirements

For intra-band contiguous multi-carrier operation, the V2X UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Tables 7.6.2G.3.3-1 and 7.6.2G.3.3-2.

For Table 7.6.2G.3.3-2 in frequency range 1, 2 and 3, up to $\max(24,6\cdot\lceil N_{RB}\cdot/6\rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7 spurious response are applicable.

Table 7.6.2G.3.3-1: Out-of-band blocking parameters for intra-band contiguous multi-carrier for V2X UE

Rx Parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + V2X Bandwidth Class specific value below				
		9				

Table 7.6.2G.3.3-2: Out of band blocking for intra-band contiguous multi-carrier for V2X UE

V2X multi-carrier configuration	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
V2X_47B	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -30 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +30 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE 1: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 4400 MHz. NOTE 2: The requirement is applied for 2 carrier intra-concurrent recpetions when 2 carrier transmission are activated at the same time					

The normative reference for this requirement is TS 36.101 [2] clause 7.6.2.1G.

7.6.2G.3.4 Test Description

7.6.2G.3.4.1 Initial conditions

Same initial conditions as in clause 7.6.2G.1.4.1 with the following exceptions- Instead of Table 7.6.2G.1.4.1-1 → use Table 7.6.2G.3.4.1-1.

Table 7.6.2G.3.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508[7] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest N_{RB_agg}, Highest N_{RB_agg}	
Test Parameters for Channel Bandwidths			
V2X MCC Configuration		**V2X PSSCH Allocation**	
CC1 N_{RB}	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**CC1 and CC2 RB Allocation**
10MHz	10MHz	QPSK	[48+48]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.92d.

7.6.2G.3.4.2 Test procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Set the downlink signal level according to the table 7.6.2G.3.5-1.
3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.2G.3.5-2. The frequency step size is 1MHz.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
5. Record the frequencies for which the throughput doesn't meet the requirements.

7.6.2G.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6

7.6.2G.3.5 Test Requirement

For intra-band contiguous multi-carrier operation,except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Tables 7.6.2G.3.5-1 and 7.6.2G.3.5-2

For Table 7.6.2G.3.5-2 in frequency range 1, 2 and 3, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(24, \quad 6\cdot\lceil N_{RB} / 6\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7G spurious response are applicable..

Table 7.6.2G.3.5-1: Out-of-band blocking parameters for intra-band contiguous multi-carrier for V2X UE

Rx Parameter	**Units**	**V2X Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + V2X Bandwidth Class specific value below				
		9				

Table 7.6.2G.3.5-2: Out of band blocking for intra-band contiguous multi-carrier for V2X UE

V2X multi-carrier configuration	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	$P_{Interferer}$	dBm	-44	-30	-15
V2X_47B	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -30 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +30 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE 1: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 4400 MHz.					
NOTE 2: The requirement is applied for 2 carrier intra-concurrent recpetions when 2 carrier transmission are activated at the same time					

7.6.2F Out-of-band blocking for category NB1

7.6.2F.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5F.1 and sub-clause 7.6.1F.1 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2F.2 Test Applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category NB1.

7.6.2F.3 Minimum Conformance Requirements

The category NB1 UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.3.2 with parameters specified in Table 7.6.2F.3-1.

For Table 7.6.2F.3-1 in frequency range 1, 2 and 3, up to 24 exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7F spurious response are applicable.

Table 7.6.2F.3-1: Out-of-band blocking parameters for category NB1 UE

Parameter	Units	Frequency		
		Range 1	Range 2	Range 3
P_{wanted}	dBm	REFSENS + 6 dB		
$P_{interferer}$ (CW)	dBm	-44	-30	-15
$F_{interferer}$ range	MHz	F_{DL_low} - 15 to F_{DL_low} - 60	F_{DL_low} - 60 to F_{DL_low} - 85	F_{DL_low} - 85 to 1 MHz
	MHz	F_{DL_high} + 15 to F_{DL_high} + 60	F_{DL_high} + 60 to F_{DL_high} + 85	F_{DL_high} + 85 to 12750 MHz
NOTE 1: For operating bands which downlink band frequency range is between 729 MHz < 1 GHz the power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to: [-18] dBm for the frequency range which is bounded by F_{DL_low} - [150] MHz of the lowest band that UE supports in frequency range 729 MHz < 1 GHz and F_{DL_high} + [150] MHz of the highest band that UE supports in frequency range 729 MHz < 1 GHz.				
NOTE 2: For operating bands which downlink band frequency range is between 1805 MHz < f < 2200 MHz the power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to: [-20] dBm for the frequency range which is bounded by F_{DL_low} - [200] MHz of the lowest band that UE supports in frequency range 1805 MHz < f < 2200 MHz and F_{DL_high} + [200] MHz of the highest band that UE supports in frequency range 1805 MHz < f < 2200 MHz.				

The normative reference for this requirement is TS 36.101 [2] clause 7.6.2.1F.

7.6.2F.4 Test Description

7.6.2F.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 7.6.2F.4.1-1. The details of the downlink reference measurement channels (RMCs) are specified in Annex A.3. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 7.6.2F.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] clause 8.1.1			NC		
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defined in Annex K.1.1		
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Modulation	Subcarriers	Modulation	N_{tones}	Subcarrier spacing
1	QPSK	12	BPSK	1@0	15 kHz

1. Connect the SS to the UE antenna connector as shown in TS 36.508 [7] Annex A, Figure A.5 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.2, and NPUSCH Format 2 is used to carry ACK/NACK on the uplink.
4. The DL Reference Measurement channel is set according to Table 7.6.2F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 7.6.2F.4.3.

7.6.2F.4.2 Test Procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.6.2F.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send HARQ feedback based on information contained in DCI format N1.
2. Set the downlink signal level according to the table 7.6.2F.5-1.
3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.2F.5-1. The frequency step size is 1MHz.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
5. Record the frequencies for which the throughput doesn't meet the requirements.
6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 3.

7.6.2F.4.3 Message Contents

Message contents are according to TS 36.508 [7] clause 8.1.6.

7.6.2F.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Tables 7.6.2F.5-1.

For Table 7.6.2F.5-1 in frequency range 1, 2 and 3, up to 24 exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7F spurious response are applicable.

Table 7.6.2F.5-1: Out-of-band blocking parameters for category NB1 UE

Parameter	Units	Frequency		
		Range 1	Range 2	Range 3
P_{wanted}	dBm	REFSENS + 6 dB		
$P_{interferer}$ (CW)	dBm	-44	-30	-15
$F_{interferer}$ range	MHz	F_{DL_low} - 15 to F_{DL_low} - 60	F_{DL_low} - 60 to F_{DL_low} - 85	F_{DL_low} - 85 to 1 MHz
	MHz	F_{DL_high} + 15 to F_{DL_high} + 60	F_{DL_high} + 60 to F_{DL_high} + 85	F_{DL_high} + 85 to 12750 MHz
NOTE 1: For operating bands which downlink band frequency range is between 729 MHz < 1 GHz the power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to: [-18] dBm for the frequency range which is bounded by F_{DL_low} - [150] MHz of the lowest band that UE supports in frequency range 729 MHz < 1 GHz and F_{DL_high} + [150] MHz of the highest band that UE supports in frequency range 729 MHz < 1 GHz.				
NOTE 2: For operating bands which downlink band frequency range is between 1805 MHz < f < 2200 MHz the power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to: [-20] dBm for the frequency range which is bounded by F_{DL_low} - [200] MHz of the lowest band that UE supports in frequency range 1805 MHz < f < 2200 MHz and F_{DL_high} + [200] MHz of the highest band that UE supports in frequency range 1805 MHz < f < 2200 MHz.				

7.6.2EA Out-of-band blocking for UE category M1

7.6.2EA.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the category M1 UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.5EA.1 and sub-clause 7.6.1EA shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.2EA.2 Test Applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category M1.

7.6.2EA.3 Minimum Conformance Requirements

Same as in clause 7.6.2.3.

7.6.2EA.4 Test Description

7.6.2EA.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for CAT M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.2EA.4.1-1. The details of the downlink and uplink

reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 7.6.2EA.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	One frequency chosen arbitrarily from low or high range						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz						
Test Parameters for Channel Bandwidths and Narrowband positions							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation		
		FDD	TDD		FDD and HD-FDD	TDD	Narrowband index (Note 1)
5MHz	QPSK	4	4	QPSK	6	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.5 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.2EA.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.6.2EA.4.3.

7.6.2EA.4.2 Test Procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 7.6.2EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The SS sends one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.
2. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 7.6.2EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.2EA.5-2. The frequency step size is 1MHz.
4. Set the downlink signal level according to the table 7.6.2EA.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.2EA.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.
5. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex G.2.
6. Record the frequencies for which the throughput doesn't meet the requirements.
7. Repeat steps from 3 to 6, using an interfering signal above the wanted signal at step 3.

7.6.2EA.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA and the following exception.

Table 7.6.2EA.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-UE-PUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.2EA.5 Test Requirement

Except for the spurious response frequencies recorded at the final step of test procedure, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.6.2EA.5-1 and 7.6.2EA.5-2.

For frequency range 1, 2, and 3, the number of spurious response frequencies recorded in the final step of test procedure shall not exceed $\max(24,\ 6\cdot\lceil N_{RB}/6\rceil)$ in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7EA Spurious Response are applicable.

Table 7.6.2EA.5-1: Out-of-band blocking parameters

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in subclause 6.2.5EA. NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2. NOTE 3: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2 should be used as REFSENS for the power in Transmission Bandwidth Configuration. NOTE 4: For DL category M1 UE, the parameters for the applicable channel bandwidth apply.							

Table 7.6.2EA.5-2: Out of band blocking

E-UTRA band	**Parameter**	**Units**	**Frequency**		
			Range 1	**Range 2**	**Range 3**
	$P_{Interferer}$	dBm	-44	-30	-15
1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 18, 19, 20, 21, 26, 27, 28, 31, 39, 41	$F_{Interferer}$ (CW)	MHz	F_{DL_low} -15 to F_{DL_low} -60	F_{DL_low} -60 to F_{DL_low} -85	F_{DL_low} -85 to 1 MHz
			F_{DL_high} +15 to F_{DL_high} + 60	F_{DL_high} +60 to F_{DL_high} +85	F_{DL_high} +85 to +12750 MHz
NOTE 1: For the UE which supports both Band 11 and Band 21 the out of blocking is FFS. NOTE 2: The power level of the interferer ($P_{Interferer}$) for Range 3 shall be modified to -20 dBm for $F_{Interferer}$ > 2800 MHz and $F_{Interferer}$ < 4400 MHz. NOTE 3: For the UE that supports both Band 4 and Band 66, the out-of-blocking frequency range for Band 4 is defined relative to F_{DL_low} and F_{DL_high} of Band 66.					

7.6.3 Narrow band blocking

7.6.3.1 Test Purpose

Verifies a receiver's ability to receive an E-UTRA signal at its assigned channel frequency in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.6.3.3 Minimum Conformance Requirements

The relative throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3.3-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.6.3.3-1: Narrow-band blocking

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: The REFSENS power level is specified in Table 7.3.3-1 and Table 7.3.3-1a for two and four antenna ports, respectively.							

For the UE which supports inter band CA configuration in Table 7.3.3-1A, P_{uw} power defined in Table 7.6.3.3-1 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.3.

7.6.3.4 Test Description

7.6.3.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.5.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1

4. The UL and DL Reference Measurement channels are set according to Table 7.6.3.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.3.4.3.

7.6.3.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.3.5-1.

4. Set the downlink signal level according to the table 7.6.3.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 3.

7.6.3.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.6.3.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.3.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.6.3.5-1.

Table 7.6.3.5-1: Narrow-band blocking

Parameter	**Unit**	**Channel Bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
P_w	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.6.3.5-1 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3_1 Narrow band blocking with 4 Rx antenna ports

7.6.3_1.1 Test Purpose

Same test purpose as in clause 7.6.3.

7.6.3_1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports.

7.6.3_1.3 Minimum Conformance Requirements

Same as in clause 7.6.3.3.

7.6.3_1.4 Test Description

7.6.3_1.4.1 Initial Conditions

Same as in clause 7.6.3.4.1 with following exceptions:

- Instead of Table 7.6.3.3.1-1→ use table 7.6.3_1.4.1-1
- Instead of Figure A.4→ use Figure A.81
- Instead of clause 7.6.3.4.3→ use clause 7.6.3_1.4.3

Table 7.6.3_1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	20	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						

7.6.3_1.4.2 Test Procedure

Same as in clause 7.6.3.4.2 with following exceptions:

- Instead of Table 7.6.3.4.1-1→ use Table 7.6.3_1.4.1-1
- Instead of Table 7.6.3.5-1→ use Table 7.6.3_1.5-1

7.6.3_1.4.3 Message Contents

Same as in clause 7.6.3.4.3.

7.6.3_1.5 Test Requirement

Same as in clause 7.6.3.5 with following exceptions:

- Instead of Table 7.6.3.5-1→ use Table 7.6.3_1.5-1

Table 7.6.3_1.5_1-1: Narrow-band blocking

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. Note 3: The REFSENS power level is specified in Table 7.3_1.5-1.							

7.6.3A Narrow band blocking for CA

7.6.3A.0 Minimum conformance requirements

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the narrow-band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.6.3 for each component carrier while all downlink carriers are active. For E-UTRA CA configurations including an operating band without uplink band or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. For E-UTRA CA configurations listed in Table 7.3A.0-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the narrow-band blocking requirements of subclause 7.6.3A.0 do not apply. For E-UTRA CA configurations with a component carrier assigned in Band 46, narrow-band blocking requirements do not apply in the presence of a narrow-band interferer in Band 46.

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.6.3A.0-1 with the uplink configuration set according to Table 7.3A.0-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink, the uplink configuration of the PCC shall be in accordance with Table 7.3.3-2.

The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Table 7.6.3A.0-1 being on either side of the aggregated signal. The throughput of each carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3A.0-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements also apply for an SCC assigned in the unpaired part with parameters specified in Table 7.6.3A.0-1.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink sub-blocks, the narrow band blocking requirements are defined with the uplink configuration in accordance with Table 7.3A.0-3. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclauses 7.6.3.3 and 7.6.3A.0 for one component carrier and two component carriers per sub-block, respectively. The requirements apply for in-gap and out-of-gap interferers while all downlink carriers are active.

Table 7.6.3A.0-1: Narrow-band blocking

Parameter	Unit	CA Bandwidth Class				
		B	C	D	E	F

Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		16	16[4]	16	16	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2
F_{uw} (offset for Δf = 7.5 kHz)	MHz					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The F_{uw} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer} / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.
Note 4: The requirement is applied for the band combinations whose component carriers' BW≥5 MHz.

For combinations of intra-band and inter-band carrier aggregation with up to five downlink carriers (up to two non-contiguously sub-blocks per band and up to four contiguously aggregated carriers per band) and one uplink carrier assigned to one E-UTRA band, the requirement is defined with the uplink active in a band other than that supporting the downlink(s) under test. The uplink configuration shall be in accordance with Table 7.3A.0-3 when the uplink is active in the band supporting two non-contiguous component carriers, Table 7.3A.0-1 when the uplink is active in a band supporting two contiguous component carriers and in accordance with Table 7.3.3-2 when the uplink is active in a band supporting one carrier per band. The downlink PCC shall be configured closer to the uplink operating band than the downlink SCC(s) when the uplink is active in band(s) supporting contiguous aggregation of up to four component carriers. For these uplink configurations, the UE shall meet the narrow-band blocking requirements for intra-band non-contiguous carrier aggregation of two downlink sub-blocks with ΔR_{IBNC} = 0 dB for all sub-block gaps (Table 7.3A.0-3) for the two non-contiguous downlink sub-blocks, the requirements for intra-band contiguous carrier aggregation for the contiguously aggregated downlink carriers and for any remaining component carrier(s) the requirements specified in subclause 7.6.3. All downlink carriers shall be active throughout the tests and the requirements for the downlinks shall be met with the single uplink carrier active in each band capable of UL operation.

For E-UTRA CA configurations with a component carriers assigned in Band 46, narrow-band blocking requirements do not apply in the presence of a narrow-band interferer in Band 46.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.3.1A.

7.6.3A.1 Narrow band blocking for CA (intra-band contiguous DL CA and UL CA)

7.6.3A.1.1 Test Purpose

Verifies a receiver's ability to receive an E-UTRA signal at its assigned CA channel frequencies in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.3A.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

7.6.3A.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.3A.0.

7.6.3A.1.4 Test Description

7.6.3A.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and CC combinations based on E-UTRA CA configurations specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.6.3A.1.4.1-1. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.3A.1.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			C: Mid range				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.			Lowest N_{RB_agg} Highest N_{RB_agg} (Note 3)				
Test Parameters for CA Configurations							
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
50	25	QPSK	50+25	QPSK	25	P_25@25	S_0@0
50	50	QPSK	50+50	QPSK	25	P_25@25	S_0@0
50	100	QPSK	50+100	QPSK	150	P_50@0	S_100@0
75	50	QPSK	75+50	QPSK	75	P_75@0	S_0@0
75	75	QPSK	75+75	QPSK	75	P_75@0	S_0@0
75	75	QPSK	75+75	QPSK	129	P_75@0	S_54@0
75	75	QPSK	75+75	QPSK	150	P_75@0	S_75@0
100	25	QPSK	100+25	QPSK	50	P_50@50	S_0@0
100	25	QPSK	100+25	QPSK	125	P_100@0	S_25@0
100	50	QPSK	100+50	QPSK	75	P_75@25	S_0@0
100	50	QPSK	100+50	QPSK	150	P_100@0	S_50@0
100	75	QPSK	100+75	QPSK	50	P_50@0	S_0@0
100	100	QPSK	100+100	QPSK	50	P_50@50	S_0@0
100	100	QPSK	100+100	QPSK	75	P_75@25	S_0@0
100	100	QPSK	100+100	QPSK	130	P_100@0	S_30@0
100	100	QPSK	100+100	QPSK	200	P_100@0	S_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.							
Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3A.0-1 is tested per CA Configuration Test CC combination.							
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same $N_{RB_agg,}$ only the fcombination with the highest NRB_PCC irst of those is tested, according to the order on the Test Configuration Table list.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.34 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are for PCC initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.6.3A.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.3A.1.4.3.

7.6.3A.1.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.3A.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3A.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6.3A.1.5-1.

7. Set the downlink signal level according to the table 7.6.3A.1.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the throughput measurement:
   The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.6.3A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
   or within (+0dB, -4 dB) of (target level in Table 7.6.3A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.
   The SCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.6.3A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
   or within (+0dB, -4 dB) of (target level in Table 7.6.3A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

8. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the aggregated component carriers at step 6.

7.6.3A.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.6.3A.1.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

Table 7.6.3A.1.4.3-2: UplinkPowerControlDedicatedSCell-r10

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH-r10	0		
deltaMCS-Enabled-r10	en0		
accumulationEnabled-r10	TRUE		
pSRS-Offset-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
pSRS-OffsetAp-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
filterCoefficient-r10	fc8	larger filter length is used to reduce the RSRP measurement variation	
pathlossReferenceLinking-r10	sCell		
}			

7.6.3A.1.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.6.3A.5-1.

Table 7.6.3A.1.5-1: Narrow-band blocking

Parameter	**Unit**	**CA Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
			16			
P_{uw} (CW)	dBm		-55			
F_{uw} (offset for Δf = 15 kHz)	MHz		- F_{offset} – 0.2 / + F_{offset} + 0.2			
F_{uw} (offset for Δf = 7.5 kHz)	MHz					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two uplink carriers.						
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						
Note 3: The F_{uw} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor \lvert F_{uw}(\text{offset for } \Delta f = 15\,\text{kHz}) \rvert / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.						

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.6.3A.1.5-1 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3A.2 Narrow band blocking for CA (intra-band contiguous DL CA without UL CA)

7.6.3A.2.1 Test Purpose

Same test purpose as 7.6.3A.1.

7.6.3A.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA. This test case applies only for CA Configurations that do not support UL CA.

7.6.3A.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.3A.0.

7.6.3A.2.4 Test Description

7.6.3A.2.4.1 Initial Conditions

Same initial conditions as in clause 7.6.3A.1.4.1 with the following exceptions:

- instead of Table 7.6.3A.1.4.1-1 → use Table 7.6.3A.2.4.1-1.
- Instead of clause 7.6.3A.1.4.3 → use clause 7.6.3A.2.4.3.

Table 7.6.3A.2.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	B: Mid range C: Mid range (Note 4)
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Lowest N_{RB_agg} Highest N_{RB_agg} (Notes 3, 4)

Test Parameters for CA Configurations

CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**			
PCC N_{RB}	**SCC N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**	
6	25	QPSK	6+25	QPSK	6	P_6@0	-
15	50	QPSK	15+50	QPSK	15	P_15@0	-
25	25	QPSK	25+25	QPSK	20	P_20@0	-
25	25	QPSK	25+25	QPSK	25	P_25@0	
25	50	QPSK	25+50	QPSK	20	P_20@0	-
25	100	QPSK	25+100	QPSK	25	P_25@0	-
50	25	QPSK	50+25	QPSK	25	P_25@25	-
50	50	QPSK	50+50	QPSK	25	P_25@25	-
50	50	QPSK	50+50	QPSK	50	P_50@0	-
50	75	QPSK	50+75	QPSK	50	P_50@0	-
75	25	QPSK	75+25	QPSK	75	P_75@0	-
75	50	QPSK	75+50	QPSK	75	P_75@0	-
75	75	QPSK	75+75	QPSK	75	P_75@0	-
100	25	QPSK	100+25	QPSK	50	P_50@50	-
100	25	QPSK	100+25	QPSK	100	P_100@0	-
100	50	QPSK	100+50	QPSK	75	P_75@25	-
100	50	QPSK	100+50	QPSK	100	P_100@0	-
100	75	QPSK	100+75	QPSK	100	P_100@0	-
100	100	QPSK	100+100	QPSK	50	P_50@75	-
100	100	QPSK	100+100	QPSK	75	P_75@25	-
100	100	QPSK	100+100	QPSK	100	P 100@0	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: Depending on CA Configuration only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per CA Configuration Test CC combination.
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same $N_{RB_agg,}$ only the combination with the highest NRB_PCC is tested.
Note 4: For CA_70C all test frequency IDs shall be tested according to table 4.3.1.1.70A-1, in TS 36.508 [7].

7.6.3A.2.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3A.2.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3A.2.4.1-1 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6.3A.1.5-1. The interferer frequency is adjusted in analogy with table 7.6.3A.2.4.2-1.

7. Set the downlink signal level according to the table 7.6.3A.1.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3A.1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.

8. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the aggregated component carriers at step 6.

Table 7.6.3A.2.4.2-1: Example for interferer frequencies

	Lower frequency	Upper frequency
F_{DL} = CA_1C Mid range (BW 20MHz + 20MHz)	2130.1 MHz	2149.9 MHz
F_{offset}	10 MHz	10 MHz
F_{uw} (offset for Δf = 15 kHz)	-10.2 MHz	+10.2 MHz
$\lfloor \lvert F_{uw}(\text{offset for } \Delta f = 15\,\text{kHz}) \rvert / 0.015 + 0.5 \rfloor 0.015 + 0.0075$	10.2075 MHz	10.2075 MHz
Adjusted F_{uw} (offset for Δf = 15 kHz)	-10.2075 MHz	+10.2075 MHz
F_{uw} = F_{DL} + Adjusted F_{uw} (offset for Δf = 15 kHz)	2117.5975 MHz	2162.4025 MHz

7.6.3A.2.4.3 Message Contents

Same message contents as in clause 7.6.3.4.3.

7.6.3A.2.5 Test Requirement

Same test requirement as in clause 7.6.3A.1.5 with the following exceptions:

- Instead of Table 7.6.3A.1.5-1 → use Table 7.6.3A.2.5-1.

Table 7.6.3A.2.5-1: Narrow-band blocking

Parameter	Unit	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		16	16			
P_{uw} (CW)	dBm	-55	-55			
F_{uw} (offset for Δf = 15 kHz)	MHz	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2			
F_{uw} (offset for Δf = 7.5 kHz)	MHz					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5.
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The F_{uw} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor \lvert F_{uw}(\text{offset for } \Delta f = 15\,\text{kHz}) \rvert / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.6.3A.2.5-1 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3A.3 Narrow band blocking for CA (inter-band DL CA without UL CA)

7.6.3A.3.1 Test Purpose

Same test purpose as 7.6.3A.1.

7.6.3A.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 2DL CA with FDD-TDD inter-band CA.

7.6.3A.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.3A.0.

7.6.3A.3.4 Test Description

7.6.3A.3.4.1 Initial Conditions

Same initial conditions as in clause 7.6.3A.1.4.1 with the following exceptions:

- Instead of Table 5.4.2A.1-1→ use Table 5.4.2A.1-2.
- instead of Table 7.6.3A.1.4.1-1 → use Table 7.6.3A.3.4.1-1.
- Instead of clause 7.6.3A.1.4.3 → use clause 7.6.3A.3.4.3.

Table 7.6.3A.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1		NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2		A: Mid range for PCC and SCC				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE		Highest N_{RB_agg} for PCC and SCC				
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**			**UL Allocation**	
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC N_{RB_alloc}**
50	50	QPSK	50	50	QPSK	50
50	50	QPSK	50	50	QPSK	25
50	50	QPSK	50	50	QPSK	20
50	50	QPSK	50	50	QPSK	16
50	75	QPSK	50	75	QPSK	25
50	100	QPSK	50	100	QPSK	50
50	100	QPSK	50	100	QPSK	25
50	100	QPSK	50	100	QPSK	20
50	100	QPSK	50	100	QPSK	16
75	25	QPSK	75	25	QPSK	75
75	25	QPSK	75	25	QPSK	20
75	50	QPSK	75	50	QPSK	25
75	75	QPSK	75	75	QPSK	25
75	100	QPSK	75	100	QPSK	25
100	50	QPSK	100	50	QPSK	100
100	50	QPSK	100	50	QPSK	75
100	50	QPSK	100	50	QPSK	50
100	75	QPSK	100	75	QPSK	100
100	75	QPSK	100	75	QPSK	50
100	100	QPSK	100	100	QPSK	100
100	100	QPSK	100	100	QPSK	75
100	100	QPSK	100	100	QPSK	50
100	100	QPSK	100	100	QPSK	45
100	100	QPSK	100	100	QPSK	25
100	100	QPSK	100	100	QPSK	20

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.

Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.3.5-2 for UE supporting one uplink carrier is tested per Test CA configuration.

Note 3: The UL resource blocks shall be located as close as possible to the downlink PCC but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).

Note 4: The frequencies of PCC and SCC shall be switched and tested in each configuration, according to the UE declared capability for UL support (within CA operation) in the individual bands. (given UL is supported in PCC band as per Table 5.2-1).

7.6.3A.3.4.2 Test Procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3A.3.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below the SCC according to Table 7.6.3A.3.5-1.
7. Set the downlink signal level according to the table 7.6.3A.3.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3A.3.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput of SCC for duration sufficient to achieve statistical significance according to Annex G.2.
9. Repeat steps from 6 to 8, using an interfering signal above the SCC at step 6.

7.6.3A.3.4.3 Message Contents

Same message contents as in clause 7.6.3.4.3.

7.6.3A.3.5 Test Requirement

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the narrow-band blocking requirements are defined with the uplink active on the band other than the band whose downlink is being tested, i.e. the requirements are tested only for the SCell downlink. The UE shall meet the requirement for each component carrier, when operated as SCell, while both downlink carriers are active.

The throughput measured during the test procedure for each component carrier, when operated as SCell, shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.6.3A.3.5-1 (originated from the single carrier Table 7.6.3.5-1).

Table 7.6.3A.3.5-1: Narrow-band blocking

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz from SCC)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz from SCC)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.6.3A.3.5-1 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3A.4 Narrow band blocking for CA (intra-band non-contiguous DL CA without UL CA)

7.6.3A.4.1 Test Purpose

Same as in clause 7.6.3A.1.1.

7.6.3A.4.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA but no UL CA.

7.6.3A.4.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.3A.0.

7.6.3A.4.4 Test description

7.6.3A.4.4.1 Initial Conditions

Same as in clause 7.6.3A.1.4.1 with the following exceptions:

- Instead of Table 7.6.3A.1.4.1-1→ use Table 7.6.3A.4.4.1-1.

Table 7.6.3A.4.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1				NC			
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2				A: N/A (Range is not relevant)			
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.				Refer to test point			
Test Parameters for CA Configurations							
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC RB allocations (L_{CRB} @ RB_{start})**

Test Parameters for CA_2A-2A Configurations							
1	100	25	35	QPSK	100+25	QPSK	P_16@57
2	100	100	20	QPSK	100+100	QPSK	P_16@57
Test Parameters for CA_3A-3A Configurations							
3	100	25	50	QPSK	100+25	QPSK	P_16@50
4	100	25	15	QPSK	100+25	QPSK	P_32@68
5	100	100	35	QPSK	100+100	QPSK	P_16@50
Test Parameters for CA_4A-4A Configurations							
6	50	25	30	QPSK	50+25	QPSK	P_50@0
7[4]	50	50	25	QPSK	50+50	QPSK	P_50@0
8[3]	100	25	20	QPSK	100+25	QPSK	P_100@0
9[3]	100	100	5	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_5A-5A Configurations							
10	50	25	10	QPSK	50+25	QPSK	P_12@38
11	50	50	5	QPSK	50+50	QPSK	P_12@38
Test Parameters for CA_7A-7A Configurations							
12	100	75	35	QPSK	100+75	QPSK	P_36@64
13	100	75	15	QPSK	100+75	QPSK	P_50@50
14	100	100	30	QPSK	100+100	QPSK	P_32@68
15	100	100	15	QPSK	100+100	QPSK	P_45@55
Test Parameters for CA_23A-23A Configurations							
16	50	25	5	QPSK	50+25	QPSK	P_50@0
Test Parameters for CA_25A-25A Configurations							
17	50	25	50	QPSK	50+25	QPSK	P_10@33
18	50	25	15	QPSK	50+25	QPSK	P_32@18
19[3]	50	50	45	QPSK	50+50	QPSK	P_10@33
20[3]	50	50	10	QPSK	50+50	QPSK	P_32@18
21[4]	100	25	40	QPSK	100+25	QPSK	P_12@62
22[4]	100	100	25	QPSK	100+100	QPSK	P_12@62
Test Parameters for CA_41A-41A Configurations							
23[4]	100	25	169	QPSK	100+25	QPSK	P_100@0
24[3]	100	50	164	QPSK	100+50	QPSK	P_100@0
25	100	100	154	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_42A-42A Configurations							
26	100	25	175	QPSK	100+25	QPSK	P_100@0
27	100	100	160	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_66A-66A Configurations							
28	100	25	65	QPSK	100+25	QPSK	P_100@0
29	100	100	50	QPSK	100+100	QPSK	P_100@0

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.

Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.

Note 3: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration

Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration

7.6.3A.4.4.2 Test Procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.3A.4.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3A.4.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
6. Set the parameters of the signal generator for the interfering signal below the PCC according to Tables 7.6.3A.4.5-1.
7. Set the downlink signal level for PCC and SCC according to the table 7.6.3.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3A.4.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using the interfering signal above the PCC at step 6.
10. Repeat the steps from 6 to 9, using the interferer signal to the SCC.

7.6.3A.4.4.3 Message Contents

Same message contents as in clause 7.6.3.4.3.

7.6.3A.4.5 Test Requirement

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the narrow band blocking requirements are defined with the uplink configuration of the PCC being in accordance with Table 7.3A.0-3. The UE shall meet the requirements specified in table 7.6.3A.4.5-1 for each component carrier while both downlink carriers are active. The requirements for each component carrier are the same as single carrier requirements in Table 7.6.3.5-1.

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.6.3A.4.5-1.

Table 7.6.3A.4.5-1: Narrow-band blocking

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.6.3A.4.5-1 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3A.5 Narrow band blocking for 3DL CA

7.6.3A.5.1 Test Purpose

Same test purpose as 7.6.3A.1.

7.6.3A.5.2 Test Applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support 3DL with Intra-band contiguous CA or 3DL with Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 3DL with FDD-TDD CA.

7.6.3A.5.3 Minimum Conformance Requirements

Same as in clause 7.6.3A.1.

7.6.3A.5.4 Test Description

7.6.3A.5.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.3A.5.4.1-1 through table 7.6.3A.5.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.3A.5.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3)	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc	UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for a CA_XD Configuration (Intra-band contiguous)												
1	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	X	Mid/CC3	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA Configuration (Inter-band)												
1	X	Mid	REFSENS	All RBs	Y	Mid	N/A	All RBs	Z	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Z	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XB-YA and CA_XC-YA Configuration (Intra-band contiguous + Inter-band)												
1	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	All RBs	X	Mid/CC2	N/A	All RBs	Y	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
4	Y	Mid	REFSENS	All RBs	X	Mid/CC1	N/A	All RBs	X	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
Default Test Settings for CA_XA-YB and CA_XA-YC Configuration (Intra-band contiguous + Inter-band)												
1	Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
2	Y	Mid/CC1	REFSENS	All RBs	Y	Mid/CC2	N/A	All RBs	X	Mid	N/A	All RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
3	X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
4	X	Mid	REFSENS	All RBs	Y	Mid/CC1	N/A	All RBs	Y	Mid/CC2	N/A	All RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band contiguous:** X corresponds to the band in the CA Configuration. E.g. for CA_41D, X=41
Note 5: **Inter-band:** X,Y,Z correspond to the 1st, 2nd and 3rd band in the CA Configuration. E.g. for CA_1A-3A-19A, X=1, Y=3, Z=19
Note 6: **Intra-band contiguous + Inter-band:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1C-3A, X=1 and Y=3
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 9: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.6.3A.5.4.1-2: Test Configuration Table with W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	X	CC2	REFSENS	All RBs	Max	X	CC1	N/A	All RBs	-	Y	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	Y	Mid	REFSENS	All RBs	-	X	CC2	N/A	All RBs	Max	X	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Default Test Settings for CA_XA-YA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	Y	CC2	REFSENS	All RBs	Max	Y	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	X	Mid	REFSENS	All RBs	-	Y	CC2	N/A	All RBs	Max	Y	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Test Settings for CA_29A-66A-66A Configuration (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	29	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
Test Settings for a CA_41C-41A Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	41	CC3	100@0	All RBs	134.2	41	CC2	N/A	All RBs	-	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_41A-41C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
2	41	CC3	100@0	All RBs	-	41	CC2	N/A	All RBs	134.2	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Group Test Settings for CA_66A-66A-XA or CA_XA-66A-66A Configurations (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
2	X	Mid	REFSENS	All RBs	-	66	CC1	N/A	All RBs	50	66	CC2	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_66A-66C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	66	CC1	100@0	All RBs	30.2	66	CC2	N/A	All RBs	-	66	CC3	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.

Note 2: **Intra-band non-contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.

Note 3: **Intra-band non-contiguous + Intra-band contiguous:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.

Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.

Note 5: **Intra-band non-contiguous + Inter-band:** X and Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A,X=2,Y=5

Note 6: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A,X=41.

Note 7: **Intra-band non-contiguous + Inter-band:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.

Note 8: **Intra-band non-contiguous + Intra-band contiguous:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RE allocation for reference sensitivity according to table 7.3.5-2.

Note 9: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.3A.5.4.1-1 through Table 7.6.3A.5.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.3A.5.4.3.

7.6.3A.5.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.3A.5.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3A.5.4.1-1 through Table 7.6.3A.5.4.1-5 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3A.5.4.1-1 through Table 7.6.3A.5.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6.3A.5.4.2-1.
7. Set the downlink signal level according to the table 7.6.3A.5.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3A.5.4.2-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput for the carrier(s) indicated in Table 7.6.3A.5.4.2-1 for duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to Table 7.6.3A.5.4.2-1 at step 6.
10. Repeat steps 1 to 9 for component carriers listed in Table 7.6.3A.5.4.2-1.

Table 7.6.3A.5.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2	7.6.3A.5.5-1
	2		
Inter-band	1	SCC1	7.6.3A.5.5-2
		SCC2	
	2	SCC1	
		SCC2	
	3	SCC1	
		SCC2	
Intra-band contiguous + Inter-band	1	SCC2	7.6.3A.5.5-2
	2		
	3	SCC1, SCC2	7.6.3A.5.5-1
	4		
Intra-band non-contiguous + Inter-band	1	SCC2	7.6.3A.5.5-2
	2	SCC1,	7.6.3A.5.5-2
		SCC2	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.6.3A.5.5-2
		SCC1, SCC2	7.6.3A.5.5-1
	2	SCC2	7.6.3A.5.5-2
		PCC, SCC1	7.6.3A.5.5-1

Note 1: Test point ID for the particular CA configuration as defined in section 7.6.3A.5.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.6.3A.5.4.3 Message Contents

Same message contents as in clause 7.6.3.4.3 for without UL CA.

Same message contents as in clause 7.6.3A.1.4.3 for UL CA.

7.6.3A.5.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table Tables below, according to the type of CA.

Table 7.6.3A.5.5-1: Narrow-band blocking (intra-band contiguous)

Parameter	Unit	CA Bandwidth Class				
		B	C	D	E	F

Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		16	16[4]	16		
P_{uw} (CW)	dBm	-55	-55	-55		
F_{uw} (offset for Δf = 15 kHz)	MHz	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2		
F_{uw} (offset for Δf = 7.5 kHz)	MHz					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5.						
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						
Note 3: The F_{uw} (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor \lvert F_{uw}(\text{offset for } \Delta f = 15\,\text{kHz}) \rvert / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.						
Note 4: The requirement is applied for the band combinations whose component carriers' BW≥5 MHz.						

Table 7.6.3A.5.5-2: Narrow-band blocking (inter-band, intra-band non-contiguous)

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w for each CC	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz from SCC)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz from SCC)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.							

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.6.3A.5.5-1 and 7.6.3A.5.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3A.6

7.6.3A.7 Narrow band blocking for 4DL CA

7.6.3A.7.1 Test Purpose

Same test purpose as 7.6.3A.1.

7.6.3A.7.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 4DL with TDD Intra-band contiguous CA, or 4DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support4DL Intra-band non-contiguous CA + Inter-band CA or 4DL Intra-band non-contiguous + Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 4DL CA with FDD-TDD CA.

7.6.3A.7.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.3A.0.

7.6.3A.7.4 Test Description

7.6.3A.7.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.3A.7.4.1-1 through table 7.6.3A.7.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.3A.7.4.1-1: Test Configuration Table

Initial Conditions																
Test Environment as specified in TS 36.508 [7] subclause 4.1					NC											
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.					For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns											
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.					Refer to “PCC NRB” and “SCCs NRB” columns											
Network signalling value					NS_01 by default											
Test Parameters for CA Configurations																
ID	**PCC**				**SCC1**				**SCC2**				**SCC3**			
	Band	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**	
	UL MOD	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**
Default Test Settings for a CA_XE Configuration (Intra-band contiguous)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA Configuration (Inter-band)																
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XB-YA-ZA and CA_XC-YA-ZA Configuration (Intra-band contiguous + Inter-band)																

Default Test Settings for CA_YA-XB-ZA and CA_YA-XC-ZA Configuration (Intra-band contiguous + Inter-band) Default Test Settings for CA_YA-ZA-XB and CA_YA-ZA-XC Configuration (Intra-band contiguous + Inter-band)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
Default Test Settings for CA_XC-YC Configuration (Intra-band contiguous + Inter-band(2))																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
3	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41E, X=41.
Note 6: **Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-8A,X=1,Y=3,Z=7,R=8.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.6.3A.7.4.1-2: Test Configuration Table with Wgap

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc		UL MOD	DL MOD	ULalloc	DLalloc
Default Test Settings for CA_XA-XA-YA-ZA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-XA-XA-ZA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																			
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REFSENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XD/XD-XA/XC-XC Configurations (Intra-band non-contiguous + Intra-band contiguous)																			
TBD																			
Default Test Settings for CA_XA-XA-YA-YA Configurations (Intra-band non-contiguous + Intra-band non-contiguous)																			
1	X	CC4	REFSENS	ALL RBs	Max	X	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	CC4	REFSENS	ALL RBs	Max	Y	CC3	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

Note 1:	CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2:	Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3:	If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4:	**Intra-band non-contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-12A,X=2,Y=4,Z=12.
Note 5:	**Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A-41A,X=41.
Note 6:	**Intra-band non-contiguous + Intra-band non-contiguous:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-4A,X=2,Y=4.
Note 7:	REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8:	**Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.3A.7.4.1-1 through Table 7.6.3A.7.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.3A.7.4.3.

7.6.3A.7.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.3A.7.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3A.7.4.1-1 through Table 7.6.3A.7.4.1-6 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3A.7.4.1-1 through Table 7.6.3A.7.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6.3A.7.4.2-1.
7. Set the downlink signal level according to the table 7.6.3A.7.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3A.7.4.2-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput for the carrier(s) indicated in Table 7.6.3A.7.4.2-1 for duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to Table 7.6.3A.7.4.2-1 at step 6.
10. Repeat steps 1 to 9 for component carriers listed in Table 7.6.3A.7.4.2-1.

Table 7.6.3A.7.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3	7.6.3A.7.5-1
	2		
Inter-band	1	SCC1	7.6.3A.7.5-2
		SCC2	
		SCC3	
	2	SCC1	
		SCC2	
		SCC3	
	3	SCC1	
		SCC2	
		SCC3	
	4	SCC1	
		SCC2	
		SCC3	
Intra-band contiguous + Inter-band	1	SCC2 SCC3	7.6.3A.7.5-2
	2		
	3	SCC1, SCC2, SCC3	7.6.3A.7.5-1
	4		
	5	SCC1, SCC2, SCC3	7.6.3A.7.5-1
	6		
Intra-band contiguous + Inter-band(2)	1	SCC2 SCC3	7.6.3A.7.5-1
	2		
	3		
	4		
Intra-band non-contiguous + Inter-band	1	SCC2, SCC3	7.6.3A.7.5-2
	2	SCC1,	7.6.3A.7.5-2
		SCC2	
		SCC3	
	3	SCC1	7.6.3A.7.5-2
		SCC2	
		SCC3	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.6.3A.7.5-2
		SCC1, SCC2, SCC3	7.6.3A.7.5-1
	2	SCC2	7.6.3A.7.5-2
		PCC, SCC1, SCC3	7.6.3A.7.5-1
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC2	7.6.3A.7.5-2
		SCC3	
	2	SCC2	
		SCC3	

Note 1: Test point ID for the particular CA configuration as defined in section 7.6.3A.7.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.

7.6.3A.7.4.3 Message Contents

Same message contents as in clause 7.6.3.4.3 for without UL CA.

Same message contents as in clause 7.6.3A.1.4.3 for UL CA.

7.6.3A.7.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table Tables below, according to the type of CA.

Table 7.6.3A.7.5-1: Narrow-band blocking (intra-band contiguous)

Parameter	Unit	CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		16	16[4]	16	16	
P_{uw} (CW)	dBm	-55	-55	-55	-55	
F_{uw} (offset for Δf = 15 kHz)	MHz	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	
F_{uw} (offset for Δf = 7.5 kHz)	MHz					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.						
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						
Note 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer}/0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.						
Note 4: The requirement is applied for the band combinations whose component carriers' BW≥5 MHz.						

Table 7.6.3A.7.5-2: Narrow-band blocking (inter-band, intra-band non-contiguous)

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w for each CC	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz from SCC)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz from SCC)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.							

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.6.3A.7.5-1 and 7.6.3A.7.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3A.8 Narrow band blocking for 5DL CA

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration tables are undefined.
- Initial conditions and test procedure are still undefined.
- Parameters of the CW signal generator are undefined.

7.6.3A.8.1 Test Purpose

Same test purpose as 7.6.3A.1.

7.6.3A.8.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 5DL with TDD Intra-band contiguous CA, or 5DL with Inter-band CA, or 5DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA, or 5DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 5DL CA with FDD-TDD CA.

7.6.3A.8.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.3A.0.

7.6.3A.8.4 Test Description

7.6.3A.8.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.3A.8.4.1-1 through table 7.6.3A.8.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.3A.8.4.1-1: Test Configuration TableInitial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC N_{RB}” and “SCCs N_{RB}” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3				SCC4			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for a CA_XF Configuration (Intra-band contiguous)																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC5	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC5	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA-SA Configuration (Inter-band)																				
1	X	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	S	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest	N/A	QPSK		Highest	N/A	QPSK		Highest	N/A	QPSK		Highest	N/A	QPSK		Highest

				N_{RB}				N_{RB}				N_{RB}				N_{RB}				N_{RB}
Default Test Settings for CA_ XB-YA-ZA-RA and CA_XC-YA-ZA-RA Configuration (Intra-band contiguous + Inter-band (1)) **Default Test Settings for CA_ YA-ZA-RA-XB and CA_YA-ZA-RA-XC Configuration (Intra-band contiguous + Inter-band (1))**																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
7	R	Mid	REF SENS	ALL RBs	Z	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
8	R	Mid	REF SENS	ALL RBs	Z	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
Default Test Settings for CA_ XD-YA-ZA Configuration (Intra-band contiguous + Inter-band (2))																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

3	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
6	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
Default Test Settings CA_XB-YB-ZA, CA_XB-YC-ZA, CA_XC-YB-ZA, and CA_XC-YC-ZA Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band) **Default Test Settings CA_ZA-XB-YB, CA_ZA-XB-YC, CA_ZA-XC-YB, and CA_ZA-XC-YC Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band)**																			
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
3	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
4	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
6	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.

Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41F, X=41.
Note 6: **Inter-band:** X,Y,Z,R,S correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-20A-42A,X=1,Y=3,Z=7,R=20,S=42.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-28A-42C, X=1, Y=3, Z=28 and R=42.
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose the Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.6.3A.8.4.1-2: Test Configuration Table with W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to "Range" columns. For mapping within Band refer to "CC" columns
Test CC Combination setting (NRB_agg) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3				W_{gap} [MHz]	SCC4			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA-ZA-RA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-ZA-XA-XA-RA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-RA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																								
1	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REF SENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Z	Mid	REF SENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
4	R	Mid	REF SENS	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XA-YD Configurations (Intra-band non-contiguous + Intra-band contiguous)																								
1	Y	CC3	REF SENS	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}
2	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	-	Y	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}
Default Test Settings for CA_XA-XA-YA-ZA-ZA Configurations Intra-band non-contiguous + Intra-band non-contiguous																								
1	Z	CC2	REF SENS	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_ag}		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$		N/A	QPSK		$N_{RB_}$

				$_{g}$					$_{agg}$					$_{agg}$					$_{agg}$					$_{agg}$
2	X	CC2	REF SENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
3	Y	Mid	REF SENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	CC2	N/A	ALL RBs	Max	Z	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band non-contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-12A-66A,X=2,Y=5,Z=12,R=66.
Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X,Y corresponds to the band of the CA Configuration. E.g. for CA_5A-5A-66D,X=5,Y=66.
Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-66A-66A,X=2,Y=5,Z=66.
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_CC1} = N_{RB_CC2} for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.3A.8.4.1-1 through Table 7.6.3A.8.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.3A.8.4.3.

7.6.3A.8.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.6.3A.8.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3A.8.4.1-1 through Table 7.6.3A.8.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3A.8.4.1-1 through Table 7.6.3A.8.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6.3A.8.4.2-1.
7. Set the downlink signal level according to the table 7.6.3A.8.4.2-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3A.8.4.2-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. Measure the average throughput for the carrier(s) indicated in Table 7.6.3A.8.4.2-1 for duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to Table 7.6.3A.8.4.2-1 at step 6.
10. Repeat steps 1 to 9 for component carriers listed in Table 7.6.3A.8.4.2-1.

Table 7.6.3A.8.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3, SCC4	7.6.3A.8.5-1
	2		
Inter-band	1	SCC1	7.6.3A.8.5-2
		SCC2	
		SCC3	
		SCC4	
	2	SCC1	
		SCC2	
		SCC3	
		SCC4	
	3	SCC1	
		SCC2	
		SCC3	
		SCC4	
	4	SCC1	
		SCC2	
		SCC3	
		SCC4	
	5	SCC1	
		SCC2	
		SCC3	
		SCC4	
Intra-band contiguous + Inter-band (1)	1	SCC2	7.6.3A.8.5-2
		SCC3	
		SCC4	
	2	SCC2	
		SCC3	
		SCC4	
	3	SCC1,SCC2	7.6.3A.8.5-1
		SCC3	7.6.3A.8.5-2
		SCC4	
	4	SCC1,SCC2	7.6.3A.8.5-1
		SCC3	7.6.3A.8.5-2
		SCC4	
	5	SCC1	7.6.3A.8.5-2
		SCC2,SCC3	7.6.3A.8.5-1
		SCC4	7.6.3A.8.5-2
	6	SCC1	7.6.3A.8.5-2
		SCC2,SCC3	7.6.3A.8.5-1
		SCC4	7.6.3A.8.5-2
	7	SCC1	7.6.3A.8.5-2
		SCC2	
		SCC3,SCC4	7.6.3A.8.5-1
	8	SCC1	7.6.3A.8.5-2
		SCC2	
		SCC3,SCC4	7.6.3A.8.5-1
Intra-band contiguous + Inter-band (2)	1	SCC3	7.6.3A.8.5-2
		SCC4	
	2	SCC3	7.6.3A.8.5-2
		SCC4	
	3	SCC1,SCC2, SCC3	7.6.3A.8.5-1
		SCC4	7.6.3A.8.5-2
	4	SCC1,SCC2, SCC3	7.6.3A.8.5-1
		SCC4	7.6.3A.8.5-2
	5	SCC1	7.6.3A.8.5-2
		SCC2,SCC3,	7.6.3A.8.5-1

		SCC4	
	6	SCC1	7.6.3A.8.5-2
		SCC2,SCC3, SCC4	7.6.3A.8.5-1
Intra-band non-contiguous + Inter-band	1	SCC2	7.6.3A.8.5-2
		SCC3	
		SCC4	
	2	SCC1	
		SCC2	
		SCC3	
		SCC4	
	3	SCC1	
		SCC2	
		SCC3	
		SCC4	
	4	SCC1	
		SCC2	
		SCC3	
		SCC4	
Intra-band non-contiguous + Intra-band contiguous	TBD	TBD	TBD
Intra-band non-contiguous + Intra-band non-contiguous	TBD	TBD	TBD
Note 1: Test point ID for the particular CA configuration as defined in section 7.6.3A.8.4.1. Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on. Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.			

7.6.3A.8.4.3 Message Contents

Same message contents as in clause 7.6.3.4.3 for without UL CA.

Same message contents as in clause 7.6.3A.1.4.3 for UL CA.

7.6.3A.8.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table Tables below, according to the type of CA.

Table 7.6.3A.8.5-1: Narrow-band blocking (intra-band contiguous)

Parameter	Unit	CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		16	16[4]	16	16	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2	- F_{offset} – 0.2 / + F_{offset} + 0.2
F_{uw} (offset for Δf = 7.5 kHz)	MHz					
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. Note 3: The $F_{interferer}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the interferer and shall be further adjusted to $\lfloor F_{interferer} / 0.015 + 0.5 \rfloor 0.015 + 0.0075$ MHz to be offset from the sub-carrier raster. Note 4: The requirement is applied for the band combinations whose component carriers' BW≥5 MHz.						

Table 7.6.3A.8.5-2: Narrow-band blocking (inter-band, intra-band non-contiguous)

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w for each CC	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz from SCC)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz from SCC)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.							

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B, 7.3.3-1C and 7.3.3-1D, P_{uw} power defined in Table 7.6.3A.8.5-1 and 7.6.3A.8.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B, 7.3.3-1C and 7.3.3-1D.

7.6.3B Narrow band blocking for UL-MIMO

7.6.3B.1 Test Purpose

Narrow band blocking for UL-MIMO is defined for an unwanted CW interfering signal falling near the UE that supports UL-MIMO receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels,

The lack of narrow-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.3B.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

7.6.3B.3 Minimum Conformance Requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in clause 7.6 shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

7.6.3B.4 Test Description

7.6.3B.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.3B.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.6.3B.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] clause 4.1	NC					
Test Frequencies as specified in TS 36.508 [7] clause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] clause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD	TDD		FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth.						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.30.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1
4. The UL and DL Reference Measurement channels are set according to Table 7.6.3B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.6.3B.4.3.

7.6.3B.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 7.6.3B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.3B.5-1.

4. Set the downlink signal level according to the table 7.6.3B.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3B.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement and the UE output power is mean sum power of each antenna connector for UE.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 3.

7.6.3B.4.3 Message Contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception.

Table 7.6.3B.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.3B.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.6.3B.5-1.

Table 7.6.3B.5-1: Narrow-band blocking

Parameter	**Unit**	**Channel Bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
P_w	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.6.3B.5-1 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3D Narrow band blocking for ProSe

7.6.3D.0 Minimum conformance requirements

The relative throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Table 7.6.3D.0-1 and Table 7.6.3D.0-2.

Table 7.6.3D.0-1: Narrow-band blocking for ProSe Direct Discovery

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w	dBm	$P_{REFSENS_ProSe}$ + channel-bandwidth specific value below + P_{offset}					
				16	13	14	16
P_{uw} (CW)	dBm			-55	-55	-55	-55
P_{offset}	dB			10.9	13.9	15.7	16.9
F_{uw} (offset for Δf = 15 kHz)	MHz			2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

Table 7.6.3D.0-2: Narrow-band blocking for ProSe Direct Communication

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w	dBm	$P_{REFSENS_ProSe}$ + channel-bandwidth specific value below					
				16	13	14	16
P_{uw} (CW)	dBm			-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz			2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

For the UE which supports inter-band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{UW} power defined in Table 7.6.3D.0-1 and Table 7.6.3D.0-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

The normative reference for this requirement is TS 36.101 [2] clause 7.6.3.1D.

7.6.3D.1 Narrow band blocking for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Use of OCNG for Downlink has not been considered and is still FFS.
- Message exceptions content needs further investigation (some values still TBD).
- Test time is FFS.

7.6.3D.1.1 Test Purpose

Narrow-band blocking verifies the receiver's ability to receive a E-UTRA signal at its assigned channel frequency in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

7.6.3D.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

7.6.3D.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.3D.0.

7.6.3D.1.4 Test Description

7.6.3D.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA ProSe bands specified in table 5.4.2D.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.3D.1.4.1-1. The details of the downlink, uplink and sidelink reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.6.

Table 7.6.3D.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range(Note 4)					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, Highest					
	Downlink Configuration (Note 2)		**Uplink Configuration (Note 2)**		**Sidelink Configuration (Reception) (Note 3)**	
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Mod'n	RB allocation
5MHz	QPSK	8	QPSK	8	QPSK	2
10MHz	QPSK	16	QPSK	16	QPSK	2
15MHz	QPSK	25	QPSK	25	QPSK	2
20MHz	QPSK	30	QPSK	30	QPSK	2
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA ProSe and Operating band, according to the applicability specified respectively in Table 5.4.2D.1-1 and Table 5.4.2.1-1.						
Note 2: After DRX configuration, DL-RMC (PDSCH) and DCI-0 for scheduling UL-RMC (PUSCH) are applied only in the DRX On subframes.						
Note 3: The RB start for the transmission of Sidelink RMC is RB#0.						
Note 4: Sidelink uses the frequencies defined for Uplink.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.71.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.3D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 7.6.1D.1.4.3.
7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

7.6.1D.1.4.2 Test Procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 7.6.3D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Initialise the variables Ptot and Pok as 0.
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.3D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.3D.1.4.1-1. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.

6. SS transmits PSDCH to transmit the SL RMC according to Table 7.6.3D.1.4.1-1. Set the Sidelink signal level to the appropriate value defined in Table 7.6.3D.1.5-1.

7. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.3D.1.5-1.

8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable Ptot.

10. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".

11. SS calculates the variable Pok as (current counter value - counter value at last test iteration).

12. SS shall compute the throughput as following:

    TP = Pok / Ptot * 100%

13. Repeat steps from 6 to 12, using an interfering signal above the wanted signal in step 7.

7.6.1D.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 7.6.3D.1.4.3-1: ACTIVATE TEST MODE: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 7.6.3D.1.4.3-2: CLOSE UE TEST LOOP: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 7.6.3D.1.4.3-3: MAC-MainConfig-RBC: Reference sensitivity for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

7.6.3D.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Tables 7.6.3D.1.5-1.

Table 7.6.3D.1.5-1: Narrow-band blocking for ProSe Direct Discovery

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w	dBm	$P_{REFSENS_ProSe}$ + channel-bandwidth specific value below + P_{offset}					
				16	13	14	16
P_{uw} (CW)	dBm			-55	-55	-55	-55
P_{offset}	dB			10.9	13.9	15.7	16.9
F_{uw} (offset for Δf = 15 kHz)	MHz			2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.6.1D.1.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.6.3D.2 Narrow band blocking for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test description is TBD

7.6.3D.2.1 Test Purpose

Same test purpose as in clause 7.6.3D.1.1.

7.6.3D.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

7.6.3D.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6.3D.0.

7.6.3D.2.4 Test Description

TBD

7.6.3D.2.5 Test Requirement

Same test requirement as in clause 7.6.3D.1.5 with the following exceptions:

- Instead of Table 7.6.3D.1.5-1 → use Table 7.6.3D.2.5-1.

Table 7.6.3D.2.5-1: Narrow-band blocking for ProSe Direct Communication

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w	dBm	$P_{REFSENS_ProSe}$ + channel-bandwidth specific value below					
				16	13	14	16
P_{uw} (CW)	dBm			-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz			2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

7.6.3E Narrow band blocking for UE category 0

7.6.3E.1 Test Purpose

Same test purpose as in clause 7.6.3.

7.6.3E.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward of UE category 0.

7.6.3E.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.6.3.3.

7.6.3E.4 Test Description

7.6.3E.4.1 Initial Conditions

Same initial conditions as in clause 7.5.4.1 with the following exceptions:

- Instead of Table 7.6.3.4.1-1 → use Table 7.6.3E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.5 using only main UE Tx/Rx antenna.

Table 7.6.3E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation	
		FDD and HD-FDD	TDD		FDD and HD-FDD	TDD
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	14	14	QPSK	15	15
5MHz	QPSK	14	14	QPSK	25	25
5MHz	QPSK	14	N/A	QPSK	20	N/A
10MHz	QPSK	14	14	QPSK	36	36
10MHz	QPSK	14	N/A	QPSK	25	N/A
10MHz	QPSK	14	N/A	QPSK	20	N/A
15MHz	QPSK	14	14	QPSK	36	36
15MHz	QPSK	14	N/A	QPSK	20	N/A
20MHz	QPSK	14	14	QPSK	36	36
20MHz	QPSK	14	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3E.3-3 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Downlink RB position shall be RB_{start} = 0						

7.6.3E.4.2 Test Procedure

Same test procedure as in clause 7.6.3.4.2

7.6.3E.4.3 Message Contents

Same message contents as in clause 7.6.3.4.3

7.6.3E.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in clause A.3.2 with parameters specified in Table 7.6.3E.5-1.

Table 7.6.3E.5-1: Narrow-band blocking

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
P_w	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
Note 1: The transmitter shall be set a 4 dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5E.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in clauses A.5.1.1/A.5.2.1.							

7.6.3EA Narrow band blocking for UE Category M1

7.6.3EA.1 Test Purpose

Verifies a receiver's ability to receive an E-UTRA signal at its assigned channel frequency in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other e-NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6.3EA.2 Test Applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category M1.

7.6.3EA.3 Minimum Conformance Requirements

The relative throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3EA.3-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.6.3EA.3-1: Narrow-band blocking

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
NOTE 1: The transmitter shall be set a 4 dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in subclause 6.2.5EA.							
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
NOTE 3: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2should be used as $P_{REFSENS}$ for P_w.							
NOTE 4: For DL category M1 UE, the parameters for the applicable channel bandwidth apply.							

The normative reference for this requirement is TS 36.101 [2] clause 7.6.3.

7.6.3EA.4 Test Description

7.6.3EA.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for CAT M1 in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.6.1EA.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Table 7.6.3EA.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz						
Test Parameters for Channel Bandwidths and Narrowband positions							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation		
		FDD	TDD		FDD and HD-FDD	TDD	Narrowband index (Note 1)
5MHz	QPSK	4	4	QPSK	6	6	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.5 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1

4. The UL and DL Reference Measurement channels are set according to Table 7.6.3EA.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.6.3EA.4.3.

7.6.3EA.4.2 Test Procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 7.6.1EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The SS sends one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.

2. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 7.6.3EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the CW signal generator for an interfering signal below the wanted signal according to Table 7.6.3EA.5-1.

4. Set the downlink signal level according to the table 7.6.3EA.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.6.3EA.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 3.

7.6.3EA.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the condition CEModeA and the following exception.

Table 7.6.3EA.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-UE-PUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.6.3EA.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.6.3EA.5-1.

Table 7.6.3EA.5-1: Narrow-band blocking

Parameter	Unit	Channel Bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_w	dBm	$P_{REFSENS}$ + channel-bandwidth specific value below					
		22	18	16	13	14	16
P_{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for Δf = 15 kHz)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for Δf = 7.5 kHz)	MHz						
NOTE 1: The transmitter shall be set a 4 dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in subclause 6.2.5EA.							
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
NOTE 3: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2 should be used as $P_{REFSENS}$ for P_w.							
NOTE 4: For DL category M1 UE, the parameters for the applicable channel bandwidth apply.							

7.7 Spurious response

7.7.1 Test Purpose

Spurious response verifies the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6.2 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7.2 Test Applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.7.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.7.3-1 and 7.7.3-2. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.7.3-1: Spurious response parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1:The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. Note 3: The REFSENS power level is specified in Table 7.3.3-1 and Table 7.3.3-1a for two and four antenna ports, respectively.							

Table 7.7.3-2: Spurious Response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Table 7.3.3-1A, P_{uw} power defined in Table 7.7.3-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A.

The normative reference for this requirement is TS 36.101 [2] clause 7.7.

7.7.4 Test Description

7.7.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2.4.1 in order to test spurious responses obtained in clause 7.6.2 under the same conditions.

7.7.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2.4.2.

4. Set the downlink signal level according to the table 7.7.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.7.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.

5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.7.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.7.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.7.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.7.5-1 and 7.7.5-2.

Table 7.7.5-1: Spurious response parameters

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.7.5-2: Spurious Response

Parameter	**Unit**	**Level**
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.7.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7_1 Spurious response with 4 Rx antenna ports

7.7_1.1 Test Purpose

To verify the ability of UE that supports 4 Rx antenna ports to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6.2_2 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7_1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports.

7.7_1.3 Minimum Conformance Requirements

Same as in clause 7.7.3.

7.7_1.4 Test Description

7.7_1.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2_1.4.1 in order to test spurious responses obtained in clause 7.6.2_1 under the same conditions.

7.7_1.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2_1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2_1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7_1.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2_1.4.2.

4. Set the downlink signal level according to the table 7.7_1.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.7_1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.

5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.7_1.4.3 Message Contents

Same as in clause 7.7.4.3.

7.7_1.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.7_1.5-1 and 7.7_1.5-2.

Table 7.7_1.5-1: Spurious response parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: The REFSENS power level is specified in Table 7.3.3-1a.							

Table 7.7_1.5-2: Spurious Response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.7_1.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7A Spurious response for CA

7.7A.0 Minimum conformance requirements

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the spurious response requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The throughput measured in each downlink with $F_{interferer}$ in Table 7.6.2A.0-0 and Table 7.6.2A.0-0a at spurious response frequencies shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.7.3-1 and 7.7.3-2. The UE shall meet these requirements for each component carrier while all downlink carriers are active.

For inter-band carrier aggregation with one component carrier per operating band and the uplink active in two E-UTRA bands, the spurious response requirements applicable specified above shall be met with the transmitter power for the uplink set to 7 dB below $P_{CMAX_L,c}$ for each serving cell *c*.

For E-UTRA CA configurations including an operating band without uplink band or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink active in each band capable of UL operation. For E-UTRA CA configurations listed in Table 7.3A.0-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the spurious response requirements of subclause 7.7A.0 do not apply.

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall configure closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.7A.0-1 with the uplink configuration set according to Table 7.3A.0-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.3-2. The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.7A.0-1 and 7.7A.0-2. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements also apply for an SCC assigned in the unpaired part with parameters specified in Tables 7.7A.0-1 and 7.7A.0-2.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink sub-blocks, the spurious response requirements are defined with the uplink configuration in accordance with Table 7.3A.0-3. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclauses 7.7.3 and 7.7A.0 for one component carrier and two component carriers per sub-block, respectively. The requirements apply with all downlink carriers active.

For intra-band non-contiguous carrier aggregation with two uplink carriers and two downlink carriers, the spurious response requirements applicable specified above shall be met with the transmitter powers for the uplinks set to $P_{CMAX_L,c}$ – 7 dBm.

Table 7.7A.0-1: Spurious response parameters

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9	9	9	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.						
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						

Table 7.7A.0-2: Spurious response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For combinations of intra-band and inter-band carrier aggregation with up to five downlink carriers (up to two non-contiguously sub-blocks per band and up to four contiguously aggregated carriers per band) and one uplink carrier assigned to one E-UTRA band, the requirement is defined with the uplink active in a band other than that supporting the downlink(s) under test. The uplink configuration shall be in accordance with Table 7.3A.0-3 when the uplink is active in the band supporting two non-contiguous component carriers, Table 7.3A.0-1 when the uplink is active in a band supporting two contiguous component carriers and in accordance with Table 7.3.3-2 when the uplink is active in a band supporting one carrier per band. The downlink PCC shall be configured closer to the uplink operating band than the downlink SCC(s) when the uplink is active in band(s) supporting contiguous aggregation of up to four component carriers. For the two non-contiguous component carriers within the same band, P_{wanted} in Table 7.6.2A.0-0 is set using ΔR_{IBNC} = 0 dB for all sub-block gaps (Table 7.3A.0-3) while a band supporting contiguously aggregated carriers the out-of-band blocking parameters in Table 7.7.3-1 are replaced by those specified in Table 7.7A.0-1. For each downlink the UE shall meet the spurious-response requirements applicable for inter-band carrier aggregation with one component carrier per operating band but with up to three component carriers assigned to the same band. All downlink carriers shall be active throughout the tests and the requirements for the downlinks shall be met with the single uplink carrier active in each band capable of UL operation.

The normative reference for this requirement is TS 36.101 [2] clause 7.7.1A.

7.7A.1 Spurious response for CA (intra-band contiguous DL CA and UL CA)

7.7A.1.1 Test Purpose

Spurious response for CA verifies the receiver's ability to receive a wanted aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6.2A is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7A.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA and UL CA.

7.7A.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.1.4 Test Description

7.7A.1.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2A.1.4.1 in order to test spurious responses obtained in clause 7.6.2A.1 under the same conditions.

7.7A.1.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.7A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7A.1.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2A.1.4.2.

7. Set the downlink signal level according to the table 7.7A.1.5-1 for both carriers. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the throughput measurement:
   The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.7A.1.5-1 + 10log(P_L_{CRB}/N_{RB_alloc})), for carrier frequency $f \leq 3.0$GHz,
   or within (+0dB, -4 dB) of (target level in Table 7.7A.1.5-1 + 10log(P_L_{CRB}/N_{RB_alloc})) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.
   The SCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.7A.1.5-1 + 10log(S_L_{CRB}/N_{RB_alloc})), for carrier frequency $f \leq 3.0$GHz,
   or within (+0dB, -4 dB) of (target level in Table 7.7A.1.5-1 + 10log(S_L_{CRB}/N_{RB_alloc})) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

8. For each spurious frequency, measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.7A.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.7A.1.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

Table 7.7A.1.4.3-2: UplinkPowerControlDedicatedSCell-r10

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH-r10	0		
deltaMCS-Enabled-r10	en0		
accumulationEnabled-r10	TRUE		
pSRS-Offset-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
pSRS-OffsetAp-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
filterCoefficient-r10	fc8	larger filter length is used to reduce the RSRP measurement variation	
pathlossReferenceLinking-r10	sCell		
}			

7.7A.1.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.7A.1.5-1 and 7.7A.1.5-2.

Table 7.7A.1.5-1: Spurious response parameters

Rx Parameter	**Units**	**CA Bandwidth Class**				
		B	**C**	**D**	**E**	**F**
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9			
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5A for two uplink carriers.						
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						

Table 7.7A.1.5-2: Spurious response

Parameter	**Unit**	**Level**
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.7A.1.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7A.2 Spurious response for CA (intra-band contiguous DL CA without UL CA)

7.7A.2.1 Test Purpose

Same test purpose as in clause 7.7A.1.

7.7A.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous DL CA. This test case applies only for CA Configurations that do not support UL CA.

7.7A.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.2.4 Test Description

7.7A.2.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2A.2.4.1 in order to test spurious responses obtained in clause 7.6.2A.2 under the same conditions.

7.7A.2.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.2.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.2.4.1-1 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7A.1.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2A.2.4.2.
7. Set the downlink signal level according to the table 7.7A.1.5-1 for both carriers. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.7A.1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. For each spurious frequency, measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.7A.2.4.3 Message Contents

Same message contents as in clause 7.7.4.3.

7.7A.2.5 Test Requirement

Same test requirement as in clause 7.7A.1.5 with the following exceptions :

- Instead of Table 7.7A.1.5-1 → use Table 7.7A.2.5-1.

Table 7.7A.2.5-1: Spurious response parameters

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F

Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9			
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						

7.7A.3 Spurious response for CA (inter-band DL CA without UL CA)

7.7A.3.1 Test Purpose

Same test purpose as in clause 7.7A.1.

7.7A.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 2DL CA with FDD-TDD inter-band CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support DL LAA.

7.7A.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.3.4 Test Description

7.7A.3.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2A.3.4.1 in order to test spurious responses obtained in clause 7.6.2A.3 under the same conditions.

7.7A.3.4.2 Test Procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.3.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7A.3.5-2. The spurious frequencies are taken from records in the step 9 of test procedures in clause 7.6.2A.3.4.2.
7. Set the downlink signal level according to the table 7.7A.3.5-1 for both carriers. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.7A.3.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.
8. For each spurious frequency, measure the average throughput of SCC for duration sufficient to achieve statistical significance according to Annex G.2.

7.7A.3.4.3 Message Contents

Same message contents as in clause 7.7.4.3.

7.7A.3.5 Test Requirement

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the spurious response requirements are defined with the uplink active on the band other than the band whose downlink is being tested i.e. the requirements are tested only for the SCell downlink. The UE shall meet the requirement for each component carrier, when operated as SCell, while both downlink carriers are active.

The throughput measured during the test procedure for each component carrier, when operated as SCell, shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.7A.3.5-1 (originated from the single carrier Table 7.7.5-1) and 7.7A.3.5-2 (originated from Table 7.6.2A.3.5-2).

Table 7.7A.3.5-1: Spurious response parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.7A.3.5-2: Spurious Response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.7A.3.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7A.4 Spurious response for CA (intra-band non-contiguous DL CA without UL CA)

7.7A.4.1 Test Purpose

Same test purpose as in clause 7.7A.1.

7.7A.4.2 Test Applicability

This test applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA without UL CA.

7.7A.4.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.4.4 Test Description

7.7A.4.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2A.4.4.1 in order to test spurious responses obtained in clause 7.6.2A.4 under the same conditions.

7.7A.4.4.2 Test Procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.7A.4.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.4.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.4.4.1-1 on PCC. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal below or above the wanted aggregated signal according to Table 7.7A.4.5-2. The spurious frequencies are taken from records in the step 9 of test procedures in clause 7.6.2A.4.4.2.
7. Set the downlink signal level according to the table 7.7A.4.5-1 for both carriers. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.7A.4.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. For each spurious frequency, measure the average throughput of each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.7A.4.4.3 Message Contents

Same message contents as in clause 7.7.4.3.

7.7A.4.5 Test Requirement

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the spurious response requirements are defined with the uplink configuration of the PCC being in accordance with Table 7.3A.0-3. The UE shall meet the requirements specified in tables 7.7A.4.5-1and 7.7A.4.5-2 for each component carrier while both downlink carriers are active.

The requirements for each component carrier are the same as single carrier requirements in Tables 7.7.5-1 and 7.7.5-2.

Table 7.7A.4.5-1: Spurious response parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.7A.4.5-2: Spurious Response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.7A.4.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7A.5 Spurious response for 3DL CA

7.7A.5.1 Test Purpose

Same test purpose as in clause 7.7A.1.

7.7A.5.2 Test Applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support 3DL with Intra-band contiguous CA or 3DL with Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 3DL with FDD-TDD CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 3DL CA involving Band 46.

7.7A.5.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.5.4 Test Description

7.7A.5.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2A.5.4.1 in order to test spurious responses obtained in clause 7.6.2A.5 under the same conditions.

7.7A.5.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.7A.5.4.3
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.5.4.1-1 through Table 7.6.2A.5.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.5.4.1-1 through Table 7.6.2A.5.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7A.5.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2A.5.4.2.
7. Set the downlink signal level according to the tables 7.7A.5.5-1 and 7.7A.5.5-3 for all carriers accordingly. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in corresponding tables 7.7A.5.5-1 and 7.7A.5.5-3 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. For each spurious frequency, measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.7A.5.4.3 Message Contents

Same message contents as in clause 7.7.4.3 for without UL CA.

Same message contents as in clause 7.7A.1.4.3 for UL CA.

7.7A.5.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

Table 7.7A.5.5-1: Spurious response parameters (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9	9		
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						

Table 7.7A.5.5-2: Spurious response (All types of CA)

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

Table 7.7A.5.5-3: Spurious response parameters (Inter-band, Intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. Note 3: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.							

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.7A.5.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7A.6

7.7A.7 Spurious response for 4DL CA

7.7A.7.1 Test Purpose

Same test purpose as in clause 7.7A.1.

7.7A.7.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 4DL with TDD Intra-band contiguous CA, or 4DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 4DL Intra-band non-contiguous CA + Inter-band CA or 4DL Intra-band non-contiguous + Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 4DL CA with FDD-TDD.

7.7A.7.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.7.4 Test Description

7.7A.7.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2A.7.4.1 in order to test spurious responses obtained in clause 7.6.2A.7 under the same conditions.

7.7A.7.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.7A.7.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.7.4.1-1 through Table 7.6.2A.7.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.7.4.1-1 through Table 7.6.2A.7.4.1-2 on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7A.7.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2A.7.4.2.
7. Set the downlink signal level according to the tables 7.7A.7.5-1 and 7.7A.7.5-3 for all carriers accordingly. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in corresponding tables 7.7A.7.5-1 and 7.7A.7.5-3 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. For each spurious frequency, measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.7A.7.4.3 Message Contents

Same message contents as in clause 7.7.4.3 for without UL CA.

Same message contents as in clause 7.7A.1.4.3 for UL CA.

7.7A.7.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

Table 7.7A.7.5-1: Spurious response parameters (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9	9	9	

Note 1:	The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.
Note 2:	Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.

Table 7.7A.7.5-2: Spurious response (All types of CA)

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

Table 7.7A.7.5-3: Spurious response parameters (Inter-band, Intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. Note 3: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.							

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.7A.7.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7A.8 Spurious response for 5DL CA

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Initial conditions and test procedure are still undefined.
- Parameters of the CW signal generator are undefined.

7.7A.8.1 Test Purpose

Same test purpose as in clause 7.7A.1.

7.7A.8.2 Test Applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 5DL with TDD Intra-band contiguous CA, or 5DL with Inter-band CA, or 5DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA, or 5DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 5DL CA with FDD-TDD CA.

7.7A.8.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7A.0.

7.7A.8.4 Test Description

7.7A.8.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2A.8.4.1 in order to test spurious responses obtained in clause 7.6.2A.8 under the same conditions.

7.7A.8.4.2 Test Procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.7A.8.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2A.8.4.1-1 through Table FFS as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2A.8.4.1-1 through Table FFS on PCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7A.8.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2A.8.4.2.
7. Set the downlink signal level according to the tables 7.7A.8.5-1 and 7.7A.8.5-3 for all carriers accordingly. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in corresponding tables 7.7A.8.5-1 and 7.7A.8.5-3 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.
8. For each spurious frequency, measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex G.2A.

7.7A.8.4.3 Message Contents

Same message contents as in clause 7.7.4.3 for without UL CA.

Same message contents as in clause 7.7A.1.4.3 for UL CA.

7.7A.8.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table s below, according to the type of CA.

Table 7.7A.8.5-1: Spurious response parameters (Intra-band contiguous)

Rx Parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	9	9	9	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A. Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						

Table 7.7A.8.5-2: Spurious response (All types of CA)

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

Table 7.7A.8.5-3: Spurious response parameters (Inter-band, Intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz

Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							
Note 3: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.							

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B, 7.3.3-1C and 7.3.3-1D, P_{uw} power defined in Table 7.7A.8.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B, 7.3.3-1C and 7.3.3-1D.

7.7B Spurious response for UL-MIMO

7.7B.1 Test Purpose

Spurious response verifies the ability of the UE that support UL-MIMO to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6B.2 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7B.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

7.7B.3 Minimum Conformance Requirements

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in Clause 7.7.3 shall be met with the UL-MIMO configurations specified in Table 6.2.2B.3-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 36.101 [2] clause 7.7.1B.

7.7B.4 Test Description

7.7B.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6B.2.4.1 in order to test spurious responses obtained in clause 7.6B.2 under the same conditions.

7.7B.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 7.6B.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7B.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6B.2.4.2.

4. Set the downlink signal level according to the table 7.7B.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.7B.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.

5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.7B.4.3 Message Contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception.

Table 7.7B.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.7B.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.7B.5-1 and 7.7B.5-2.

Table 7.7B.5-1: Spurious response parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.7B.5-2: Spurious Response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, P_{uw} power defined in Table 7.7B.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7D Spurious response for ProSe

7.7D.0 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Tables 7.7.1D-1, 7.7.1D-2, and 7.7.1D-3.

Table 7.7D.0-1: Spurious response parameters for ProSe Direct Discovery

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below+ P_{offset}					
				6	6	7	9
P_{offset}	dB			10.9	13.9	15.7	16.9
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

Table 7.7D.0-2: Spurious response parameters for ProSe Direct Communication

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below					
				6	6	7	9
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

Table 7.7D.0-3: Spurious response for ProSe

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{interferer}$ power defined in Table 7.7D.0-3 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

The normative reference for this requirement is TS 36.101 [2] clause 7.7.1D.

7.7D.1 Spurious response for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Use of OCNG for Downlink has not been considered and is still FFS.
- Message exceptions content needs further investigation (some values still TBD).
- Test time is FFS.

7.7D.1.1 Test Purpose

Spurious response for ProSe verifies the receiver's ability to receive a wanted aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6.2D is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7D.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

7.7D.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7D.0.

7.7D.1.4 Test Description

7.7D.1.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2D.1.4.1 in order to test spurious responses obtained in clause 7.6.2D.1 under the same conditions.

7.7D.1.4.2 Test Procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 7.7D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Initialise the variables Ptot and Pok as 0.
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.6.2D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.6.2D.1.4.1-1. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.
6. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7D.1.5-2. The spurious frequencies are taken from records in step 12 of test procedures in clause 7.6.2D.1.4.2.
7. SS transmits PSDCH to transmit the SL RMC according to Table 7.6.2D.1.4.1-1. Set the Sidelink signal level to the appropriate value defined in Table 7.7D.1.5-1.
8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable Ptot.
9. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".
10. SS calculates the variable Pok as (current counter value - counter value at last test iteration).
11. SS shall compute the throughput as following:

    TP = Pok / Ptot * 100%

12. Repeat steps from 6 to 11 for all frequencies recorded in step 12 of the test procedure in clause 7.6.2D.1.4.2.

7.7D.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 7.7D.1.4.3-1: ACTIVATE TEST MODE: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 7.7D.1.4.3-2: CLOSE UE TEST LOOP: Reference sensitivity for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 7.7D.1.4.3-3: MAC-MainConfig-RBC: Reference sensitivity for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

7.7D.1.5 Test Requirement

The throughput measurement of each carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Table 7.7D.1.5-1 and 7.7D.1.5-2.

Table 7.7D.1.5-1: Spurious response parameters for ProSe Direct Discovery

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below+ P_{offset}					
				6	6	7	9
P_{offset}	dB			10.9	13.9	15.7	16.9
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

Table 7.7D.1.5-2: Spurious response for ProSe

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer}$ power defined in Table 7.7D.1.5-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.7D.2 Spurious response for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test procedure is TBD
- Message contents are TBD
- Test system uncertainties and test tolerances are TBD

7.7D.2.1 Test Purpose

Same test purpose as in clause 7.7D.1.

7.7D.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

7.7D.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7D.0.

7.7D.2.4 Test Description

7.7D.2.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2D.2.4.1 in order to test spurious responses obtained in clause 7.6.2D.2 under the same conditions.

7.7D.2.4.2 Test Procedure

TBD

7.7D.2.4.3 Message Contents

TBD

7.7D.2.5 Test Requirement

Same test requirement as in clause 7.7D.1.5 with the following exceptions:

- Instead of Table 7.7D.1.5-1 → use Table 7.7D.2.5-1.

Table 7.7D.2.5-1: Spurious response parameters for ProSe Direct Communication

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below					
				6	6	7	9
NOTE 1: Reference measurement channel is specified in Annex A.6.2.							

7.7E Spurious response for UE category 0

7.7E.1 Test Purpose

Same test purpose as in clause 7.7.1.

7.7E.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward of UE category 0.

7.7E.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.7.3.

7.7E.4 Test Description

7.7E.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2E.4.1 in order to test spurious responses obtained in clause 7.6.2E under the same conditions.

7.7E.4.2 Test Procedure

Same test procedure as in clause 7.7.4.2

7.7E.4.3 Message Contents

Same message contents as in clause 7.7.4.3

7.7E.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.7E.5-1 and 7.7E.5-2.

Table 7.7E.5-1: Spurious response parameters

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.7E.5-2: Spurious Response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

7.7EA Spurious response for UE category M1

7.7EA.1 Test Purpose

Spurious response verifies the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6.2EA is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7EA.2 Test Applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category M1.

7.7EA.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.7EA.3-1 and 7.7EA.3-2. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.7EA.3-1: Spurious response parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3. NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.7EA.3-2: Spurious response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

The normative reference for this requirement is TS 36.101 [2] clause 7.7.

7.7EA.4 Test Description

7.7EA.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2EA.4.1 in order to test spurious responses obtained in clause 7.6.2EA under the same conditions.

7.7EA.4.2 Test Procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 7.7EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The SS sends one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.

2. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 7.7EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7EA.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2EA.4.2.

4. Set the downlink signal level according to the table 7.7EA.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.7EA.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the throughput measurement.

5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.7EA.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.7EA.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.7EA.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.7EA.5-1 and 7.7EA.5-2.

Table 7.7EA.5-1: Spurious response parameters

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		6	6	6	6	7	9
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5EA.							
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.7EA.5-2: Spurious Response

Parameter	**Unit**	**Level**
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

7.7F Spurious response for category NB1

7.7F.1 Test purpose

Spurious response verifies the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6.2 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

7.7F.3 Minimum conformance requirements

The category NB1 UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annexe A.3.2 with parameters specified in Tables 7.7F.3-1.

Table 7.7F.3-1: Spurious response parameters for category NB1

Parameter	Unit	Level
P_{signal}	dBm	REFSENS+6
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies
Number of spurious response frequencies		24 (in OOB range 1, 2, 3)
NOTE 1: Reference measurement channel is specified in Annex FFS. NOTE 2: The REFSENS power level is specified in 7.3.1F.1-1. NOTE 3: OOB range 1, 2, 3 refers to Table 7.6.2.1F-1.		

The normative reference for this requirement is TS 36.101 [2] clause 7.7.1F.

7.7F.4 Test description

7.7F.4.1 Initial conditions

The initial conditions shall be the same as in clause 7.6.2F.4.1 in order to test spurious responses obtained in clause 7.6.2F under the same conditions.

7.7F.4.2 Test procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.6.2F.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send HARQ feedback based on information contained in DCI format N1.

2. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7F.5-1. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2F.4.2

3. Set the Downlink signal level according to the Table 7.7F.5-1.

4. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

7.7F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 8.1.6.

7.7F.5 Test requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Tables 7.7F.5-1.

Table 7.7F.5-1: Spurious response parameters for category NB1

Parameter	Unit	Level
P_{signal}	dBm	REFSENS+6
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies
Number of spurious response frequencies		24 (in OOB range 1, 2, 3)
NOTE 1: Reference measurement channel is specified in Annex FFS. NOTE 2: The REFSENS power level is specified in 7.3.1F.1-1. NOTE 3: OOB range 1, 2, 3 refers to Table 7.6.2.1F-1.		

7.7G Spurious response for V2X Communication

7.7G.1 Spurious response for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test procedure is incomplete
- The test tolerance is left FFS

7.7G.1.1 Test Purpose

Spurious response for V2X verifies the receiver's ability to receive a wanted aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6.2G is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7G.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.7G.1.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Tables 7.7G.3-1 and 7.7G.3-2.

Table 7.7G.3-1: Spurious response parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
NOTE 1: Reference measurement channel is specified in TS36.101[2] Annex A.8.2.							

Table 7.7G.3-2: Spurious response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

The normative reference for this requirement is TS 36.101 [2] clause 7.7.1G.

7.7G.1.4 Test Description

7.7G.1.4.1 Initial Conditions

The initial conditions shall be the same as in clause 7.6.2G.1.4.1 in order to test spurious responses obtained in clause 7.6.2G under the same conditions.

7.7G.1.4.2 Test Procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table 7.6.2G.1.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.

3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7G.1.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6.2G.1.4.2.
4. Set the signal level of V2X to the value defined in table 7.7G.1.5-1.
5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.7G.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.10.

7.7G.1.5 Test Requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Tables 7.7G.1.5-1 and 7.7G.1.5-2.

Table 7.7G.1.5-1: Spurious response parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
NOTE 1: Reference measurement channel is specified in TS36.101[2] Annex A.8.2.							

Table 7.7G.1.5-2: Spurious response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

7.7G.2 Spurious response for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Initial condition is incomplete due to 7.6.2G.2 is not made
- Test procedure is investigating and incomplete due to 7.6.2G.2 is not made

7.7G.2.1 Test Purpose

Same test purpose as in clause 7.7G.1.

7.7G.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.7G.2.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Tables 7.7G.2.3-1 and 7.7G.2.3-2.

Table 7.7G.2.3-1: Spurious response parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
NOTE 1: Reference measurement channel is specified in Annex A.8.2.							

Table 7.7G.2.3-2: Spurious response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 7.7G.2.3 apply for the E-UTRA V2X sidelink reception and the requirements in subclause 7.7.3 apply for the E-UTRA downlink reception while all downlink carriers are active.

The normative reference for this requirement is TS 36.101 [2] clause 7.7.1G.

7.7G.2.4 Test description

7.7G.2.4.1 Initial conditions

The initial conditions shall be the same as in clause [TBD] in order to test spurious responses obtained in clause 7.6.2G under the same conditions.

7.7G.2.4.2 Test Procedure

1. The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables [TBD] on E-UTRA Band. The SS sends downlink MAC padding bits on the DL RMC.

2. SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table [TBD]. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.

3. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7G.2.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause [TBD].

4. Set the signal level of V2X to the value defined in table 7.7G.2.5-1.

5. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.7G.2.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.7G.2.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Tables 7.7G.2.5-1 and 7.7G.2.5-2.

Table 7.7G.2.5-1: Spurious response parameters

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
NOTE 1: Reference measurement channel is specified in Annex A.8.2.							

Table 7.7G.2.5-2: Spurious response

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.5G-2, the requirements in subclause 7.7G.2.5 apply for the E-UTRA V2X sidelink reception and the requirements in subclause 7.7.3 apply for the E-UTRA downlink reception while all downlink carriers are active.

7.7G.3 Spurious response for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Initial condition is incomplete due to 7.6.2G.3 is not made
- Test procedure is investigating and incomplete due to 7.6.2G.3 is not made

7.7G.3.1 Test Purpose

Same test purpose as in clause 7.7G.1.

7.7G.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.7G.3.3 Minimum conformance requirements

For intra-band contiguous multi-carrier operation, the V2X UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Table 7.7G.3.3-1 and Table 7.7G.3.3-2.

Table 7.7G.3.3-1: Spurious response parameters for intra-band contiguous multi-carrier for V2X UE

Rx Parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + V2X Bandwidth Class specific value below				
		9				
NOTE 1: The requirement is applied for 2 carrier intra-concurrent recpetions when 2 carrier transmission are activated at the same time						

Table 7.7.G.3.3-2: Spurious response for intra-band contiguous multi-carrier for V2X UE

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies
NOTE 1: The requirement is applied for 2 carrier intra-concurrent recpetions when 2 carrier transmission are activated at the same time		

The normative reference for this requirement is TS 36.101 [2] clause 7.7.1G.

7.7G.3.4 Test description

7.7G.3.4.1 Initial conditions

The initial conditions shall be the same as in clause [TBD] in order to test spurious responses obtained in clause 7.6.2G under the same conditions.

7.7G.3.4.2 Test Procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration and to schedule the V2X RMC according to Table [TBD]. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.
2. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7G.3.5-2. The spurious frequencies are taken from records in the final step of test procedures in clause [TBD].
3. Set the signal level of V2X to the value defined in table 7.7G.3.5-1.
4. For the spurious frequency, measure the average throughput for a duration sufficient to achieve statistical significance according to Annex [TBD].

7.7G.3.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.7G.3.5 Test Requirement

For intra-band contiguous multi-carrier operation, the V2X UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Table 7.7G.3.5-1 and Table 7.7G.3.5-2.

Table 7.7G.3.5-1: Spurious response parameters for intra-band contiguous multi-carrier for V2X UE

Rx Parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + V2X Bandwidth Class specific value below				
		9				
NOTE 1: The requirement is applied for 2 carrier intra-concurrent recpetions when 2 carrier transmission are activated at the same time						

Table 7.7.G.3.5-2: Spurious response for intra-band contiguous multi-carrier for V2X UE

Parameter	Unit	Level
$P_{Interferer}$ (CW)	dBm	-44
$F_{Interferer}$	MHz	Spurious response frequencies
NOTE 1: The requirement is applied for 2 carrier intra-concurrent recpetions when 2 carrier transmission are activated at the same time		

7.8 Intermodulation characteristics

7.8.1 Wide band Intermodulation

7.8.1.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8.1.2 Test applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.8.1.3 Minimum conformance requirements

Intermodulation response rejection is a measure of the capability of the receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8.1.3-1 for the specified wanted signal mean power in the presence of two interfering signals. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.8.1.3-1: Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.3-2 with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz.
Note 4: The REFSENS power level is specified in Table 7.3.3-1 and Table 7.3.3-1a for two and four antenna ports, respectively.

For the UE which supports inter band CA configuration in Table 7.3.1A-2, $P_{interferer1}$ and $P_{interferer2}$ powers defined in Table 7.8.1.1-1 are increased by the amount given by ΔR_{IB} in Table 7.3.1A-2.

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1 and TS 36.101 [2] Annexes A and D.

[FFS: Although it is not explicitly stated in TS 36.101 [2] whether the modulated interferer defined in 36.101 Annex D applies to wanted channel bandwidths of less than 5MHz, this test specification has assumed that the modulated interferer definition applies to all channel bandwidths. The content of TS 36.101 [2] Annex D.2 has been copied into Annex FFS of the present document]

7.8.1.4 Test description

7.8.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Figure A.6.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.8.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.8.1.4.3.

7.8.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.8.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.8.1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.

4. Set the Interfering signal levels to the values as defined in Table 7.8.1.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 4.

7.8.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.8.1.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.8.1.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1.5-1: Test parameters for Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz

Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz
Note 4: For the UE which supports inter band CA configuration in Tables 7.3.3-1A and 7.3.3-1B, $P_{interferer1}$ and $P_{interferer2}$ powers are increased by the amount given by ΔR_{IB} in Tables 7.3.3-1A and 7.3.3-1B.

7.8.1_1 Wide band Intermodulation with 4 Rx antenna ports

7.8.1_1.1 Test purpose

To test the ability of UE that supports 4 Rx antenna ports to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8.1_1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports.

7.8.1_1.3 Minimum conformance requirements

Same as in clause 7.8.1.3.

7.8.1_1.4 Test description

7.8.1_1.4.1 Initial condition

Same as in clause 7.8.1.4.1 with following exceptions:

- Instead of Figure A.6 → use Figure A.81.
- Instead of Table 7.8.1.4.1-1 → use Table 7.8.1_1.4.1-1.

Table 7.8.1_1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	20	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						

7.8.1_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1_1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.8.1_1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.8.1_1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

4. Set the Interfering signal levels to the values as defined in Table 7.8.1_1.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 4.

7.8.1_1.4.3 Message contents

Same as in clause 7.8.1.4.3.

7.8.1_1.5 Test requirements

The throughput shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1_1.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1_1.5-1: Test parameters for Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz
Note 4: For the UE which supports inter band CA configuration in Tables 7.3.3-1A and 7.3.3-1B, $P_{interferer1}$ and $P_{interferer2}$ powers are increased by the amount given by ΔR_{IB} in Tables 7.3.3-1A and 7.3.3-1B.
Note 5: The REFSENS power level is specified in Table 7.3.3-1a.

7.8.1A Wide band Intermodulation for CA

7.8.1A.0 Minimum conformance requirements

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one E-UTRA band the wide band intermodulation requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.8.1.3 for each component carrier while all downlink carriers are active. For E-UTRA CA configurations including an operating band without uplink band or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. For a component carrier configured in Band 46, the requirements specified in subclause 7.8.1.3 are replaced by the requirements in Table 7.8.1A.0-0. For E-UTRA CA configurations listed in Table 7.3A.0-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the wideband intermodulation requirements of subclause 7.8.1A.0 do not apply.

Table 7.8.1A.0-0: Wide band intermodulation

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
						6		9
	$P_{Interferer\ 1}$ (CW)	dBm	-46					
	$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
	$BW_{Interferer\ 2}$					20		20
	$F_{Interferer\ 1}$ (Offset)	MHz				-BW/2-30 / +BW/2+30		-BW/2 – 30 / +BW/2 + 30
	$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.8.1A.0-1 with the uplink configuration set according to Table 7.3A.0-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.3-2. The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Table 7.8.1A.0-1 being on either side of the aggregated signal. The throughput of each carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8.1A.0-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements also apply for an SCC assigned in the unpaired part with parameters specified in Tables 7.8.1A.0-1.

Table 7.8.1A.0-1: Wide band intermodulation

Rx parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12	13.8	15	16

$P_{Interferer\ 1}$ (CW)	dBm	-46				
$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
$BW_{Interferer\ 2}$	MHz	5	5	5	5	5
$F_{Interferer\ 1}$ (Offset)	MHz	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.
Note 4: The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz
Note 5: The $F_{interferer\ 1}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and $F_{interferer\ 2}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink sub-blocks, the wide band intermodulation requirements are defined with the uplink configuration in accordance with Table 7.3A.0-3. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in subclause 7.8.1.3 and in this subclause for one component carrier and two component carriers per sub-block, respectively. The requirements apply for out-of-gap interferers while all downlink carriers are active.

For combinations of intra-band and inter-band carrier aggregation with up to five downlink carriers (up to two non-contiguously sub-blocks per band and up to four contiguously aggregated carriers per band) and one uplink carrier assigned to one E-UTRA band, the requirement is defined with the uplink active in a band other than that supporting the downlink(s) under test. The uplink configuration shall be in accordance with Table 7.3A.0-3 when the uplink is active in the band supporting two non-contiguous component carriers, Table 7.3A.0-1 when the uplink is active in a band supporting two contiguous component carriers and in accordance with Table 7.3.3-2 when the uplink is active in a band supporting one carrier per band. For these uplink configurations, the UE shall meet the wide-band intermodulation requirements for intra-band non-contiguous carrier aggregation of two downlink sub-blocks with ΔR_{IBNC} = 0 dB for all sub-block gaps (Table 7.3A.0-3) for the two non-contiguous downlink sub-blocks, the requirements for intra-band contiguous carrier aggregation for the contiguously aggregated downlink carriers and for any remaining component carrier(s) the requirements specified in subclause 7.8.1. All downlink carriers shall be active throughout the tests and the requirements for the downlinks shall be met with the single uplink carrier active in each band capable of UL operation.

For contiguously aggregated component carriers configured in Band 46, the said requirements for intra-band contiguous carrier aggregation of two downlink carriers are replaced by requirements in Table 7.8.1A.0-2. For non-contiguously aggregated component carriers configured in Band 46, the said requirements are applied to each sub-block for out-of-gap interferers. For the sub-block with a single component carrier, the requirement is replaced by Table 7.8.1A.0-0. For the sub-block with two or more contiguous component carriers, the requirement is replaced by Table 7.8.1A.0-1. All downlink carriers shall be active throughout the tests and the requirements for the downlinks shall be met with the single uplink carrier active in each band capable of UL operation.

Table 7.8.1A.0-2: Wide band intermodulation

E-UTRA Band	Rx parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
				12	13.8	15	
	$P_{Interferer\ 1}$ (CW)	dBm	-46				
	$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
	$BW_{Interferer\ 2}$	MHz		20	20	20	
	$F_{Interferer\ 1}$ (Offset)	MHz		$-F_{offset}$-30 / + F_{offset}+30	$-F_{offset}$-30 / + F_{offset}+30	$-F_{offset}$-30 / + F_{offset}+30	
	$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				

NOTE 1: The transmitter shall be set to 4dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.
NOTE 4: The interfering modulated signal is 20 MHz E-UTRA signal as described in Annex D interference setting 2;
NOTE 5: The $F_{interferer\ 1}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and $F_{interferer\ 2}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1A and TS 36.101 [2] Annexes A and D.

7.8.1A.1 Wideband intermodulation for CA (intra-band contiguous DL CA and UL CA)

7.8.1A.1.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8.1A.1.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports intra-band contiguous DL CA and UL CA.

7.8.1A.1.3 Minimum conformance requirements

Minimum conformance requirements are specified in clause 7.8.1A.0.

7.8.1A.1.4 Test description

7.8.1A.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA bands specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.8.1A.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1A.1.4.1-1: Test Configuration Table

Initial Conditions									
Test Environment as specified in TS 36.508[7] subclause 4.1			NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			Mid range						
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE			Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 3)						
Test Parameters for CA Configurations									
CA Configuration / N_{RB_agg}		**DL Allocation**		**UL Allocation**					
PCC N_{RB}	**SCC NRB**	**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**N_{RB_alloc}**	**PCC & SCC RB allocations (L_{CRB} @ RB_{start})**			
50	25	QPSK	50+25	QPSK	25	P_25@25	S_0@0	-	-
50	50	QPSK	50+50	QPSK	25	P_25@25	S_0@0	-	-
50	100	QPSK	50+100	QPSK	150	P_50@0	S_100@0	-	-
75	50	QPSK	75+50	QPSK	75	P_75@0	S_0@0	-	-
75	75	QPSK	75+75	QPSK	75	P_75@0	S_0@0	-	-
75	75	QPSK	75+75	QPSK	129	P_75@0	S_54@0	-	-
75	75	QPSK	75+75	QPSK	150	P_75@0	S_75@0	-	-
100	25	QPSK	100+25	QPSK	50	P_50@50	S_0@0	-	-
100	25	QPSK	100+25	QPSK	125	P_100@0	S_25@0	-	-
100	50	QPSK	100+50	QPSK	75	P_75@25	S_0@0	-	-
100	50	QPSK	100+50	QPSK	150	P_100@0	S_50@0	-	-
100	75	QPSK	100+75	QPSK	175	P_100@0	S_75@0	-	-
100	100	QPSK	100+100	QPSK	50	P_50@50	S_0@0	-	-
100	100	QPSK	100+100	QPSK	75	P_75@25	S_0@0	-	-
100	100	QPSK	100+100	QPSK	130	P_100@0	S_30@0	-	-
100	100	QPSK	100+100	QPSK	200	P_100@0	S_100@0	-	-
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.									
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.0-1 is tested per Test CA configuration.									
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.									

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Figure group A.34 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.8.1A.1.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.8.1.1A.4.3.

7.8.1A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.8.1A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1A.1.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1A.1.4.1-1 on both PCC and SCC. Since the UE has no payload data to send, the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level for PCC and SCC to the value as defined in Table 7.8.1A.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:
The PCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.8.1A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.8.1A.1.5-1 + $10\log(P_L_{CRB}/N_{RB_alloc})$) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.
The SCC output power is within (+0dB, -3.4 dB) of (target level in Table 7.8.1A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$), for carrier frequency $f \leq 3.0$GHz,
or within (+0dB, -4 dB) of (target level in Table 7.8.1A.1.5-1 + $10\log(S_L_{CRB}/N_{RB_alloc})$) for carrier frequency 3.0GHz < $f \leq 4.2$GHz.

7. Set the Interfering signal levels to the values as defined in Table 7.8.1A.1.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal at step 7.

7.8.1A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exception.

Table 7.8.1A.1.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

Table 7.8.1A.1.4.3-2: UplinkPowerControlDedicatedSCell-r10

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UE-PUSCH-r10	0		
deltaMCS-Enabled-r10	en0		
accumulationEnabled-r10	TRUE		
pSRS-Offset-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
pSRS-OffsetAp-r10	7 (0 dB)	The actual parameter value is -10.5 + 1.5*pSRS-Offset value; 0 is the actual value in dB (-10.5 + 1.5*7 dB).	
filterCoefficient-r10	fc8	larger filter length is used to reduce the RSRP measurement variation	
pathlossReferenceLinking-r10	sCell		
}			

7.8.1A.1.5 Test requirements

The throughput of each carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1A.1.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1A.1.5-1: Test parameters for Wide band intermodulation

Rx parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12			
$P_{Interferer\ 1}$ (CW)	dBm	-46				
$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
$BW_{Interferer\ 2}$	MHz	5	5			
$F_{Interferer\ 1}$ (Offset)	MHz	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5			
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5 for one uplink carrier and in subclause 6.2.5 for two uplink carriers A.

Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.

Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.

Note 4: The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer\ 1}$ and $P_{Interferer\ 2}$ power defined in Table 7.8.1A.1.5-1 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.8.1A.2 Wideband intermodulation for CA (intra-band contiguous DL CA without UL CA)

7.8.1A.2.1 Test purpose

Same as 7.8.1A.1

7.8.1A.2.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports intra-band contiguous DL CA. This test case applies only for CA Configurations that do not support UL CA.

7.8.1A.2.3 Minimum conformance requirements

Same as 7.8.1A.1

7.8.1A.2.4 Test description

7.8.1A.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA bands specified in table 5.4.2A.1-1. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.8.1A.2.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1A.2.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	Normal
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	B: Mid range C: Mid range (Note 4)
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE	Lowest N_{RB_agg}, Highest N_{RB_agg} (Notes 3, 4)

Test Parameters for CA Configurations

CA Configuration / N_{RB_agg}		DL Allocation		UL Allocation					
PCC N_{RB}	SCCs NRB	CC MOD	PCC & SCC RB allocation	CC MOD	N_{RB_alloc}	PCC & SCC RB allocations (L_{CRB} @ RB_{start})			
6	25	QPSK	6+25	QPSK	6	P_6@0	-	-	-
15	50	QPSK	15+50	QPSK	15	P_15@0	-	-	-
25	25	QPSK	25+25	QPSK	20	P_20@0	-	-	-
25	25	QPSK	25+25	QPSK	25	P_25@0	-	-	-
25	50	QPSK	25+50	QPSK	20	P_20@0	-	-	-
25	100	QPSK	25+100	QPSK	25	P_25@0	-	-	-
50	25	QPSK	50+25	QPSK	25	P_25@25	-	-	-
50	50	QPSK	50+50	QPSK	25	P_25@25	-	-	-
50	50	QPSK	50+50	QPSK	50	P_50@0	-	-	-
50	75	QPSK	50+75	QPSK	50	P_50@0	-	-	-
75	25	QPSK	75+25	QPSK	75	P_75@0	-	-	-
75	50	QPSK	75+50	QPSK	75	P_75@0	-	-	-
75	75	QPSK	75+75	QPSK	75	P_75@0	-	-	-
100	25	QPSK	100+25	QPSK	50	P_50@50	-	-	-
100	25	QPSK	100+25	QPSK	100	P_100@0	-	-	-
100	50	QPSK	100+50	QPSK	75	P_75@25	-	-	-
100	50	QPSK	100+50	QPSK	100	P_100@0	-	-	-
100	75	QPSK	100+75	QPSK	100	P_100@0	-	-	-
100	100	QPSK	100+100	QPSK	50	P_50@50	-	-	-
100	100	QPSK	100+100	QPSK	75	P_75@25	-	-	-
100	100	QPSK	100+100	QPSK	100	P_100@0	-	-	-

Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-1.
Note 2: Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test CA configuration.
Note 3: If the UE supports multiple CC Combinations in the CA Configuration with the same N_{RB_agg} , only the combination with the highest NRB_PCC is tested.
Note 4: For CA_70C all test frequency IDs shall be tested according to table 4.3.1.1.70A-1, in TS 36.508 [7].

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Figure group A.34 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.8.1.2A.4.3.

7.8.1A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1A.2.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1A.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level to the value as defined in Table 7.8.1A.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.8.1A.1.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

7. Set the Interfering signal levels to the values as defined in subclause 7.8.1A.2.5 and frequency below the aggregated component carriers, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2.

9. Repeat steps from 6 to 8, using an interfering signal above the aggregated component carriers at step 7.

7.8.1A.2.4.3 Message contents

Same message contents as in clause 7.8.1.4.3.

7.8.1A.2.5 Test requirements

Same as 7.8.1A.1.5. with the following exceptions:

- Instead of Table 7.8.1A.1.5-1 → use Table 7.8.1A.2.5-1.

Table 7.8.1A.2.5-1: Test parameters for Wide band intermodulation

Rx parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12			

$P_{Interferer\ 1}$ (CW)	dBm	-46				
$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
$BW_{Interferer\ 2}$	MHz	5	5			
$F_{Interferer\ 1}$ (Offset)	MHz	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5			
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5.						
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.						
Note 4: The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz						

For the UE which supports inter band CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer\ 1}$ and $P_{Interferer\ 2}$ power defined in Table 7.8.1A.2.5-1 is increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.8.1A.3 Wideband intermodulation for CA (inter-band DL CA without UL CA)

7.8.1A.3.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8.1A.3.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports inter-band contiguous DL CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 2DL CA with FDD-TDD inter-band CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support DL LAA.

7.8.1A.3.3 Minimum conformance requirements

Same as 7.8.1A.1

7.8.1A.3.4 Test description

7.8.1A.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA bands specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.8.1A.3.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1A.3.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1		NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2		A: Mid range for PCC and SCC				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE		Highest N_{RB_agg} for PCC and SCC				
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**			**UL Allocation**	
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC N_{RB_alloc}**
50	50	QPSK	50	50	QPSK	50
50	50	QPSK	50	50	QPSK	25
50	50	QPSK	50	50	QPSK	20
50	50	QPSK	50	50	QPSK	16
50	75	QPSK	50	75	QPSK	25
50	100	QPSK	50	100	QPSK	50
50	100	QPSK	50	100	QPSK	25
50	100	QPSK	50	100	QPSK	20
50	100	QPSK	50	100	QPSK	16
75	25	QPSK	75	25	QPSK	75
75	25	QPSK	75	25	QPSK	20
75	50	QPSK	75	50	QPSK	25
75	75	QPSK	75	75	QPSK	25
75	100	QPSK	75	100	QPSK	25
100	50	QPSK	100	50	QPSK	100
100	50	QPSK	100	50	QPSK	75
100	50	QPSK	100	50	QPSK	50
100	75	QPSK	100	75	QPSK	100
100	75	QPSK	100	75	QPSK	50
100	100	QPSK	100	100	QPSK	100
100	100	QPSK	100	100	QPSK	75
100	100	QPSK	100	100	QPSK	50
100	100	QPSK	100	100	QPSK	45
100	100	QPSK	100	100	QPSK	25
100	100	QPSK	100	100	QPSK	20

Note 1:	CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.
Note 2:	Depending on CA configurations, only the appropriate Uplink RB allocation value according to table 7.3A.3.5-2 for UE supporting one uplink carrier is tested per Test CA configuration.
Note 3:	The UL resource blocks shall be located as close as possible to the downlink PCC but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).
Note 4:	The frequencies of PCC and SCC shall be switched and tested in each configuration, according to the UE declared capability for UL support (within CA operation) in the individual bands.

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Figure group A.34 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.8.1A.3.4.3.

7.8.1A.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1A.3.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1A.3.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level to the value as defined in Table 7.8.1A.3.5-0 for operating band 46 or Table 7.8.1A.3.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.8.1A.3.5-0 for operating band 46 or Table 7.8.1A.3.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

7. Set the Interfering signal levels to the values as defined in Table 7.8.1A.3.5-0 for operating band 46 without uplink band or Table 7.8.1A.3.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput of SCC for a duration sufficient to achieve statistical significance according to Annex G.2.

9. Repeat steps from 6 to 8, using an interfering signal above the wanted signal at step 4.

7.8.1A.3.4.3 Message contents

Same message contents as in clause 7.8.1.4.3.

7.8.1A.3.5 Test requirements

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the in-band blocking requirements are defined with the uplink active on the band other than the band whose downlink is being tested, i.e., the requirements are

tested only for the SCell downlink. The UE shall meet the requirement for each component carrier, when operated as SCell, while both downlink carriers are active.

The throughput measured during the test procedure for each component carrier, when operated as SCell, shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1A.3.5-0 for band combinations including operating band 46 without uplink operation and Table 7.8.1A.3.5-1 (originated from the single carrier Table 7.8.1.5-1).

The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.

Table 7.8.1A.3.5-0: Test Parameters for Wide band intermodulation

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					9
	$P_{Interferer\ 1}$ (CW)	dBm	-46					
	$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
	$BW_{Interferer\ 2}$							20
	$F_{Interferer\ 1}$ (Offset)	MHz						-BW/2 – 30 / +BW/2 + 30
	$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1.

Table 7.8.1A.3.5-1: Test parameters for Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset from SCC)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset from SCC)	MHz	$2*F_{Interferer\ 1}$					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz
Note 4: For the UE which supports inter band CA configuration in Tables 7.3.3-1A and 7.3.3-1B, $P_{interferer1}$ and $P_{interferer2}$ powers are increased by the amount given by ΔR_{IB} in Tables 7.3.3-1A and 7.3.3-1B

7.8.1A.4 Wideband intermodulation for CA (intra band non-contiguous DL CA without UL CA)

7.8.1A.4.1 Test purpose

Same as 7.8.1A.1

7.8.1A.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support intra-band non-contiguous DL CA but no UL CA.

7.8.1A.4.3 Minimum conformance requirements

Same as 7.8.1A.1

7.8.1A.4.4 Test description

7.8.1A.4.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA bands specified in table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in table 7.8.1A.4.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1A.4.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1			NC				
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2			A: N/A (Range is not relevant)				
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration.			Refer to test point				
Test Parameters for CA Configurations							
ID	**CA Configuration / N_{RB_agg}**		**W_{gap} [MHz]**	**DL Allocation**		**UL Allocation**	
	PCC N_{RB}	**SCCs N_{RB}**		**CC MOD**	**PCC & SCC RB allocation**	**CC MOD**	**PCC RB allocations (L_{CRB} @ RB_{start})**

Test Parameters for CA_2A-2A Configuration							
1	100	25	35	QPSK	100+25	QPSK	P_16@57
2	100	100	20	QPSK	100+100	QPSK	P_16@57
Test Parameters for CA_3A-3A Configuration							
3	100	25	50	QPSK	100+25	QPSK	P_16@50
4	100	25	15	QPSK	100+25	QPSK	P_32@68
5	100	100	35	QPSK	100+100	QPSK	P_16@50
Test Parameters for CA_4A-4A Configuration							
6	50	25	30	QPSK	50+25	QPSK	P_50@0
7[4]	50	50	25	QPSK	50+50	QPSK	P_50@0
8[3]	100	25	20	QPSK	100+25	QPSK	P_100@0
9[3]	100	100	5	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_5A-5A Configuration							
10	50	25	10	QPSK	50+25	QPSK	P_12@38
11	50	50	5	QPSK	50+50	QPSK	P_12@38
Test Parameters for CA_7A-7A Configuration							
12	100	75	35	QPSK	100+75	QPSK	P_36@64
13	100	75	15	QPSK	100+75	QPSK	P_50@50
14	100	100	30	QPSK	100+100	QPSK	P_32@68
15	100	100	15	QPSK	100+100	QPSK	P_45@55
Test Parameters for CA_23A-23A Configuration							
16	50	25	5	QPSK	50+25	QPSK	P_50@0
Test Parameters for CA_25A-25A Configuration							
17	50	25	50	QPSK	50+25	QPSK	P_10@33
18	50	25	15	QPSK	50+25	QPSK	P_32@18
19[3]	50	50	45	QPSK	50+50	QPSK	P_10@33
20[3]	50	50	10	QPSK	50+50	QPSK	P_32@18
21[4]	100	25	40	QPSK	100+25	QPSK	P_12@62
22[4]	100	100	25	QPSK	100+100	QPSK	P_12@62
Test Parameters for CA_41A-41A Configuration							
23[4]	100	25	169	QPSK	100+25	QPSK	P_100@0
24[3]	100	50	164	QPSK	100+50	QPSK	P_100@0
25	100	100	154	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_42A-42A Configuration							
26	100	25	175	QPSK	100+25	QPSK	P_100@0
27	100	100	160	QPSK	100+100	QPSK	P_100@0
Test Parameters for CA_66A-66A Configuration							
28	100	25	65	QPSK	100+25	QPSK	P_100@0
29	100	100	50	QPSK	100+100	QPSK	P_100@0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-3.							
Note 2: The carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.							
Note 3: Applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration							
Note 4: Not applicable if only Bandwidth Combination Set 0 is supported by the UE for the CA Configuration							

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Figure group A.34 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.8.1A.3.4.3.

7.8.1A.4.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1A.4.4.1-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1A.4.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level to the value as defined in Table 7.8.1A.4.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in Table 7.8.1A.4.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the Throughput measurement.

7. Set the Interfering signal levels to the values as defined in Table 7.8.1A.4.5-1 and frequency below SCC, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput for each component carrier for a duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above PCC at step 7.

7.8.1A.4.4.3 Message contents

Same message contents as in clause 7.8.1.4.3.

7.8.1A.4.5 Test requirements

The throughput measured during the test procedure for each component carrier, shall be $\geq$ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1A.4.5-1 (originated from the single carrier Table 7.8.1.5-1).

Table 7.8.1A.4.5-1: Test parameters for Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9

$P_{Interferer\ 1}$ (CW)	dBm	-46		
$P_{Interferer\ 2}$ (Modulated)	dBm	-46		
$BW_{Interferer\ 2}$		1.4	3	5
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$		

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz
Note 4: For the UE which supports inter band CA configuration in Tables 7.3.3-1A and 7.3.3-1B, $P_{interferer1}$ and $P_{interferer2}$ powers are increased by the amount given by ΔR_{IB} in Tables 7.3.3-1A and 7.3.3-1B

7.8.1A.5 Wideband intermodulation for 3DL CA

7.8.1A.5.1 Test purpose

Same as 7.8.1A.1

7.8.1A.5.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support 3DL with Intra-band contiguous CA or 3DL with Inter-band CA, or 3DL with Inter-band and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 3DL with Intra-band non-contiguous CA and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 3DL with FDD-TDD CA.

This test case also applies to all types of E-UTRA UE release 13 and forward that support 3DL CA involving Band 46.

7.8.1A.5.3 Minimum conformance requirements

Same as 7.8.1A.1.

7.8.1A.5.4 Test description

7.8.1A.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1A.5.4.1-1 through table 7.8.1A.5.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1A.5.4.1-1: Test Configuration Table

Initial Conditions	
Environment as specified in TS 36.508[7] subclause 4.1	NC
Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

PCC				SCC1				SCC2			
Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
UL MOD	DL MOD	ULalloc (Note 2,3)	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for a CA_XD Configuration (Intra-band contiguous)											
X	Mid/ CC1	REFSENS	All RBs	X	Mid/ CC2	N/A	All RBs	X	Mid/ CC3	N/A	All
QPSK	QPSK		LowHighest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High N_{RB}
X	Mid/ CC1	REFSENS	All RBs	X	Mid/ CC2	N/A	All RBs	X	Mid/ CC3	N/A	All
QPSK	QPSK		HighLowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Low N_{RB}
Default Test Settings for a CA_XA-YA-ZA Configuration (Inter-band)											
X	Mid	REFSENS	All RBs	Y	Mid	N/A	All RBs	Z	Mid	N/A	All
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		High N
Y	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Z	Mid	N/A	All
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		High N
Z	Mid	REFSENS	All RBs	X	Mid	N/A	All RBs	Y	Mid	N/A	All
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		High N
Default Test Settings for CA_XB-YA and CA_XC-YA Configuration (Intra-band contiguous + Inter-band)											
X	Mid/ CC1	REFSENS	All RBs	X	Mid/ CC2	N/A	All RBs	Y	Mid	N/A	All
QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High N
X	Mid/ CC1	REFSENS	All RBs	X	Mid/ CC2	N/A	All RBs	Y	Mid	N/A	All
QPSK	QPSK		HLowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		High N
Y	Mid	REFSENS	All RBs	X	Mid/ CC1	N/A	All RBs	X	Mid/CC2	N/A	All
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High N_{RB}
Y	Mid	REFSENS	All RBs	X	Mid/ CC1	N/A	All RBs	X	Mid/CC2	N/A	All
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Low N_{RB}
Default Test Settings for CA_XA-YB and CA_XA-YC Configuration (Intra-band contiguous + Inter-band)											
Y	Mid/ CC1	REFSENS	All RBs	Y	Mid/ CC2	N/A	All RBs	X	Mid	N/A	All
QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High N
Y	Mid/ CC1	REFSENS	All RBs	Y	Mid/ CC2	N/A	All RBs	X	Mid	N/A	All
QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		High N
X	Mid	REFSENS	All RBs	Y	Mid/ CC1	N/A	All RBs	Y	Mid/ CC2	N/A	All
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		High N_{RB}

X	Mid	REFSENS	All RBs	Y	Mid/ CC1	N/A	All RBs	Y	Mid/ CC2	N/A	All
QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lov N_{RB}

1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
2: Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
3: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual b within the CA Configuration, test points with that individual band as PCC are not applicable.
4: **Intra-band contiguous:** X corresponds to the band in the CA Configuration. E.g. for CA_41D, X=41
5: **Inter-band:** X,Y,Z correspond to the 1st, 2nd and 3rd band in the CA Configuration. E.g. for CA_1A-3A-19A, X=1, Y=3, Z=19
6: **Intra-band contiguous + Inter-band:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_1C-3A, X=1 and Y=3
7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
8: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
9: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose th Combination with $N_{RB_PCC} = N_{RB_SCC1}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testi

Table 7.8.1A.5.4.1-2: Test Configuration Table with W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508[7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	X	CC2	REFSENS	All RBs	Max	X	CC1	N/A	All RBs	-	Y	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	Y	Mid	REFSENS	All RBs	-	X	CC2	N/A	All RBs	Max	X	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Default Test Settings for CA_XA-YA-YA Configurations (Intra-band non-contiguous + Inter-band)														
1	Y	CC2	REFSENS	All RBs	Max	Y	CC1	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
2	X	Mid	REFSENS	All RBs	-	Y	CC2	N/A	All RBs	Max	Y	CC1	N/A	All RBs
	QPSK	QPSK				N/A	QPSK				N/A	QPSK		
Test Settings for CA_29A-66A-66A Configuration (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	29	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		50
Test Settings for a CA_41C-41A Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	41	CC3	100@0	All RBs	134.2	41	CC2	N/A	All RBs	-	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_41A-41C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
2	41	CC3	100@0	All RBs	-	41	CC2	N/A	All RBs	134.2	41	CC1	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100
Group Test Settings for CA_66A-66A-XA or CA_XA-66A-66A Configurations (Intra-band non-contiguous + Inter-band)														
1	66	CC1	100@0	All RBs	50	66	CC2	N/A	All RBs	-	X	Mid	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		Highest NRB
2	X	Mid	REFSENS	All RBs	-	66	CC1	N/A	All RBs	50	66	CC2	N/A	All RBs
	QPSK	QPSK		Highest NRB		N/A	QPSK		100		N/A	QPSK		100
Test Settings for a CA_66A-66C Configuration (Intra-band non-contiguous + Intra-band contiguous)														
1	66	CC1	100@0	All RBs	30.2	66	CC2	N/A	All RBs	-	66	CC3	N/A	All RBs
	QPSK	QPSK		100		N/A	QPSK		100		N/A	QPSK		100

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.

Note 2: **Intra-band non-contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.

Note 3: **Intra-band non-contiguous + Intra-band contiguous:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.

Note 4: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.

Note 5: **Intra-band non-contiguous + Inter-band:** X and Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A,X=2,Y=5

Note 6: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A,X=41.

Note 7: **Intra-band non-contiguous + Inter-band:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.

Note 8: **Intra-band non-contiguous + Intra-band contiguous:** REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RE allocation for reference sensitivity according to table 7.3.5-2.

Note 9: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.8.1A.5.4.1-1 through Table 7.8.1A.5.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.8.1A.5.4.3.

7.8.1A.5.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.8.1A.5.4.3

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1A.5.4.1-1 through Table 7.8.1A.5.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1A.5.4.1-1 through Table 7.8.1A.5.4.1-2 as appropriate on PCC and SCCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level to the value as defined in Table 77.8.1A.5.4.2-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.

7. Set the Interfering signal levels to the values as defined in Table 7.8.1A.5.4.2-1 and frequency below the measured carrier(s) according to table 7.8.1A.5.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput for the carrier(s) indicated in table 7.8.1A.5.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to table 7.8.1A.5.4.2-1.

10. Repeat steps 6 to 9 for component carriers listed in table 7.8.1A.5.4.2-1.

Table 7.8.1A.5.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2	7.8.1A.5.5-2
	2		
Inter-band	1	SCC1	7.8.1A.5.5-0 7.8.1A.5.5-1
		SCC2	
	2	SCC1	
		SCC2	
	3	SCC1	
		SCC2	
Intra-band contiguous + Inter-band	1	SCC2	7.8.1A.5.5-0 7.8.1A.5.5-1
	2		
	3	SCC1, SCC2	7.8.1A.5.5-2 7.8.1A.5.5-3
	4		
Intra-band non-contiguous + Inter-band	1	SCC2	7.8.1A.5.5-0 7.8.1A.5.5-1
	2	SCC1	
		SCC2	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.8.1A.5.5-1
		SCC1, SCC2	7.8.1A.5.5-2 7.8.1A.5.5-3
	2	SCC2	7.8.1A.5.5-1
		PCC, SCC1	7.8.1A.5.5-2 7.8.1A.5.5-3

Note 1: Test point ID for the particular CA configuration as defined in section 7.8.1A.5.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.
Note 4: Skip the parts of the test procedure configuring in-gap interferer positions for a non-contiguous component carrier

7.8.1A.5.4.3 Message contents

Same message contents as in clause 7.8.1.4.3 for without UL CA.

Same message contents as in clause 7.8.1A.1.4.3 for UL CA.

7.8.1A.5.5 Test requirement

The throughput of the carrier(s) under test shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1A.5.5-0, Table 7.8.1A.5.5-1, Table 7.8.1A.5.5-2, or Table 7.8.1A.5.5-3 for the specified wanted signal mean power in the presence of two interfering signals.

The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.

Table 7.8.1A.5.5-0: Test Parameters for Wide band intermodulation (band 46)

E-UTRA band	Rx Parameter	Units	Channel bandwidth					
			1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
46	Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					9
	$P_{Interferer\ 1}$ (CW)	dBm	-46					

	$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
	$BW_{Interferer\ 2}$							20
	$F_{Interferer\ 1}$ (Offset)	MHz						-BW/2 – 30 / +BW/2 + 30
	$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 with P_{CMAX_L} as defined in subclause 6.2.5.
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD/FS3 as described in Annex A.5.1.1/A.5.2.1/A.5.3.1.

Table 7.8.1A.5.5-1: Test parameters for Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset from SCC)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset from SCC)	MHz	$2*F_{Interferer\ 1}$					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz
Note 4: For the UE which supports inter band CA configuration in Tables 7.3.3-1A and 7.3.3-1B, $P_{interferer1}$ and $P_{interferer2}$ powers are increased by the amount given by ΔR_{IB} in Tables 7.3.3-1A and 7.3.3-1B
Note 5: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps

Table 7.8.1A.5.5-2: Wide band intermodulation

Rx parameter	Units	Table 7.8.1A.5.5-2 CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12	13.8		
$P_{Interferer\ 1}$ (CW)	dBm	-46				
$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
$BW_{Interferer\ 2}$	MHz	5	5	5		
$F_{Interferer\ 1}$ (Offset)	MHz	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5		
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.
Note 4: The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz
Note 5: The $F_{interferer\ 1}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and $F_{interferer\ 2}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.

Table 7.8.1A.5.5-3: Wide band intermodulation (band 46, intra-band contiguous)

E-UTRA Band	Rx parameter	Units	CA Bandwidth Class				
			B	C	D	E	F
46	Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
				12	13.8		
	$P_{Interferer\ 1}$ (CW)	dBm	-46				
	$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
	$BW_{Interferer\ 2}$	MHz		20	20		
	$F_{Interferer\ 1}$ (Offset)	MHz		$-F_{offset}$-30 / + F_{offset}+30	$-F_{offset}$-30 / + F_{offset}+30		
	$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				

NOTE 1: The transmitter shall be set to 4dB below $P_{CMAX_L,c}$ or P_{CMAX_L} as defined in subclause 6.2.5A.
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.
NOTE 4: The interfering modulated signal is 20 MHz E-UTRA signal as described in Annex D interference setting 2;
NOTE 5: The $F_{interferer\ 1}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and $F_{interferer\ 2}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer\ 1}$ and $P_{Interferer\ 2}$ power defined in Table 7.8.1A.5.5-2 increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.8.1A.6

7.8.1A.7 Wideband intermodulation for 4DL CA

7.8.1A.7.1 Test purpose

Same as 7.8.1A.1.

7.8.1A.7.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 4DL with TDD Intra-band contiguous CA, or 4DL with Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 4DL with Intra-band non-contiguous CA and Inter-band CA, or 4DL with Intra-band non-contiguous and Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 4DL CA with FDD-TDD CA.

7.8.1A.7.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.8.1A.0.

7.8.1A.7.4 Test description

7.8.1A.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-2a. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1A.7.4.1-1 through table 7.8.1A.7.4.1-6 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1A.7.4.1-1: Test Configuration Table

Initial Conditions																
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC															
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns															
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC NRB” and “SCCs NRB” columns															
Network signalling value	NS_01 by default															
Test Parameters for CA Configurations																
ID	**PCC**				**SCC1**				**SCC2**				**SCC3**			
	Band	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Range**	**NRB**	
	UL MOD	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**
Default Test Settings for a CA_XE Configuration (Intra-band contiguous)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	X	Mid/CC3	N/A	ALL RBs	X	Mid/CC4	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA Configuration (Inter-band)																
1	X	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	R	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_XB-YA-ZA and CA_XC-YA-ZA Configuration (Intra-band contiguous + Inter-band)																

Default Test Settings for CA_YA-XB-ZA and CA_YA-XC-ZA Configuration (Intra-band contiguous + Inter-band) Default Test Settings for CA_YA-ZA-XB and CA_YA-ZA-XC Configuration (Intra-band contiguous + Inter-band)																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REFSENS	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REFSENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
Default Test Settings for CA_XC-YC Configuration (Intra-band contiguous + Inter-band(2))																
1	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/CC1	REFSENS	ALL RBs	X	Mid/CC2	N/A	ALL RBs	Y	Mid/CC1	N/A	ALL RBs	Y	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}
3	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid/CC1	REFSENS	ALL RBs	Y	Mid/CC2	N/A	ALL RBs	X	Mid/CC1	N/A	ALL RBs	X	Mid/CC2	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}	N/A	QPSK		Lowest N_{RB}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41E, X=41.
Note 6: **Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-8A,X=1,Y=3,Z=7,R=8.
Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_3C-7A-28A, X=3,Y=7 and Z=28.
Note 8: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.
Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.8.1A.7.4.1-2: Test Configuration Table with Wgap

Initial Conditions																				
Test Environment as specified in TS 36.508 [7] subclause 4.1						NC, TL/VL, TL/VH, TH/VL, TH/VH														
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.						For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns														
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.						Highest N_{RB}														
Network signalling value						NS_01 by default														
Test Parameters for CA Configurations																				
ID	**PCC**				**W_{gap} [MHz]**	**SCC1**				**W_{gap} [MHz]**	**SCC2**				**W_{gap} [MHz]**	**SCC3**				
	Band	**Range**	**NRB**			**Band**	**Range**	**NRB**			**Band**	**Range**	**NRB**			**Band**	**Range**	**NRB**		
	UL MOD	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**		**UL MOD**	**DL MOD**	**ULalloc**	**DLalloc**	
Default Test Settings for CA_XA-XA-YA-ZA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-XA-XA-ZA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																				
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
3	Z	Mid	REFSENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
Default Test Settings for CA_XA-XD/XD-XA/XC-XC Configurations (Intra-band non-contiguous + Intra-band contiguous)																				
TBD																				
Default Test Settings for CA_XA-XA-YA-YA Configurations (Intra-band non-contiguous + Intra-band non-contiguous)																				
1	X	CC4	REFSENS	ALL RBs	Max	X	CC3	N/A	ALL RBs	-	Y	CC2	N/A	ALL RBs	Max	Y	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	
2	Y	CC4	REFSENS	ALL RBs	Max	Y	CC3	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}	

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band non-contiguous + Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-12A,X=2,Y=4,Z=12.
Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41C-41A-41A,X=41.
Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X,Y correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-4A-4A,X=2,Y=4.
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.8.1A.7.4.1-1 through Table 7.8.1A.7.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.3A.5.4.3.

7.8.1A.7.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.8.1A.7.4.3.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1A.7.4.1-1 through Table7.8.1A.7.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1A.7.4.1-1 through Table 7.8.1A.7.4.1-2 as appropriate on PCC and SCCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

6. Set the Downlink signal level to the value as defined in Table 7.8.1A.7.5-1 or 7.8.1A.7.5-2. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.

7. Set the Interfering signal levels to the values as defined in 7.8.1A.7.5-1 or 7.8.1A.7.5-2 and frequency below the measured carrier(s) according to table 7.8.1A.7.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document.

8. Measure the average throughput for the carrier(s) indicated in table 7.8.1A.7.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.

9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to table 7.8.1A.7.4.2-1.

10. Repeat steps 6 to 9 for component carriers listed in table 7.8.1A.7.4.2-1.

Table 7.8.1A.7.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3	7.8.1A.7.5-2
	2		
Inter-band	1	SCC1	7.8.1A.7.5-1
		SCC2	
		SCC3	
	2	SCC1	
		SCC2	
		SCC3	
	3	SCC1	
		SCC2	
		SCC3	
	4	SCC1	
		SCC2	
		SCC3	
Intra-band contiguous + Inter-band	1	SCC2 SCC3	7.8.1A.7.5-1
	2		
	3	SCC1, SCC2, SCC3	7.8.1A.7.5-2 7.8.1A.7.5-1
	4		
	5	SCC1, SCC2, SCC3	7.8.1A.7.5-1 7.8.1A.7.5-2
	6		
Intra-band contiguous + Inter-band(2)	1	SCC2 SCC3	7.8.1A.7.5-1 7.8.1A.7.5-2
	2		
	3		
	4		
Intra-band non-contiguous + Inter-band	1	SCC2, SCC3	7.8.1A.7.5-1
	2	SCC1,	7.8.1A.7.5-1
		SCC2	
		SCC3	
	3	SCC1	7.8.1A.7.5-1
		SCC2	
		SCC3	
Intra-band non-contiguous + Intra-band contiguous	1	PCC	7.8.1A.7.5-1
		SCC1, SCC2, SCC3	7.8.1A.7.5-1 7.8.1A.7.5-2
	2	SCC2	7.8.1A.7.5-2
		PCC, SCC1, SCC3	7.8.1A.7.5-1 7.8.1A.7.5-2
Intra-band non-contiguous + Intra-band non-contiguous	1	SCC2	7.8.1A.7.5-1
		SCC3	
	2	SCC2	
		SCC3	

Note 1: Test point ID for the particular CA configuration as defined in section 7.8.1A.7.4.1.
Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on.
Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row.
Note 4: Skip the parts of the test procedure configuring in-gap interferer positions for a non-contiguous component carrier.

7.8.1A.7.4.3 Message contents

Same message contents as in clause 7.8.1.4.3 for without UL CA.

Same message contents as in clause 7.8.1A.1.4.3 for UL CA.

7.8.1A.7.5 Test requirement

The throughput of the carrier(s) under test shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1A.7.5-1 or Table 7.8.1A.7.5-2 for the specified wanted signal mean power in the presence of two interfering signals.

The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.

Table 7.8.1A.7.5-1: Test parameters for Wide band intermodulation (inter-band)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset from SCC)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset from SCC)	MHz	$2*F_{Interferer\ 1}$					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.

Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.

Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz.

Note 4: For the UE which supports inter band CA configuration in Tables 7.3.3-1A and 7.3.3-1B, $P_{interferer1}$ and $P_{interferer2}$ powers are increased by the amount given by ΔR_{IB} in Tables 7.3.3-1A and 7.3.3-1B.

Note 5: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.

Table 7.8.1A.7.5-2: Wide band intermodulation (Intra-band contiguous)

Rx parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12	13.8	15	
$P_{Interferer\ 1}$ (CW)	dBm	-46				
$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
$BW_{Interferer\ 2}$	MHz	5	5	5	5	
$F_{Interferer\ 1}$ (Offset)	MHz	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.
Note 4: The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz.
Note 5: The $F_{interferer\ 1}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and $F_{interferer\ 2}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C, $P_{Interferer\ 1}$ and $P_{Interferer\ 2}$ power defined in Table 7.8.1A.7.5-2 increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B and 7.3.3-1C.

7.8.1A.8 Wideband intermodulation for 5DL CA

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test configuration tables are undefined.
- Initial conditions and test procedure are still undefined.
- Parameters of the CW signal generator are undefined.

7.8.1A.8.1 Test purpose

Same as 7.8.1A.1.

7.8.1A.8.2 Test applicability

This test case applies to all types of E-UTRA UE release 11 and forward that support 5DL with TDD Intra-band contiguous CA, or 5DL with Inter-band CA, or 5DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA UE release 11 and forward that support 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA, or 5DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

This test case also applies to all types of E-UTRA UE release 12 and forward that support 5DL CA with FDD-TDD CA.

7.8.1A.8.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.8.1A.0.

7.8.1A.8.4 Test description

7.8.1A.8.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA configurations specified in table 5.4.2A.1-1 through table 5.4.2A.1-3. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1A.8.4.1-1 through table 7.8.1A.8.4.1-2 as appropriate. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 and A.3. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1A.8.4.1-1: Test Configuration Table

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Refer to “PCC N_{RB}” and “SCCs N_{RB}” columns
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				SCC1				SCC2				SCC3				SCC4			
	Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB		Band	Range	NRB	
	UL MOD	DL MOD	ULalloc (Note 2,3,4)	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc	UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for a CA_XF Configuration (Intra-band contiguous)																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC5	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	X	Mid/ CC4	N/A	ALL RBs	X	Mid/ CC5	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
Default Test Settings for a CA_XA-YA-ZA-RA-SA Configuration (Inter-band)																				
1	X	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	Y	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Z	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}

4	R	Mid	REF SENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	S	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	S	Mid	REFSENS	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
Default Test Settings for CA_ XB-YA-ZA-RA and CA_XC-YA-ZA-RA Configuration (Intra-band contiguous + Inter-band (1)) **Default Test Settings for CA_ YA-ZA-RA-XB and CA_YA-ZA-RA-XC Configuration (Intra-band contiguous + Inter-band (1))**																			
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
6	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	R	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
7	R	Mid	REF SENS	ALL RBs	Z	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}

8	R	Mid	REF SENS	ALL RBs	Z	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs
	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}
Default Test Settings for CA_ XD-YA-ZA Configuration (Intra-band contiguous + Inter-band (2))																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid	N/A	ALL RBs	Y	Mid	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}
3	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
4	Y	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
6	Z	Mid	REF SENS	ALL RBs	Y	Mid	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC3	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}

Default Test Settings CA_XB-YB-ZA, CA_XB-YC-ZA, CA_XC-YB-ZA, and CA_XC-YC-ZA Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band) Default Test Settings CA_ZA-XB-YB, CA_ZA-XB-YC, CA_ZA-XC-YB, and CA_ZA-XC-YC Configuration (Intra-band contiguous + Intra-band contiguous + Inter-band)																				
1	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
2	X	Mid/ CC1	REF SENS	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
3	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
4	Y	Mid/ CC1	REF SENS	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	Z	Mid	N/A	ALL RBs
	QPSK	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Highest N_{RB}
5	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}	N/A	QPSK		Highest N_{RB_agg}
6	Z	Mid	REF SENS	ALL RBs	X	Mid/ CC1	N/A	ALL RBs	X	Mid/ CC2	N/A	ALL RBs	Y	Mid/ CC1	N/A	ALL RBs	Y	Mid/ CC2	N/A	ALL RBs
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}	N/A	QPSK		Lowest N_{RB_agg}

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.

Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if present in the table, otherwise use Default Test Settings test points.

Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.

Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.

Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41F, X=41.

Note 6: **Inter-band:** X,Y,Z,R,S correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-7A-20A-42A,X=1,Y=3,Z=7,R=20,S=42.

Note 7: **Intra-band contiguous + Inter-band:** X,Y,Z,R correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-28A-42C, X=1, Y=3, Z=28 and R=42.

Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.

Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose for testing the Combination with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}.

Note 10: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg}, choose the Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with maximum N_{RB_PCC} for testing.

Table 7.8.1A.8.4.1-2: Test Configuration Table with W_{gap}

Initial Conditions	
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes.	For test frequencies refer to “Range” columns. For mapping within Band refer to “CC” columns
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE.	Highest N_{RB}
Network signalling value	NS_01 by default

Test Parameters for CA Configurations

ID	PCC				W_{gap} [MHz]	SCC1				W_{gap} [MHz]	SCC2				W_{gap} [MHz]	SCC3				W_{gap} [MHz]	SCC4			
	Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB			Band	Range	NRB	
	UL MOD	DL MOD	UL alloc (Note 2,3, 4)	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	UL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc		UL MOD	DL MOD	UL alloc	DL alloc
Default Test Settings for CA_XA-XA-YA-ZA-RA Configurations (Intra-band non-contiguous + Inter-band) **Default Test Settings for CA_YA-ZA-XA-XA-RA Configurations (Intra-band non-contiguous + Inter-band)** **Default Test Settings for CA_YA-ZA-RA-XA-XA Configurations (Intra-band non-contiguous + Inter-band)**																								
1	X	CC2	REFSENS	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
2	Y	Mid	REFSENS	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}

3	Z	Mid	REFSENS	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs	-	R	Mid	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
4	R	Mid	REFSENS	ALL RBs	-	Z	Mid	N/A	ALL RBs	-	Y	Mid	N/A	ALL RBs	-	X	CC2	N/A	ALL RBs	Max	X	CC1	N/A	ALL RBs
	QPSK	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}		N/A	QPSK		N_{RB_agg}
Default Test Settings for a CA_XA-XE/XC-XD Configuration (Intra-band non-contiguous + Intra-band contiguous)																							
TBD																							
Default Test Settings for a CA_XA-XA-YA-YA-ZA Configuration (Intra-band non-contiguous + Intra-band non-contiguous)																							
TBD																							

Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: Use CA Configuration – specific test points if present in the table. Otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use Default Test Settings test points.
Note 3: If, according to the UE declared capability, UE does not support UL in an individual band within the CA Configuration, test points with that individual band as PCC are not applicable.
Note 4: **Intra-band non-contiguous + Inter-band**: X, Y, Z, R correspond to the different bands in the CA Configuration. E.g. for CA_2A-2A-5A-12A-66A, X=2, Y=5, Z=12 and R=66.
Note 5: **Intra-band non-contiguous + Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_48A-48E, X=48.
Note 6: **Intra-band non-contiguous + Intra-band non-contiguous:** X, Y, Z correspond to the different bands in the CA Configuration. E.g. for CA_3A-3A-7A-7A-8A, X=3, Y=7 and Z=8.
Note 7: REFSENS refers to the PCC band's and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2.
Note 8: **Intra-band non-contiguous + Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , choose the Combination with $N_{RB_CC1} = N_{RB_CC2}$ for testing. If no such combination is supported, choose Combination with maximum N_{RB_CC1} for testing.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure group A.58 as appropriate if the UE supports 2 Rx antennas or Figure A.82 if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1, and C.3.1, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and DL Reference Measurement channels are set according to Table 7.8.1A.8.4.1-1 through Table 7.8.1A.8.4.1-2 as appropriate.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.8.1A.8.4.3.

7.8.1A.8.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.8.1A.8.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1A.8.4.1-1 through Table 7.8.1A.8.4.1-2 as appropriate on PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8.1A.8.4.1-1 through Table 7.8.1A.8.4.1-2 as appropriate on PCC and SCCs. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
6. Set the Downlink signal level to the value as defined in Table 7.8.1A.8.5-1 or 7.8.1A.8.5-2. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < $f \leq 4.2$GHz, for at least the duration of the Throughput measurement.
7. Set the Interfering signal levels to the values as defined in 7.8.1A.8.5-1 or 7.8.1A.8.5-2 and frequency below the measured carrier(s) according to table 7.8.1A.8.4.2-1, using a modulated interferer bandwidth as defined in Annex D of the present document.
8. Measure the average throughput for the carrier(s) indicated in table 7.8.1A.8.4.2-1 for a duration sufficient to achieve statistical significance according to Annex G.2A.
9. Repeat steps from 6 to 8, using an interfering signal above the measured carrier(s) according to table 7.8.1A.8.4.2-1.
10. Repeat steps 6 to 9 for component carriers listed in table 7.8.1A.8.4.2-1.

Table 7.8.1A.8.4.2-1: Test repetition and measurement configuration

CA configuration	ID (Note 1)	Throughput measured on (Note 3)	Table with test parameters to select (Note 2)
Intra-band contiguous	1	PCC, SCC1, SCC2,SCC3, SCC4	7.8.1A.8.5-2
	2		
Inter-band	1	SCC1	7.8.1A.8.5-1
		SCC2	
		SCC3	

		SCC4	
	2	SCC1	
		SCC2	
		SCC3	
		SCC4	
	3	SCC1	
		SCC2	
		SCC3	
		SCC4	
	4	SCC1	
		SCC2	
		SCC3	
		SCC4	
	5	SCC1	
		SCC2	
		SCC3	
		SCC4	
Intra-band contiguous + Inter-band (1)	1	SCC2	7.8.1A.8.5-1
		SCC3	
		SCC4	
	2	SCC2	
		SCC3	
		SCC4	
	3	SCC1,SCC2	7.8.1A.8.5-2
		SCC3	7.8.1A.8.5-1
		SCC4	
	4	SCC1,SCC2	7.8.1A.8.5-2
		SCC3	7.8.1A.8.5-1
		SCC4	
	5	SCC1	7.8.1A.8.5-1
		SCC2,SCC3	7.8.1A.8.5-2
		SCC4	7.8.1A.8.5-1
	6	SCC1	7.8.1A.8.5-1
		SCC2,SCC3	7.8.1A.8.5-2
		SCC4	7.8.1A.8.5-1
	7	SCC1	7.8.1A.8.5-1
		SCC2	
		SCC3,SCC4	7.8.1A.8.5-2
	8	SCC1	7.8.1A.8.5-1
		SCC2	
		SCC3,SCC4	7.8.1A.8.5-2
Intra-band contiguous + Inter-band (2)	1	SCC3	7.8.1A.8.5-1
		SCC4	
	2	SCC3	7.8.1A.8.5-1
		SCC4	
	3	SCC1,SCC2, SCC3	7.8.1A.8.5-2
		SCC4	7.8.1A.8.5-1
	4	SCC1,SCC2, SCC3	7.8.1A.8.5-2
		SCC4	7.8.1A.8.5-1
	5	SCC1	7.8.1A.8.5-1
		SCC2,SCC3, SCC4	7.8.1A.8.5-2
	6	SCC1	7.8.1A.8.5-1
		SCC2,SCC3, SCC4	7.8.1A.8.5-2
Intra-band non-contiguous + Inter-band	1	SCC2	7.8.1A.8.5-1
		SCC3	
		SCC4	
	2	SCC1	
		SCC2	
		SCC3	
		SCC4	
	3	SCC1	

		SCC2	
		SCC3	
		SCC4	
	4	SCC1	
		SCC2	
		SCC3	
		SCC4	
Intra-band non-contiguous + Intra-band contiguous	TBD	TBD	TBD
Intra-band non-contiguous + Intra-band non-contiguous	TBD	TBD	TBD
Note 1: Test point ID for the particular CA configuration as defined in section 7.8.1A.8.4.1. Note 2: The reference for the placement of the interferer signals is the centre frequency of the carrier closest to the interferer among the carriers throughput is measured on. Note 3: Where there are multiple rows for a single Test point ID, the test is repeated for each row. Note 4: Skip the parts of the test procedure configuring in-gap interferer positions for a non-contiguous component carrier.			

7.8.1A.8.4.3 Message contents

Same message contents as in clause 7.8.1.4.3 for without UL CA.

Same message contents as in clause 7.8.1A.1.4.3 for UL CA.

7.8.1A.8.5 Test requirement

The throughput of the carrier(s) under test shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1A.8.5-1 or Table 7.8.1A.8.5-2 for the specified wanted signal mean power in the presence of two interfering signals.

The test requirements do not apply when the interfering signal overlaps with the channel bandwidth of any downlink CC.

Table 7.8.1A.8.5-1: Test parameters for Wide band intermodulation (inter-band , intra-band non-contiguous)

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration for each CC	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset from SCC)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset from SCC)	MHz	$2*F_{Interferer\ 1}$					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz.
Note 4: For the UE which supports inter band CA configuration in Tables 7.3.3-1A and 7.3.3-1B, $P_{interferer1}$ and $P_{interferer2}$ powers are increased by the amount given by ΔR_{IB} in Tables 7.3.3-1A and 7.3.3-1B.
Note 5: For intra-band non-contiguous + inter-band CA, ΔR_{IBNC} = 0 dB for all sub-block gaps.

Table 7.8.1A.8.5-2: Wide band intermodulation (Intra-band contiguous)

Rx parameter	Units	CA Bandwidth Class				
		B	C	D	E	F
Power per CC in Aggregated Transmission Bandwidth Configuration	dBm	REFSENS + CA Bandwidth Class specific value below				
		9	12	13.8	15	16
$P_{Interferer\ 1}$ (CW)	dBm	-46				
$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
$BW_{Interferer\ 2}$	MHz	5	5	5	5	5
$F_{Interferer\ 1}$ (Offset)	MHz	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5	$-F_{offset}$-7.5 / + F_{offset}+7.5
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} or $P_{CMAX_L_CA}$ as defined in subclause 6.2.5A.
Note 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.
Note 4: The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz.
Note 5: The $F_{interferer\ 1}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the CW interferer and $F_{interferer\ 2}$ (offset) is the frequency separation of the centre frequency of the carrier closest to the interferer and the centre frequency of the modulated interferer.

For a UE, which supports CA configuration in Tables 7.3.3-1A, 7.3.3-1B, 7.3.3-1C and 7.3.3-1D, $P_{Interferer\ 1}$ and $P_{Interferer\ 2}$ power defined in Table 7.8.1A.8.5-2 increased by the amount given by $\Delta R_{IB,c}$ in Tables 7.3.3-1A, 7.3.3-1B, 7.3.3-1C and 7.3.3-1D.

7.8.1B Wide band Intermodulation for UL-MIMO

7.8.1B.1 Test purpose

Intermodulation response tests the ability of UE that support UL-MIMO to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8.1B.2 Test applicability

This test applies to all types of E-UTRA UE release 10 and forward that support UL-MIMO.

7.8.1B.3 Minimum conformance requirements

For UE(s) with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in subclause 7.8.1B.3 shall be met with the UL-MIMO configurations specified in Table 6.2.2B.3-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1B and TS 36.101 [2] Annexes A and D.

7.8.1B.4 Test description

7.8.1B.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1B.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.8.1B.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	15	15	QPSK	15	15
5MHz	QPSK	25	25	QPSK	25	25
5MHz	QPSK	25	N/A	QPSK	20	N/A
5MHz	QPSK	25	N/A	QPSK	15	N/A
5MHz	QPSK	25	N/A	QPSK	5[4]	N/A
10MHz	QPSK	50	50	QPSK	50	50
10MHz	QPSK	50	N/A	QPSK	25	N/A
10MHz	QPSK	50	N/A	QPSK	20	N/A
10MHz	QPSK	50	N/A	QPSK	15	N/A
15MHz	QPSK	75	75	QPSK	75	75
15MHz	QPSK	75	N/A	QPSK	50	N/A
15MHz	QPSK	75	N/A	QPSK	25	N/A
15MHz	QPSK	75	N/A	QPSK	20	N/A
20MHz	QPSK	100	100	QPSK	100	100
20MHz	QPSK	100	N/A	QPSK	75	N/A
20MHz	QPSK	100	N/A	QPSK	50	N/A
20MHz	QPSK	100	N/A	QPSK	25	N/A
20MHz	QPSK	100	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3.3-2 is tested per Test Channel Bandwidth.						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Applicable only to E-UTRA FDD Band 31. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).						

1. Connect the SS and interfering sources to the UE antenna connectors as shown in TS 36.508 [7] Figure A.31.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.8.1B.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.8.1B.4.3.

7.8.1B.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1B.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 4 for C_RNTI to schedule the UL RMC according to Table 7.8.1B.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.
3. Set the Downlink signal level to the value as defined in Table 7.8.1B.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4

dB of the target level in Table 7.8.1B.5-1 for carrier frequency f ≤ 3.0GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz < f ≤ 4.2GHz, for at least the duration of the throughput measurement.

4. Set the Interfering signal levels to the values as defined in Table 7.8.1B.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 4.

7.8.1B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception.

Table 7.8.1B.4.3-1: UplinkPowerControlDedicated

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlDedicated-DEFAULT ::= SEQUENCE {			
p0-UePUSCH	0		
deltaMCS-Enabled	en0		
accumulationEnabled	TRUE		
p0-uePUCCH	0		
pSRS-Offset	3 (-6 dB)		
filterCoefficient	fc8	larger filter length is used to reduce the RSRP measurement variation	
}			

7.8.1B.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1B.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1B.5-1: Test parameters for Wide band intermodulation

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz.

7.8.1C

7.8.1D Wide band intermodulation for ProSe

7.8.1D.0 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Table 7.8.1D.0-1, Table 7.8.1D.0-2, and Table 7.8.1D.0-3 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1D.0-1: Wide band intermodulation parameters for ProSe Direct Discovery

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_{offset}	dB			10.9	13.9	15.7	16.9

Table 7.8.1D.0-2: Wide band intermodulation for ProSe Direct Communication

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_{offset}	dB			0	0	0	0

Table 7.8.1D.0-3: Wide band intermodulation for ProSe

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below+ P_{offset}					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					
NOTE 1: Reference measurement channel is specified in Annex A.6.2. NOTE 2: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3.-1B and 7.3.3-1C, $P_{interferer1}$ and $P_{interferer2}$ powers defined in Table 7.8.1D.0-3 are increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.1-1A, 7.3.3.-1B and 7.3.3-1C.

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1D.

7.8.1D.1 Wide band intermodulation for ProSe Direct Discovery

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Use of OCNG for Downlink has not been considered and is still FFS.
- Message exceptions content needs further investigation (some values still TBD).
- Test time is FFS.

7.8.1D.1.1 Test Purpose

The wide band intermodulation requirement is defined following the same principles using modulated E-UTRA carrier and CW signal as interferer.

7.8.1D.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Discovery, but not ProSe Direct Communication.

7.8.1D.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8.1D.0.

7.8.1D.1.4 Test Description

7.8.1D.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA ProSe bands specified in table 5.4.2D.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1D.1.4.1-1. The details of the downlink, uplink and sidelink reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.6.

Table 7.8.1D.1.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range(Note 4)					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz, Highest					
	Downlink Configuration (Note 2)		**Uplink Configuration (Note 2)**		**Sidelink Configuration (Reception) (Note 3)**	
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Mod'n	RB allocation
5MHz	QPSK	8	QPSK	8	QPSK	2
10MHz	QPSK	16	QPSK	16	QPSK	2
15MHz	QPSK	25	QPSK	25	QPSK	2
20MHz	QPSK	30	QPSK	30	QPSK	2
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA ProSe and Operating band, according to the applicability specified respectively in Table 5.4.2D.1-1 and Table 5.4.2.1-1.						
Note 2: After DRX configuration, DL-RMC (PDSCH) and DCI-0 for scheduling UL-RMC (PUSCH) are applied only in the DRX On subframes.						
Note 3: The RB start for the transmission of Sidelink RMC is RB#0.						
Note 4: Sidelink uses the frequencies defined for Uplink.						

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.72.
2. The parameter settings for the cell are set up according to TS 36.508 [7] clause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.
4. The UL and DL Reference Measurement channels are set according to Table 7.6.1D.1.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 7.6.1D.1.4.3.

7. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

7.8.1D.1.4.2 Test Procedure

1. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions (only those marked with "…Step 1…") are defined in clause 7.8.1D.1.4.3.
2. The UE shall transmit RRCConnectionReconfigurationComplete message.
3. Initialise the variables Ptot and Pok as 0.
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 7.8.1D.1.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.
5. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 7.8D.1.4.1-1. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.
6. SS transmits PSDCH to transmit the SL RMC according to Table 7.8.1D.1.4.1-1. Set the Sidelink signal level to the appropriate value defined in Table 7.8.1D.1.5-2.
7. Set the Interfering signal levels to the values as defined in Table 7.8.1D.1.5-2 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.
8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable Ptot.
10. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE".
11. SS calculates the variable Pok as (current counter value - counter value at last test iteration).
12. SS shall compute the throughput as following:

    TP = Pok / Ptot * 100%

13. Repeat steps from 6 to 12, using an interfering signal above the wanted signal at step 7.

7.8.1D.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

- Table A.7.1.1-1 for FDD
- Table A.7.1.2-1 for TDD

Table 7.8.1D.1.4.3-1: ACTIVATE TEST MODE: Wide band Intermodulation for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 7.8.1D.1.4.3-2: CLOSE UE TEST LOOP: Wide band Intermodulation for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 7.8.1D.1.4.3-3: MAC-MainConfig-RBC: Wide band Intermodulation for ProSe Direct Discovery (applicable only for Step 1 of Test procedure)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	TBD		
periodicBSR-Timer	TBD		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	TBD		
}			

7.8.1D.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.6.2 with parameters specified in Tables 7.8.1D.1.5-1 and 7.8.1D.1.5-2.

Table 7.8.1D.1.5-1: Wide band intermodulation parameters for ProSe Direct Discovery

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_{offset}	dB			10.9	13.9	15.7	16.9

Table 7.8.1D.1.5-2: Wide band intermodulation for ProSe

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_ProSe}$ + channel bandwidth specific value below+ P_{offset}					
		12	8	6	6	7	9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$		1.4	3	5			
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5			
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					
NOTE 1: Reference measurement channel is specified in Annex A.6.2 NOTE 2: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211							

For the UE which supports inter band CA configuration in Table 7.3.3-1A, 7.3.3.-1B and 7.3.3-1C, $P_{interferer1}$ and $P_{interferer2}$ powers defined in Table 7.8.1D.0-3 are increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.1-1A, 7.3.3.-1B and 7.3.3-1C.

7.8.1D.2 Wide band intermodulation for ProSe Direct Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test description is TBD

7.8.1D.2.1 Test Purpose

Same test purpose as in clause 7.8.1D.1.1.

7.8.1D.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward which support ProSe Direct Communication.

7.8.1D.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8.1D.0.

7.8.1D.2.4 Test Description

TBD

7.8.1D.2.5 Test Requirement

Same test requirement as in clause 7.6.1D.1.5 with the following exceptions:

- Instead of Table 7.8.1D.1.5-1 → use Table 7.8.1D.2.5-1.

Table 7.8.1D.2.5-1: Wide band intermodulation for ProSe Direct Communication

Rx parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
P_{offset}	dB			0	0	0	0

7.8.1E Wide band Intermodulation for UE category 0

7.8.1E.1 Test purpose

Same test purpose as in clause 7.8.1.1.

7.8.1E.2 Test applicability

This test applies to all types of E-UTRA UE release 12 and forward of UE category 0.

7.8.1E.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.8.1.3.

7.8.1E.4 Test description

7.8.1E.4.1 Initial condition

Same initial conditions as in clause 7.8.1.4.1 with the following exceptions:

- Instead of Table 7.8.1.4.1-1 → use Table 7.8.1E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.6 using only main UE Tx/Rx antenna.

Table 7.8.1E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508 [7] subclause 4.1	NC					
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD and HD-FDD	**TDD**		**FDD and HD-FDD**	**TDD**
1.4MHz	QPSK	6	6	QPSK	6	6
3MHz	QPSK	14	14	QPSK	15	15
5MHz	QPSK	14	14	QPSK	25	25
5MHz	QPSK	14	N/A	QPSK	20	N/A
10MHz	QPSK	14	14	QPSK	36	36
10MHz	QPSK	14	N/A	QPSK	25	N/A
10MHz	QPSK	14	N/A	QPSK	20	N/A
15MHz	QPSK	14	14	QPSK	36	36
15MHz	QPSK	14	N/A	QPSK	20	N/A
20MHz	QPSK	14	14	QPSK	36	36
20MHz	QPSK	14	N/A	QPSK	20	N/A
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.						
Note 2: Depending on E-UTRA band, only the appropriate Uplink RB allocation value according to table 7.3E.3-3 is tested per Test Channel Bandwidth. The allocation shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.4.2-1).						
Note 3: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.						
Note 4: Downlink RB position shall be RBstart = 0.						

7.8.1E.4.2 Test procedure

Same test procedure as in clause 7.8.1.4.2

7.8.1E.4.3 Message contents

Same message contents as in clause 7.8.1.4.3

7.8.1E.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1E.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1E.5-1: Test parameters for Wide band intermodulation

Rx Parameter	**Units**	**Channel bandwidth**					
		1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9

$P_{Interferer\ 1}$ (CW)	dBm	-46		
$P_{Interferer\ 2}$ (Modulated)	dBm	-46		
$BW_{Interferer\ 2}$		1.4	3	5
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$		
Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5. Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz				

7.8.1EA Wide band Intermodulation for UE category M1

7.8.1EA.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8.1EA.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category M1.

7.8.1EA.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8.1EA.3-1 for the specified wanted signal mean power in the presence of two interfering signals. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.8.1EA.3-1: Wide band intermodulation for category M1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9

$P_{Interferer\ 1}$ (CW)	dBm	-46		
$P_{Interferer\ 2}$ (Modulated)	dBm	-46		
$BW_{Interferer\ 2}$		1.4	3	5
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$		

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in clause 6.2.5EA.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 with set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz.
Note 4: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2 should be used as REFSENS for the power in Transmission Bandwidth Configuration.
Note 5: For DL category M1 UE, the parameters for the applicable channel bandwidth apply, and BW refers to the corresponding channel bandwidth.

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1.

7.8.1EA.4 Test description

7.8.1EA.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1EA.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2

Table 7.8.1EA.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Mid range						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz						
Test Parameters for Channel Bandwidths and Narrowband positions							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation		
		FDD	TDD		FDD and HD-FDD	TDD	Narrowband index (Note 1)
5MHz	QPSK	4	4	QPSK	6	6	0

Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4.
Note 2: Downlink RB position shall be RB_{start} = 0 within the narrowband.

1. Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.6 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1, and uplink signals according to Annex H.1 and H.3.1.

4. The UL and DL Reference Measurement channels are set according to Table 7.8.1EA.4.1-1.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.8.1EA.4.3.

7.8.1EA.4.2 Test procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 7.8.1EA.4.1-1. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via MPDCCH DCI format 6-0A for C_RNTI to schedule the UL RMC according to Table 7.8.1EA.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the downlink signal level according to the value as defined in Table 7.8.1EA.5-1. Send uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the target level in table 7.8.1EA.5-1 for carrier frequency $f \leq 3.0$GHz or within +0, -4.0 dB of the target level for carrier frequency 3.0GHz $< f \leq$ 4.2GHz, for at least the duration of the throughput measurement.

4. Set the Interfering signal levels to the values as defined in Table 7.8.1EA.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 4.

7.8.1EA.4.3 Message contents

Same message contents as in clause 7.8.1.4.3

7.8.1EA.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1EA.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1EA.5-1: Test parameters for Wide band intermodulation for category M1

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + channel bandwidth specific value below					
		12	8	6	6	7	9

$P_{Interferer\ 1}$ (CW)	dBm	-46		
$P_{Interferer\ 2}$ (Modulated)	dBm	-46		
$BW_{Interferer\ 2}$		1.4	3	5
$F_{Interferer\ 1}$ (Offset)	MHz	-BW/2 –2.1 / +BW/2+ 2.1	-BW/2 –4.5 / +BW/2 + 4.5	-BW/2 – 7.5 / +BW/2 + 7.5
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$		

Note 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3EA-3 with P_{CMAX_L} as defined in clause 6.2.5EA.
Note 2: The reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
Note 3: The modulated interferer consists of the Reference measurement channel specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1.The interfering modulated signal is 5MHz E-UTRA signal as described in Annex D for channel bandwidth ≥5MHz
Note 4: For DL category M1 UE, the reference sensitivity for category M1 in table 7.3EA-1 and 7.3EA-2 should be used as REFSENS for the power in Transmission Bandwidth Configuration.
Note 5: For DL category M1 UE, the parameters for the applicable channel bandwidth apply, and BW refers to the corresponding channel bandwidth.

7.8.1F Wide band Intermodulation for category NB1

7.8.1F.1 Test purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8.1F.2 Test applicability

This test case applies to all types of UE release 13 and forward of category NB1.

7.8.1F.3 Minimum conformance requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in Annex A.3.2 with parameters specified in Table 7.8.1F.3-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1F.3-1: Wide band intermodulation for category NB1

Parameters for wideband intermodulation	
Category NB1 Signal power	REFSENS + 12 dB
CW interferer signal power	- 46 dBm
1.4 MHz E-UTRA interferer signal power	- 46 dBm
CW interferer offset	± 2.2 MHz
1.4 MHz E-UTRA interferer	± 4.4 MHz

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1F.

7.8.1F.4 Test description

7.8.1F.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test parameters, and are shown in table 7.8.1F.4.1-1. The details of the downlink reference measurement channels (RMCs) are specified in Annex A.3. Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Table 7.8.1F.4.1-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 36.508 [7] clause 8.1.1			NC		
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defiend in Annex K.1.1		
Configuration ID	**Downlink Configuration**		**Uplink Configuration**		
	Modulation	Subcarriers	Modulation	N_{tones}	Subcarrier spacing
1	QPSK	12	BPSK	1@0	15 kHz

1. Connect the SS to the UE antenna connector as shown in TS 36.508 [7] Annex A, Figure A. 6 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.2, and NPUSCH Format 2 is used to carry ACK/NACK on the uplink.
4. The DL Reference Measurement channel is set according to Table 7.8.1F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 7.8.1F.4.3.

7.8.1F.4.2 Test procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Table 7.8.1F.4.1-1. The SS sends downlink MAC padding bits on the DL RMC. The UE will send HARQ feedback based on information contained in DCI format N1.
2. Set the Downlink signal level according to the Table 7.8.1F.5-1.
3. Set the Interfering signal levels to the values as defined in Table 7.8.1F.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
5. Repeat steps from 2 to 4, using an interfering signal above the wanted signal at step 3.

7.8.1F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 8.1.6

7.8.1F.5 Test requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1F.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1F.5-1: Test parameters for Wide band intermodulation for category NB1

Parameters for wideband intermodulation	
Category NB1 Signal power	REFSENS + 12 dB
CW interferer signal power	- 46 dBm
1.4 MHz E-UTRA interferer signal power	- 46 dBm
CW interferer offset [MHz]	-BW/2 – 2.1 / +BW/2 + 2.1
1.4 MHz E-UTRA interferer offset [MHz]	2*CW interferer offset

7.8.1G Wide band Intermodulation for V2X Communication

7.8.1G.1 Wide band Intermodulation for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test tolerance is FFS.

7.8.1G.1.1 Test Purpose

Intermodulation response for V2X tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8.1G.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.8.1G.1.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Table 7.8.1G.1.3-1 for the specified wanted signal mean power in the presence of two interfering signals

Table 7.8.1G.1.3-1: Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$					10		10
$F_{Interferer\ 1}$ (Offset)	MHz				-BW/2 – 15 / +BW/2 + 15		-BW/2 – 15 / +BW/2 + 15
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					
NOTE 1: Reference measurement channel is specified in Annex A.8.2. NOTE 2: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1G.

7.8.1G.1.4 Test Description

7.8.1G.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3, and reference GNSS configuration as defined in Table C.2-8. in Annex C.2

Table 7.8.1G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.89.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 7.8.1G.1.4.3.
3. The V2X reference measurement channel is set according to Table 7.8.1G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.

5. UE test mode – State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C.

7.8.1G.1.4.2 Test Procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.

2. Set the Downlink signal level to the value as defined in Table 7.8.1G.1.5-1.

3. Set the Interfering signal levels to the values as defined in Table 7.8.1G.1.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

5. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 3.

7.8.1G.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.8.1G.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1G.1.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1G.1.5-1: Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$					10		10
$F_{Interferer\ 1}$ (Offset)	MHz				-BW/2 – 15 / +BW/2 + 15		-BW/2 – 15 / +BW/2 + 15
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					
NOTE 1: Reference measurement channel is specified in Annex A.8.2. NOTE 2: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

7.8.1G.2 Wide band Intermodulation for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test tolerance is TBD.

- Connection diagram is TBD.

7.8.1G.2.1 Test Purpose

Same as in clause 7.8.1G.1.

7.8.1G.2.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.8.1G.2.3 Minimum Conformance Requirements

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Table 7.8.1G.2.3-1 for the specified wanted signal mean power in the presence of two interfering signals

Table 7.8.1G.2.3-1: Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$					10		10
$F_{Interferer\ 1}$ (Offset)	MHz				-BW/2 – 15 / +BW/2 + 15		-BW/2 – 15 / +BW/2 + 15
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					
NOTE 1: Reference measurement channel is specified in Annex A.8.2. NOTE 2: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

When UE is configured for simultaneous E-UTRA V2X sidelink and E-UTRA downlink reception for inter-band E-UTRA V2X / E-UTRA bands specified in Table 5.2G-2, the requirements in subclause 7.8.1G.2.3 apply for the E-UTRA V2X sidelink reception and the requirements in subclause 7.8.1.3 apply for the E-UTRA downlink reception while all downlink carriers are active.

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1G.

7.8.1G.2.4 Test Description

7.8.1G.2.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-2. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.8.1G.2.4.1-1. The details of the uplink, downlink and V2X reference measurement channels (RMCs) are specified in Annexes A.2, A.3 and A.8.3 respectively.

Table 7.8.1G.2.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	NC						
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, 5MHz, Highest for uplink Lowest, Highest for V2X						
Test Parameters for Channel Bandwidths							
	Downlink		**Uplink Configuration**		**V2X Configuration**		
Ch BW	Mod'n	RB allocation	Mod'n	RB allocation	Ch BW	Mod'n	RB allocation
1.4 MHz	QPSK	1	QPSK	1	10 MHz	QPSK	[48]
1.4 MHz	QPSK	5	QPSK	5	20 MHz	QPSK	[96]
3 MHz	QPSK	1	QPSK	1			
3 MHz	QPSK	4	QPSK	4			
5 MHz	QPSK	1	QPSK	1			
5 MHz	QPSK	8	QPSK	8			
10 MHz	QPSK	1	QPSK	1			
10 MHz	QPSK	12	QPSK	12			
15 MHz	QPSK	1	QPSK	1			
15 MHz	QPSK	16	QPSK	16			
20 MHz	QPSK	1	QPSK	1			
20 MHz	QPSK	18	QPSK	18			
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.							

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD].
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3. Message content exceptions are defined in clause 7.8.1G.2.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.0, and uplink signals according to Annex H.1 and H.3.0.
4. The UL and V2X Reference Measurement Channels are set according to Table 7.8.1G.2.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C. Message content exceptions are defined in clause 7.6.2G.2.4.3.

7.8.1G.2.4.2 Test Procedure

1. The SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 7.6.2G.2.4.1-1 on E-UTRA Band. The SS sends downlink MAC padding bits on the DL RMC.
2. SS simultaneously sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC and V2X scheduling information via PDCCH DCI format 5A for SL_V_RNTI to schedule the V2X RMC according to Table 7.8.1G.2.4.1-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL and V2X RMCs.
3. Set the Downlink signal level to the value as defined in Table 7.8.1G.2.5-1.
4. Set the Interfering signal levels to the values as defined in Table 7.8.1G.2.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.
6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal at step 3.

7.8.1G.2.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.8.1G.2.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1G.2.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1G.2.5-1: Wide band intermodulation

Rx Parameter	Units	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in Transmission Bandwidth Configuration	dBm	$P_{REFSENS_V2X}$ + channel bandwidth specific value below					
					6		9
$P_{Interferer\ 1}$ (CW)	dBm	-46					
$P_{Interferer\ 2}$ (Modulated)	dBm	-46					
$BW_{Interferer\ 2}$					10		10
$F_{Interferer\ 1}$ (Offset)	MHz				-BW/2 – 15 / +BW/2 + 15		-BW/2 – 15 / +BW/2 + 15
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$					
NOTE 1: Reference measurement channel is specified in Annex A.8.2. NOTE 2: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. The data content shall be uncorrelated to the wanted signal and modulated according to clause 5 of TS36.211.							

7.8.1G.3 Wide band Intermodulation for V2X Communication / Intra-band contiguous multi-carrier operation

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test tolerance is TBD.

7.8.1G.3.1 Test Purpose

Same as in clause 7.8.1G.1.

7.8.1G.3.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.8.1G.3.3 Minimum Conformance Requirements

For intra-band contiguous multi-carrier operation, the V2X UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.8.2 with parameters specified in Table 7.8.1G.3.3-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1G.3.3-1: Wide band intermodulation for intra-band contiguous multi-carrier for V2X UE

Rx parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
P_w in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + V2X Bandwidth Class specific value below				
		9				
$P_{Interferer\ 1}$ (CW)	dBm	-46				
$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
$BW_{Interferer\ 2}$	MHz	10				
$F_{Interferer\ 1}$ (Offset)	MHz	$-F_{offset}$-15 / + F_{offset}+15				
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				
NOTE 1: The requirement is applied for 2 carrier intra-concurrent recpetions when 2 carrier transmission are activated at the same time						

The normative reference for this requirement is TS 36.101 [2] clause 7.8.1G.

7.8.1G.3.4 Test Description

7.8.1G.3.4.1 Initial Conditions

Same initial conditions as in clause 7.8.1G.1.4.1 with the following exceptions:

- Instead of Table 7.8.1G.1.4.1-1 → use Table 7.8.1G.3.4.1-1.

Table 7.8.1G.3.4.1-1: Test Configuration Table

Initial Conditions			
Test Environment as specified in TS 36.508[7] subclause 4.1		NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1		Low range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1		Lowest N_{RB_agg}, Highest N_{RB_agg}	
Test Parameters for Channel Bandwidths			
V2X MCC Configuration		**V2X PSSCH Allocation**	
CC1 N_{RB}	**CC2 N_{RB}**	**CC1 & CC2 Mod**	**CC1 and CC2 RB Allocation**
10MHz	10MHz	QPSK	[48+48]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.92d.

7.8.1G.3.4.2 Test Procedure

1. The UE starts to perform the V2X sidelink communication according to SL-V2X-Preconfiguration. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the V2X RMC.

2. Set the Downlink signal level to the value as defined in Table 7.8.1G.3.5-1.

3. Set the Interfering signal levels to the values as defined in Table 7.8.1G.3.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in Annex D of the present document.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

5. Repeat steps from 2 to 4, using an interfering signal above the wanted signal at step 2.

7.8.1G.3.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.8.1G.3.5 Test Requirement

For intra-band contiguous multi-carrier operation,the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8.1G.3.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8.1G.3.5-1: Wide band intermodulation for intra-band contiguous multi-carrier for V2X UE

Rx parameter	Units	V2X Bandwidth Class				
		B	C	D	E	F
P_w in Transmission Bandwidth Configuration, per CC	dBm	REFSENS + V2X Bandwidth Class specific value below				
		9				
$P_{Interferer\ 1}$ (CW)	dBm	-46				
$P_{Interferer\ 2}$ (Modulated)	dBm	-46				
$BW_{Interferer\ 2}$	MHz	10				
$F_{Interferer\ 1}$ (Offset)	MHz	$-F_{offset}$-15 / + F_{offset}+15				
$F_{Interferer\ 2}$ (Offset)	MHz	$2*F_{Interferer\ 1}$				
NOTE 1: The requirement is applied for 2 carrier intra-concurrent recpetions when 2 carrier transmission are activated at the same time						

7.8.2 Void

7.9 Spurious emissions

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

7.9.1 Test Purpose

Test verifies the UE's spurious emissions meet the requirements described in clause 7.9.3.

Excess spurious emissions increase the interference to other systems.

7.9.2 Test Applicability

This test applies to all types of E-UTRA UE release 8 and forward.

7.9.3 Minimum Conformance Requirements

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 7.9.3-1

Table 7.9.3-1: General receiver spurious emission requirements

Frequency Band	Measurement Bandwidth	Maximum level	Note
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	Note 1
Note 1: Applies only for Band 22, Band 42,Band 43 and Band 48. Note 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1.			

The normative reference for this requirement is TS 36.101 [2] clause 7.9.1.

7.9.4 Test Description

7.9.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in table 5.4.2.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.9.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.3 and A.2 respectively.

Table 7.9.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	0	0	QPSK	0	0
3MHz	QPSK	0	0	QPSK	0	0
5MHz	QPSK	0	0	QPSK	0	0
10MHz	QPSK	0	0	QPSK	0	0
15MHz	QPSK	0	0	QPSK	0	0
20MHz	QPSK	0	0	QPSK	0	0
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band. The applicable channel bandwidths are specified in Table 7.3.3-2.						

1. Connect a spectrum analyzer (or other suitable test equipment) to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.8.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.1.
4. The DL Reference Measurement channels are set according to Table 7.9.4.1-1.
5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.9.4.3.

7.9.4.2 Test Procedure

1. Sweep the spectrum analyzer (or equivalent equipment) over a frequency range and measure the average power of spurious emission.

2. Repeat step 1 for all E-UTRA Rx antennas of the UE.

7.9.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.9.5 Test Requirement

The measured spurious emissions derived in step 1), shall not exceed the maximum level specified in Table 7.9.5-1.

Table 7.9.5-1: General receiver spurious emission requirements

Frequency Band	Measurement Bandwidth	Maximum level	Note
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	Note 1
Note 1: Applies only for Band 22, Band 42, Band 43 and Band 48. Note 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1.			

7.9_1 Spurious emissions with 4 Rx antenna ports

7.9_1.1 Test Purpose

Test verifies the UE's spurious emissions meet the requirements described in clause 7.9_1.3.

Excess spurious emissions increase the interference to other systems.

7.9_1.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that supports 4 Rx antenna ports.

7.9_1.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.9.3.

7.9_1.4 Test Description

7.9_1.4.1 Initial Conditions

Same as in clause 7.9.4.1 with following exceptions:

- Instead of Table 7.9.4.1-1→ use Table 7.9_1.4.1-1.

- Instead of Figure A.8→ use Figure A.83 configuration Table.

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	NC	
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Highest	
Test Parameters for Channel Bandwidths		
	Downlink Configuration	**Uplink Configuration**

- Instead of clause 7.9.4.3→ use clause 7.9_1.4.3.

Table 7.9_1.4.1-1: Test ConfiCh BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD	**TDD**		**FDD**	**TDD**
1.4MHz	QPSK	0	0	QPSK	0	0
3MHz	QPSK	0	0	QPSK	0	0
5MHz	QPSK	0	0	QPSK	0	0
10MHz	QPSK	0	0	QPSK	0	0
15MHz	QPSK	0	0	QPSK	0	0
20MHz	QPSK	0	0	QPSK	0	0
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band. The applicable channel bandwidths are specified in Table 7.3.3-2.						

7.9_1.4.2 Test Procedure

Same as in clause 7.9.4.2.

7.9_1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.9_1.5 Test Requirement

The measured spurious emissions derived in step 1), shall not exceed the maximum level specified in Table 7.9_1.5-1.

Table 7.9_1.5-1: General receiver spurious emission requirements

Frequency Band	Measurement Bandwidth	Maximum level	Note
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	Note 1
Note 1: Applies only for Band 22, Band 42 and Band 43. Note 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1.			

7.9A Spurious emissions for CA

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

7.9A.1 Test Purpose

Test verifies the UE's spurious emissions meet the requirements described in clause 7.9A.3.

Excess spurious emissions increase the interference to other systems.

7.9A.2 Test Applicability

This test applies to all types of E-UTRA UE release 10 and forward that support inter-band DL CA with a DL-only band.

7.9A.3 Minimum Conformance Requirements

For E-UTRA CA configurations including an operating band without uplink band (as noted in Table 5.2-1), the power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 7.9A.3-1.

Table 7.9A.3-1: General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	Note
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 26 GHz	1 MHz	-47 dBm	3
NOTE 1: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1. NOTE 2: The requirements apply when the UE is configured for carrier aggregation but is not transmitting. NOTE 3: Applies only for Band 46			

The normative reference for this requirement is TS 36.101 [2] clause 7.9.1A

7.9A.4 Test Description

7.9A.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA CA bands specified in Table 5.4.2A.1-1 and Table 5.4.2A.1-2. All of these configurations shall be tested with applicable test parameters for each CA Configuration, and are shown in Table 7.9A.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.9A.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1 for different CA bandwidth classes, and PCC and SCCs are mapped onto physical frequencies according to Table 7.1-2	A: Low range, Mid range, High range for PCC and SCC					
Test CC Combination setting (N_{RB_agg}) as specified in subclause 5.4.2A.1 for the CA Configuration across bandwidth combination sets supported by the UE	Highest N_{RB_agg} for PCC and SCC					
Test Parameters for CA Configurations						
CA Configuration / N_{RB_agg}		**DL Allocation**			**UL Allocation**	
PCC N_{RB}	**SCCs N_{RB}**	**CC MOD**	**PCC & SCC RB allocation**		**CC MOD**	**PCC N_{RB_alloc}**
50	50	QPSK	0	0	QPSK	0
50	75	QPSK	0	0	QPSK	0
50	100	QPSK	0	0	QPSK	0
75	50	QPSK	0	0	QPSK	0
75	100	QPSK	0	0	QPSK	0
100	50	QPSK	0	0	QPSK	0
100	75	QPSK	0	0	QPSK	0
100	100	QPSK	0	0	QPSK	0
Note 1: CA Configuration Test CC Combination settings are checked separately for each CA Configuration, which applicable aggregated channel bandwidths are specified in Table 5.4.2A.1-2.						

1. Connect the SS to the UE antenna connectors as shown in Figure TS 36.508 [7] Annex A, Figure A.8a as appropriate if the UE supports 2 Rx antennas or Figure TBD if the UE supports 4 Rx antennas in the band.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.0.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 7.9A.4.3.

7.9A.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.1 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 7.9A.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Sweep the spectrum analyzer (or equivalent equipment) over a frequency range and measure the average power of spurious emission. During measurement SS sends no uplink scheduling information to the UE
5. Repeat step 4 for all E-UTRA Rx antennas of the UE.

7.9A.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.9A.5 Test Requirement

The measured spurious emissions derived in step 4), shall not exceed the maximum level specified in Table 7.9A.5-1

Table 7.9A.5-1: General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	Note
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 26 GHz	1 MHz	-47 dBm	3
NOTE 1: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1. NOTE 2: The requirements apply when the UE is configured for carrier aggregation but is not transmitting. NOTE 3: Applies only for Band 46			

7.9E Spurious emissions for UE category 0

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

7.9E.1 Test Purpose

Same test purpose as in clause 7.9.1.

7.9E.2 Test Applicability

This test applies to all types of E-UTRA UE release 12 and forward of UE category 0.

7.9E.3 Minimum Conformance Requirements

Same minimum conformance requirements as in clause 7.9.3.

7.9E.4 Test Description

7.9E.4.1 Initial Conditions

Same initial conditions as in clause 7.9.4.1 with the following exceptions:

- Instead of Table 7.9.4.1-1 → use Table 7.9E.4.1-1.
- Connect the SS to the UE antenna connectors as shown in TS 36.508[7] Annex A Figure A.8 using only main UE Tx/Rx antenna.

Table 7.9E.4.1-1: Test Configuration Table

Initial Conditions						
Test Environment as specified in TS 36.508[7] subclause 4.1	NC					
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range					
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Highest					
Test Parameters for Channel Bandwidths						
	Downlink Configuration			**Uplink Configuration**		
Ch BW	**Mod'n**	**RB allocation**		**Mod'n**	**RB allocation**	
		FDD and HD-FDD	**TDD**		**FDD and HD-FDD**	**TDD**
1.4MHz	QPSK	0	0	QPSK	0	0
3MHz	QPSK	0	0	QPSK	0	0
5MHz	QPSK	0	0	QPSK	0	0
10MHz	QPSK	0	0	QPSK	0	0
15MHz	QPSK	0	0	QPSK	0	0
20MHz	QPSK	0	0	QPSK	0	0
Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band. The applicable channel bandwidths are specified in Table 7.3E.3-3.						

7.9E.4.2 Test Procedure

Same test procedure as in clause 7.9.4.2

7.9E.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.9E.5 Test Requirement

The measured spurious emissions derived in step 1), shall not exceed the maximum level specified in Table 7.9E.5-1.

Table 7.9E.5-1: General receiver spurious emission requirements

Frequency Band	Measurement Bandwidth	Maximum level	Note
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	Note 1
Note 1: Applies only for Band 22, Band 42 and Band 43. Note 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1.			

7.9EA Spurious emissions for UE category M1

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

7.9EA.1 Test Purpose

Test verifies the UE's spurious emissions meet the requirements described in clause 7.9.3.

Excess spurious emissions increase the interference to other systems.

7.9EA.2 Test Applicability

This test applies to all types of E-UTRA UE release 13 and forward of UE category M1.

7.9EA.3 Minimum Conformance Requirements

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 7.9EA.3-1

Table 7.9EA.3-1: General receiver spurious emission requirements

Frequency Band	Measurement Bandwidth	Maximum level	Note
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	Note 1
Note 1: Applies only for Band 22, Band 42 and Band 43. Note 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1.			

The normative reference for this requirement is TS 36.101 [2] clause 7.9.1.

7.9EA.4 Test Description

7.9EA.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in clause 5.2E. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.9EA.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 respectively.

Table 7.9EA.4.1-1: Test Configuration Table

Initial Conditions							
Test Environment as specified in TS 36.508[7] subclause 4.1	NC						
Test Frequencies as specified in TS36.508 [7] subclause 4.3.1	Low range, Mid range, High range						
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	5MHz						
Test Parameters for Channel Bandwidths and Narrowband positions							
	Downlink Configuration			**Uplink Configuration**			
Ch BW	Mod'n	RB allocation		Mod'n	RB allocation		
		FDD	TDD		FDD and HD-FDD	TDD	Narrowband index (Note 1)
5MHz	QPSK	0	0	QPSK	0	0	0
Note 1: Denotes where in the channel Bandwidth the narrowband shall be placed. Narrowband and Narrowband index are defined in TS36.211, 5.2.4							

1. Connect a spectrum analyzer (or other suitable test equipment) to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.7 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 4.4.3.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.1.
4. The DL Reference Measurement channels are set according to Table 7.9EA.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 7.9EA.4.3.

7.9EA.4.2 Test Procedure

1. Sweep the spectrum analyzer (or equivalent equipment) over a frequency range and measure the average power of spurious emission.

2. Repeat step 1 for all E-UTRA Rx antennas of the UE.

7.9EA.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.9EA.5 Test Requirement

The measured spurious emissions derived in step 1), shall not exceed the maximum level specified in Table 7.9EA.5-1.

Table 7.9EA.5-1: General receiver spurious emission requirements

Frequency Band	Measurement Bandwidth	Maximum level	Note
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	Note 1
Note 1: Applies only for Band 22, Band 42 and Band 43. Note 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1.			

7.9F Spurious emissions for Category NB1

7.9F.1 Test Purpose

Same test purpose as in clause 7.9.1.

7.9F.2 Test Applicability

This test applies to all types of E-UTRA UE release 13 and forward that support Category NB1.

7.9F.3 Minimum Conformance Requirements

Minimum conformance requirements as in Table 7.9F.3-1.

Table 7.9F.3-1: Minimum Receiver Spurious Emission Requirements

Frequency band	Measurement bandwidth	Maximum level	NOTE
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	

The normative reference for this requirement is TS 36.101 [2] clause 7.9.1.

7.9F.4 Test Description

7.9F.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions and test frequencies based on the subset of E-UTRA operating bands defined for NB-IoT in clause 5.2F. All of these configurations shall be tested with applicable test

parameters, and are shown in table 7.9F.4.1-1. The details of the downlink reference measurement channels (RMCs) are specified in Annex A.3.

Table 7.9F.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 36.508 [7] clause 8.1.1			NC	
Test Frequencies as specified in TS36.508 [7] clause 8.1.3.1			Frequency ranges defiend in Annex K.1.1	
Configuration ID	**Downlink Configuration**		**Uplink Configuration**	
	Modulation	N_{tones}	Modulation	N_{tones}
1	QPSK	0	BPSK	0

1. Connect the SS to the UE antenna connector as shown in TS 36.508 [7] Annex A, Figure A.8 using only the main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to TS 36.508 [7] subclause 8.1.4.3
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.2,
4. The DL Reference Measurement channel is set according to Table 7.9F.4.1-1.
5. Propagation conditions are set according to Annex B.0.
6. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 7.9F.4.3.

7.9F.4.2 Test Procedure

1. Sweep the spectrum analyzer (or equivalent equipment) over a frequency range and measure the average power of spurious emission.

7.9F.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 8.1.6.

7.9F.5 Test Requirement

The measured spurious emissions derived in step 1), shall not exceed the maximum level specified in Table 7.9F.5-1

Table 7.9F.5-1: General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	NOTE
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	

7.9G Spurious emissions for V2X Communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test tolerance is FFS.

7.9G.1 Spurious emissions for V2X Communication / Non-concurrent with E-UTRA uplink transmissions

7.9G.1.1 Test Purpose

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

7.9G.1.2 Test Applicability

This test applies to all types of E-UTRA UE release 14 and forward that support V2X Communication.

7.9G.1.3 Minimum Conformance Requirements

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 7.9G.1.3-1.

Table 7.9G.1.3-1: General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	NOTE
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	1
12.75 GHz – 26GHz	1 MHz	-47dBm	3
NOTE 1: Applies only for Band 22, Band 42, Band 43 and Band 48 NOTE 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1. NOTE 3: Applies for Band 47			

In addition, for a V2X UE operating in Region 1, the power of any spurious emission shall not exceed the levels specified in Table 7.9G.1.3-2.

Table 7.9G.1.3-2: Additional RX spurious emissions limits in Region 1

Frequency Range	Maximum Level	Measurement bandwidth	NOTE
5795 MHz ≤ f < 5815MHz	[-65 dBm]	1 MHz	
NOTE: The additional Rx spurious emission limits, however, are specified in EIRP in Region 1. Furthermore, the requirement varies based on antenna installation. It is FFS how to convert this to conducted requirements.			

The normative reference for this requirement is TS 36.101 [2] clause 7.9.

7.9G.1.4 Test Description

7.9G.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA operating bands specified in table 5.4.2G.1-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in table 7.9G.1.4.1-1. The details of the V2X reference measurement channels (RMCs) are specified in Annex A.8.3, and reference GNSS configuration as defined in Table C.2-8. in Annex C.2

Table 7.9G.1.4.1-1: Test Configuration Table

Initial Conditions		
Test Environment as specified in TS 36.508[7] subclause 4.1	NC	
Test Frequencies as specified in TS 36.508 [7] subclause 4.3.1	Mid range	
Test Channel Bandwidths as specified in TS 36.508 [7] subclause 4.3.1	Lowest, Highest	
Test Parameters for Channel Bandwidths		
	V2X Configuration to Transmit	
Ch BW	Modulation	RB allocation
10MHz	QPSK	[48]
20MHz	QPSK	[96]

1. Connect the SS to the UE antenna connectors and connect the GNSS simulator to the UE GNSS RX antenna connector as shown in TS 36.508 [7] Annex A, Figure A.89.
2. The parameter settings for the V2X sidelink transmission over PC5 are pre-configured according to TS 36.508 [7] subclause 6.8.2. Message content exceptions are defined in clause 7.9G.1.4.3.
3. The V2X reference measurement channel is set according to Table 7.9G.1.4.1-1.
4. Propagation conditions are set according to Annex B.0.
5. UE test mode – State 3A-RF-V2X according to TS 36.508 [7] clause 5.2A.2C.

7.9G.1.4.2 Test Procedure

1. Sweep the spectrum analyzer (or equivalent equipment) over a frequency range and measure the average power of spurious emission.
2. Repeat step 1 for all E-UTRA Rx antennas of the UE.

7.9G.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] subclause 4.6.

7.9G1.5 Test Requirement

The measured spurious emissions derived in step 1), shall not exceed the maximum level specified in Table 7.9G.1.5-1

Table 7.9G.1.5-1: General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	NOTE
30MHz ≤ f < 1GHz	100 kHz	-57 dBm	
1GHz ≤ f ≤ 12.75 GHz	1 MHz	-47 dBm	
12.75 GHz ≤ f ≤ 5th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	1
12.75 GHz – 26GHz	1 MHz	-47dBm	3
NOTE 1: Applies only for Band 22, Band 42, Band 43 and Band 48 NOTE 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1. NOTE 3: Applies for Band 47			

In addition, for a V2X UE operating in Region 1, the measured spurious emissions derived in step 1) shall not exceed the levels specified in Table 7.9G.1.5-2.

Table 7.9G.1.5-2: Additional RX spurious emissions limits in Region 1

Frequency Range	Maximum Level	Measurement bandwidth	NOTE
5795 MHz ≤ f < 5815MHz	[-65 dBm]	1 MHz	
NOTE: The additional Rx spurious emission limits, however, are specified in EIRP in Region 1. Furthermore, the requirement varies based on antenna installation. It is FFS how to convert this to conducted requirements.			

7.10 Void

7.10A Receiver image for CA

TS 36.101 [2] clause 7.10.1A specifies minimum requirements for receiver image for CA but recommends that these requirements do not need to be tested.

8 Performance Requirement

8.1 General

The performance requirements for the physical channels specified in TS 36.211 [8] clause 6 (for downlink physical channels) shall be as defined in the respective sections below.

The requirements for the UE in this clause are specified for the downlink reference measurement channels specified in Annex A, the propagation conditions specified in Annex B and the downlink physical channels specified in Annex C.

Unless otherwise stated the throughput measurements in clause 8 shall be performed according to the general rules for statistical testing in Annex G clause G.3.

The requirement for a UE that support E-UTRA in downlink shall be tested according to the declared UE PDSCH category and CA capabilities.

The fading of the signals and the AWGN signals applied to each receiver antenna connector shall be uncorrelated. The levels of the test signal applied to each of the antenna connectors shall be as defined in the respective test cases.

The UE performance in this section is considered to be operating band independent. Therefore, the required performance in the respective test cases can be verified in one of the operating bands supported by the UE under test. All the test points supported by the bands of the multiband UE (based on channel bandwidth, DL and UL configuration) need to be tested.

For CA testing, unless otherwise stated, the logical carriers PCC / SCC are mapped on physical frequencies as defined in Table 8.1-1.

Table 8.1-1: PCC/SCCs frequency mapping

CA Configuration	PCC mapping	Notes
Intra-band CA	CC1	1
Inter-band CA (CA_x-y-z-…-n)	Bx (if not supported by the UE, then any one of the supported bands)	2
Note 1: Notation CCi means PCC on component carrier CCi and SCCs on all remaining component carriers, with frequencies defined in the corresponding intra-band contiguous / non-contiguous CA band in TS 36.508.		
Note 2: Notation Bi means PCC on component Band i and SCCs on all remaining component carriers, with frequencies defined in TS 36.508.		

8.1.1 Receiver antenna capability

The performance requirements are based on UE(s) that utilize one or more antenna receivers.

For all test cases, the SNR is defined as:

$$SNR = \frac{\sum_{j=1}^{N_{RX}} \hat{E}_s^{(j)}}{\sum_{j=1}^{N_{RX}} N_{oc}^{(j)}},$$

where N_{RX} denotes the number of receiver antenna connectors and the superscript receiver antenna connector j. The above SNR definition assumes that the REs are not precoded. The SNR definition does not account for any gain which can be associated to the precoding operation. The relative power of physical channels transmitted is defined in Table C.3.2-1. The SNR requirement applies for the UE categories and CA capabilities given for each test.

For enhanced performance requirements type A, the SINR is defined as

$$SINR = \frac{\sum_{j=1}^{N_{RX}} \hat{E}_s^{(j)}}{\sum_{j=1}^{N_{RX}} N_{oc}^{(j)}},$$

where N_{RX} denotes the number of receiver antenna connectors and the superscript receiver antenna connector j. The above SINR definition assumes that the REs are not precoded. The SINR definition does not account for any gain which can be associated to the precoding operation. The relative power of physical channels transmitted is defined in Table C.3.2-1. The SINR requirement applies for the UE categories given for each test.

For the performance requirements specified in this clause, it is assumed that N_{RX}=2 unless otherwise stated.

Table 8.1.1-1: Void

8.1.1.1 Simultaneous unicast and MBMS operations

8.1.1.2 Dual-antenna receiver capability in idle mode

8.1.2 Applicability of requirements

8.1.2.1 Applicability of requirements for different channel bandwidths

In Clause 8 the test cases may be defined with different channel bandwidth to verify the same target FRC conditions with the same propagation conditions, correlation matrix and antenna configuration.

Test cases defined for 5MHz channel bandwidth that reference this clause are applicable to UEs that support only Band 31.

8.1.2.2 Definition of CA capability

The definition with respect to CA capabilities for 2CCs is given as in Table 8.1.2.2-1. The definition with respect to CA capabilities for 3CCs is given in Table 8.1.2.2-3.

Table 8.1.2.2-1: Definition of CA capability with 2DL CCs

CA Capability	CA Capability Description
CA2_C	Intra-band contiguous CA
CA2_A2	Inter-band CA (two bands)
CA2_N2	Intra-band non-contiguous CA (with two sub-blocks)
Note 1: CA2_C corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-1 for 2 DL CCs. CA2_A2 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-2 for 2 DL CCs. CA2_N2 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-3 for 2 DL CCs.	

The supported testable aggregated CA bandwidth combinations for 2CCs for each CA capability are listed in Table 8.1.2.2-2.

Table 8.1.2.2-2: Supported testable aggregated CA bandwidth combinations for different CA capability with 2DL CCs

CA Capability	Bandwidth combination for FDD CA	Bandwidth combination for TDD CA	Bandwidth combination for TDD-FDD CA	Bandwidth combination for CA with LAA SCell(s)
CA2_C	5+5MHz, 5+10MHz, 5+15MHz, 10+10MHz, 20+20MHz	20+20MHz, 15+20MHz	NA	NA
CA2_A2	10+10MHz, 20+5MHz, 10+15MHz, 10+20MHz, 15+20MHz, 20+20MHz	20+20MHz	10(FDD)+20(TDD)MHz, 15(FDD)+20(TDD)MHz, 20(FDD)+20(TDD)MHz	20(FDD)+20(LAA)MHz, 10(FDD)+20(LAA)MHz, 15(FDD)+20(LAA)MHz, 20(TDD)+20(LAA)MHz
CA2_N2	5+10MHz, 10+10MHz, 10+20MHz, 20+20MHz	20+20MHz	NA	NA
NOTE 1: This table is only for information and applicability and test rules of CA performance requirements are specified in 8.1.2.3 and 9.1.1.2.				

Table 8.1.2.2-3: Definition of CA capability with 3 DL CCs

CA Capability	CA Capability Description
CA3_C	Intra-band contiguous CA
CA3_A2	Inter-band CA (two bands)
CA3_A3	Inter-band CA (three bands)
CA3_N2	Intra-band non-contiguous CA (with two sub-blocks)
Note 1: CA3_C corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-1 for 3 DL CCs. CA3_A2 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-2 for 3 DL CCs. CA3_A3 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in and Table 5.4.2A.1-2a for 3 DL CCs. CA3_N2 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-3 for 3 DL CCs.		

The supported testable largest aggregated CA bandwidth combinations for 3CCs for each CA capability are listed in Table 8.1.2.2-4.

Table 8.1.2.2-4: Supported largest aggregated CA bandwidth combinations for different CA capability with 3 CCs

CA capability	Bandwidth combination for FDD CA	Bandwidth combination for TDD CA	Bandwidth combination for TDD-FDD CA	Bandwidth combination for CA with LAA SCell(s)
CA3_C	NA	20+20+20MHz	NA	NA
CA3_A2	5+10+10MHz 5+10+20MHz, 5+15+20MHz, 10+10+20MHz, 10+20+20MHz, 20+20+20MHz	15+20+20MHz, 20+20+20MHz	10(FDD)+20(TDD)+20(TDD)MHz 15(FDD)+20(TDD)+20(TDD)MHz, 20(FDD)+20(TDD)+20(TDD)MHz	10(FDD)+ 2×20(LAA)MHz, 15(FDD)+ 2×20(LAA)MHz, 20(FDD)+ 2×20(LAA)MHz, 20(TDD)+ 2×20(LAA)MHz
CA3_A3	10+10+20MHz, 10+15+15MHz, 10+15+20MHz, 10+20+20MHz, 15+15+20MHz, 15+20+20MHz, 20+20+20MHz	NA	2×20(FDD)+20(TDD)MHz, 20(FDD)+ 2×20(TDD)MHz, 20(FDD)+15(FDD)+20(TDD)MHz, 20(FDD)+10(FDD)+20(TDD)MHz, 2×15(FDD)+20(TDD)MHz	NA
CA3_N2	NA	20+20+20MHz	NA	NA
NOTE 1: This table is only for information and applicability and test rules of CA performance requirements are specified in 8.1.2.3 and 9.1.1.2.				

Table 8.1.2.2-5: Definition of CA capability with 4 DL CCs

CA Capability	CA Capability Description
CA4_C	Intra-band contiguous CA
CA4_A2	Inter-band CA (two bands)
CA4_A3	Inter-band CA (three bands)
CA4_A4	Inter-band CA (four bands)
CA4_N2	Intra-band non-contiguous CA (with two sub-blocks)
NOTE 1: CA4_C corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-1 for 4 DL CCs. CA4_A2 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-2 for 4 DL CCs. CA4_A3 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in and Table 5.4.2A.1-2a for 4 DL CCs. CA4_A4 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in and Table 5.4.2A.1-2b for 4 DL CCs CA4_N2 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-3 for 4 DL CCs.	

The supported testable largest aggregated CA bandwidth combinations for 4CCs for each CA capability are listed in Table 8.1.2.2-6.

Table 8.1.2.2-6: Supported largest aggregated CA bandwidth combinations for different CA capability with 4 CCs

CA capability	Bandwidth combination for FDD CA	Bandwidth combination for TDD CA	Bandwidth combination for TDD-FDD CA	Bandwidth combination for CA with LAA SCell(s)
CA4_C	NA	NA	NA	NA
CA4_A2	20+20+20+20MHz 20+20+10+5MHz	20+20+20+20MHz 15+20+20+20MHz	20(FDD)+20(TDD)+20(TDD)+20(TDD) MHz	10(FDD)+ 3×20(LAA)MHz, 15(FDD)+ 3×20(LAA)MHz, 20(FDD)+ 3×20(LAA)MHz, 20(TDD)+ 3×20(LAA)MHz
CA4_A3	20+20+20+20MHz 20+20+20+10MHz 20+20+10+10MHz 20+10+10+5MHz	NA	2×20(FDD)+2×20(TDD)MHz, 20(FDD)+15(FDD)+2×20(TDD)MHz, 2×15(FDD)+2x20(TDD)MHz	NA
CA4_A4	20+20+20+20MHz 20+20+20+10MHz 20+20+10+10MHz	NA	2×20(FDD)+15(FDD)+20(TDD)MHz, 2×15(FDD)+20(FDD)+20(TDD)MHz 2×20(FDD)+10(FDD)+20(TDD)MHz	NA
CA4_N2	NA	20+20+20+20MHz	NA	NA
NOTE 1: This table is only for information and applicability and test rules of CA performance requirements are specified in 8.1.2.3 and 9.1.1.2.				

Table 8.1.2.2-7: Definition of CA capability with 5 DL CCs

CA Capability	CA Capability Description
CA5_C	Intra-band contiguous CA
CA5_A2	Inter-band CA (two bands)
CA5_A3	Inter-band CA (three bands)
CA5_A4	Inter-band CA (four bands)
CA5_A5	Inter-band CA (five bands)
CA5_N2	Intra-band non-contiguous CA (with two sub-blocks)
NOTE 1: CA5_C corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-1 for 5 DL CCs. CA5_A2 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-2 for 5 DL CCs. CA5_A3 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in and Table 5.4.2A.1-2a for 5 DL CCs. CA5_A4 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in and Table 5.4.2A.1-2b for 5 DL CCs CA5_A5 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in and Table 5.4.2A.1-xx for 5 DL CCs CA5_N2 corresponds to E-UTRA CA configurations and bandwidth combination sets defined in Table 5.4.2A.1-3 for 5 DL CCs.		

The supported testable largest aggregated CA bandwidth combinations for 5CCs for each CA capability are listed in Table 8.1.2.2-8.

Table 8.1.2.2-8: Supported largest aggregated CA bandwidth combinations for different CA capability with 5 CCs

CA capability	Bandwidth combination for FDD CA	Bandwidth combination for TDD CA	Bandwidth combination for TDD-FDD CA	Bandwidth combination for CA with LAA SCell(s)
CA5_C	NA	NA	NA	NA
CA5_A2	NA	NA	NA	10(FDD)+ 4×20(LAA)MHz, 15(FDD)+ 4×20(LAA)MHz, 20(FDD)+ 4×20(LAA)MHz, 20(TDD)+ 4×20(LAA)MHz
CA5_A3	5×20MHz	NA	NA	NA
CA5_A4	5×20MHz	NA	15+2×20(FDD)+2×20(TDD)MHz 2×15+20(FDD)+2×20(TDD)MHz	NA
CA5_A5	NA	NA		NA
CA5_N2	NA	NA	NA	NA
NOTE 1: This table is only for information and applicability and test rules of CA performance requirements are specified in 8.1.2.3 and 9.1.1.2.				

For test cases with more than one component carrier, "Fraction of Maximum Throughput" in the performance requirement refers to the ratio of the sum of throughput values of all component carriers to the sum of the nominal maximum throughput values of all component carriers, unless otherwise stated.

8.1.2.2A Definition of dual connectivity capability

The definition with respect to dual connectivity capabilities for configurations with 2CCs is given as in Table 8.1.2.2A-1.

Table 8.1.2.2A-1: Definition of dual connectivity capability with 2DL CCs

Dual connectivity Capability	Dual connectivity capability Description
DC_A_2	Inter-band dual connectivity (two bands)
Note 1: DC_A_2 corresponds to E-UTRA dual connectivity configurations and bandwidth combination sets defined for inter-band dual connectivity (two bands) in Table 5.4.2C.1-1.	

The supported testable dual connectivity bandwidth combinations for 2CCs for each dual connectivity capability are listed in Table 8.1.2.2A-2.

Table 8.1.2.2A-2: Supported testable dual connectivity bandwidth combinations for different dual connectivities capability with 2DL CCs

Dual connectivity capability	Bandwidth combination for FDD dual connectivity	Bandwidth combination for TDD dual connectivity
DC_A_2	10+10MHz, 10+20MHz, 15+15MHz, 15+20MHz, 20+20MHz	20+20MHz
Note 1: This table is only for information and applicability and test rules of dual connectivity performance requirements are specified in 8.1.2.3A		

8.1.2.3 Applicability and test rules for different CA configurations and bandwidth combination sets

The performance requirement for CA UE demodulation tests in Clause 8 are defined independent of CA configurations and bandwidth combination sets specified in Clause 5.4.2A.1. For UEs supporting different CA configurations and bandwidth combination sets, the applicability and test rules are defined for the tests for 2 DL CCs in Table 8.1.2.3-1, and 3 or more DL CCs in Table 8.2.2.3-2. For simplicity, CA configuration below refers to combination of CA configuration and bandwidth combination set.

Table 8.1.2.3-1: Applicability and test rules for CA UE demodulation tests with 2 DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 2CCs in Clause 8.2.1.1.1_A.1, 8.2.1.4.2_A.1	Any one of the supported CA capabilities	Any one of the supported FDD CA configurations	10+10 MHz, 20+20 MHz, 5+5 MHz, 10MHz+5MHz, 15MHz+5MHz
CA tests with 2CCs in Clause 8.2.1.3.1_A.1	Each supported CA capability	Any one of the supported FDD CA configurations in each CA capability	10+10 MHz, 20+20 MHz, 5+5 MHz, 10MHz+5MHz, other combinations
CA tests with 2CCs in Clause 8.2.1.3.1A_A.1, 8.7.1.1_A.1	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported FDD CA configurations with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 8.2.1.7_A.1	CA_C	Supported FDD intra-band contiguous CA configurations covering the lowest and highest operating bands	Largest aggregated CA bandwidth combinations
CA tests with 2CCs in Clause 8.2.2.1.1_A.1, 8.2.2.4.2_A.1	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD CA configurations with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 8.2.2.3.1_A.1	Each supported CA capability	Any one of the supported TDD CA configurations in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 8.2.2.3.1A_A.1, 8.7.2.1_A.1	Any one of the supported CA capabilities with largest aggregated CA bandwidth	Any one of the supported TDD CA configurations with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in 8.2.2.7_A.1	CA_C	Supported TDD intra-band contiguous CA configurations covering the lowest and highest operating bands	Largest aggregated CA bandwidth combinations
CA tests with 2CCs in Clause [8.2.1.8.1]	CA_N	CA_3A-3A defined in Table 5.4.2A.1-3	10+10 MHz
CA tests with 2CCs in Clause [8.2.2.8.1]	CA2_C	CA_41C defined in Table 5.4.2A.1-1	20+20 MHz

Note 1: The applicability and test rules are specified in this table, unless otherwise stated.
Note 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1.
Note 3: A single Uplink CC is configured for all tests

Table 8.1.2.3-2: Applicability and test rules for CA UE demodulation tests with 3 or more DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 3 or more CCs in Clause 8.2.1.1.1_A.2, 8.2.1.1.1_A.4, 8.2.1.1.1_A.5, 8.2.1.4.2_A.2, 8.2.1.4.2_A.3, 8.2.1.4.2_A.4, 8.7.1.1_A.2, 8.7.1.1_A.4, 8.7.1.1_A.5	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported FDD CA configurations with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3 or more CCs in Clause 8.2.1.3.1_A.2, 8.2.1.3.1_A.3, 8.2.1.3.1_A.4	Each supported CA capability	Any one of the supported FDD CA configurations in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3 or more CCs in Clause 8.2.2.1.1_A.2, 8.2.2.1.1_A.3, 8.2.2.1.1_A.4, 8.2.2.4.2_A.2, 8.2.2.4.2_A.3, 8.2.2.4.2_A.4, 8.7.2.1_A.2, 8.7.2.1_A.3, 8.7.2.1_A.5	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD CA configurations with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3 or more CCs in Clause 8.2.2.3.1_A.2, 8.2.2.3.1_A.3, 8.2.2.3.1_A.4	Each supported CA capability	Any one of the supported TDD CA configurations in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3CCs in Clause [8.2.2.8.1]	CA3_C	CA_41D defined in Table 5.4.2A.1-1	20+20+20 MHz
Note 1: The applicability and test rules are specified in this table, unless otherwise stated. Note 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. Note 3: A single Uplink CC is configured for all tests			

8.1.2.3A Applicability and test rules for different dual connectivity configuration and bandwidth combination set

The performance requirement for dual connectivity UE demodulation tests in Clause 8 are defined independent of dual connectivity configurations and bandwidth combination sets specified in Clause 5.4.2C.1. For UEs supporting different dual connectivity configurations and bandwidth combination sets, the applicability and test rules are defined for the tests for the configurations with 2CCs in Table 8.1.2.3A-1. For simplicity, dual connectivity configuration below refers to combination of dual connectivity configuration and bandwidth set.

Both CA performance requirements and dual connectivity performance requirements are applied for dual connectivity capable UE.

Table 8.1.2.3A-1: Applicability and test rules for dual connectivity UE demodulation tests with 2DL CCs

Tests	Dual connectivity capability where the tests apply	Dual connectivity configuration from the selected CA capability where the tests apply	Dual connectivity Bandwidth combination to be tested in priority order
Dual connectivity test in Clause 8.2.1.4.3A, 8.7.6.1, 8.7.6.2	Any one of the supported dual connectivity capabilities with largest aggregated dual connectivity bandwidth combination	Any one of the supported FDD dual connectivity configurations with the largest aggregated dual connectivity bandwidth combination	Largest dual connectivity aggregated bandwidth combination
Dual connectivity test in Clause 8.2.2.4.4, 8.7.7.1, 8.7.7.2	Any one of the supported dual connectivity capabilities with largest aggregated dual connectivity bandwidth combination	Any one of the supported TDD dual connectivity configurations with the largest aggregated dual connectivity bandwidth combination	Largest dual connectivity aggregated bandwidth combination
Note 1: The applicability and test rules are specified in this table, unless otherwise stated. Note 2: Number of the supported bandwidth combinations to be tested from each selected DC or CA configuration is 1.			

8.1.2.3B Applicability and test rules for different TDD-FDD CA configurations and bandwidth combination sets

The performance requirement for TDD-FDD CA UE demodulation tests in Clause 8 are defined independent of CA configurations and bandwidth combination sets specified in Clause 5.4.2A.1. For UEs supporting different CA configurations and bandwidth combination sets, the applicability and test rules are defined for the tests for 2 DL TDD-FDD CA in Table 8.1.2.3B-1, in Table 8.1.2.3B-2 and for 3 DL TDD-FDD CA, in Table 8.1.2.3B-3 and for 4 DL TDD-FDD CA, in Table 8.1.2.3B-4 and for 5 DL TDD-FDD CA. For simplicity, CA configuration below refers to combination of CA configuration and bandwidth combination set.

Table 8.1.2.3B-1: Applicability and test rules for CA UE demodulation tests for TDD-FDD CA with 2 DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 2CCs in Clause 8.2.3.1.1.1, 8.2.3.2.1A, 8.2.3.3.1.1, 8.7.5.1.1	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD-FDD CA configurations with FDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 8.2.3.2.1.1	Each supported CA capability	Any one of the supported TDD-FDD CA configurations with FDD PCell in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 8.2.3.1.2.1, 8.2.3.2.2A, 8.2.3.3.2.1, 8.7.5.2.1	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD-FDD CA configurations with TDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 8.2.3.2.2.1	Each supported CA capability	Any one of the supported TDD-FDD CA configurations with TDD PCell in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
NOTE 1: The applicability and test rules are specified in this table, unless otherwise stated. NOTE 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. NOTE 3: A single Uplink CC is configured for all tests.			

Table 8.1.2.3B-2: Applicability and test rules for CA UE demodulation tests for TDD-FDD CA with 3 DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 3CCs in Clause 8.2.3.1.1.2, 8.2.3.3.1.2, 8.7.5.1.2	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD-FDD CA configurations with FDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3CCs in Clause 8.2.3.2.1.2	Each supported CA capability	Any one of the supported TDD-FDD CA configurations with FDD PCell in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3CCs in Clause 8.2.3.1.2.2, 8.2.3.3.2.2, 8.7.5.2.2	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD-FDD CA configurations with TDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3CCs in Clause 8.2.3.2.2.2	Each supported CA capability	Any one of the supported TDD-FDD CA configurations with TDD PCell in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
NOTE 1: The applicability and test rules are specified in this table, unless otherwise stated. NOTE 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. NOTE 3: A single Uplink CC is configured for all tests.			

Table 8.1.2.3B-3: Applicability and test rules for CA UE demodulation tests for TDD-FDD CA with 4 DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 4CCs in Clause 8.2.3.1.1.3, 8.2.3.3.1.3, 8.7.5.1.3	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD-FDD CA configurations with FDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 4CCs in Clause [8.2.3.2.1.3]	Each supported CA capability	Any one of the supported TDD-FDD CA configurations with FDD PCell in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 4CCs in Clause 8.2.3.1.2.3, 8.2.3.3.2.3, 8.7.5.2.3	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD-FDD CA configurations with TDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 4CCs in Clause [8.2.3.2.2.3]	Each supported CA capability	Any one of the supported TDD-FDD CA configurations with TDD PCell in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
NOTE 1: The applicability and test rules are specified in this table, unless otherwise stated. NOTE 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. NOTE 3: A single Uplink CC is configured for all tests.			

Table 8.1.2.3B-4: Applicability and test rules for CA UE demodulation tests for TDD-FDD CA with 5 DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 5CCs in Clause 8.2.3.1.1.4, 8.2.3.3.1.4, 8.7.5.1.4	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD-FDD CA configurations with FDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 5CCs in Clause [8.2.3.2.1.4]	Each supported CA capability	Any one of the supported TDD-FDD CA configurations with FDD PCell in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 5CCs in Clause 8.2.3.1.2.4, 8.2.3.3.2.4, 8.7.5.2.4	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD-FDD CA configurations with TDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 5CCs in Clause [8.2.3.2.2.4]	Each supported CA capability	Any one of the supported TDD-FDD CA configurations with TDD PCell in each CA capability with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
NOTE 1: The applicability and test rules are specified in this table, unless otherwise stated. NOTE 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. NOTE 3: A single Uplink CC is configured for all tests.			

8.1.2.3D Applicability and test rules for different CA with LAA SCell(s) configurations and bandwidth combination sets

The performance requirement for CA with LAA SCell(s) UE demodulation tests in Clause 8 are defined independent of CA configurations and bandwidth combination sets specified in Clause 5.4.2A.1. For UEs supporting different CA with LAA SCell(s) configurations and bandwidth combination sets, the applicability and test rules are defined for the tests for 2 DL CA with LAA SCell(s) in Table 8.1.2.3D-1 and in Table 8.1.2.3D-2 for 3 or more DL CA with LAA SCell(s). For simplicity, CA configuration below refers to combination of CA with LAA SCell(s) configuration and bandwidth combination set.

Table 8.1.2.3D-1: Applicability and test rules for CA UE demodulation tests for CA with LAA SCell(s) with 2 DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 2CCs in Clause 8.2.4.1.1, 8.3.3.1.1	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported CA with LAA SCell(s) configurations with FDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 8.2.4.1.2, 8.3.3.1.2	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported CA with LAA SCell(s) configurations with TDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
NOTE 1: The applicability and test rules are specified in this table, unless otherwise stated. NOTE 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. NOTE 3: A single Uplink CC is configured for all tests.			

Table 8.1.2.3D-2: Applicability and test rules for CA UE demodulation tests for CA with LAA SCell(s) with 3 or more DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 2CCs in Clause 8.2.4.1.1, 8.3.3.1.1	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported CA with LAA SCell(s) configurations with FDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 8.2.4.1.2, 8.3.3.1.2	Any one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported CA with LAA SCell(s) configurations with TDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
NOTE 1: The applicability and test rules are specified in this table, unless otherwise stated. NOTE 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. NOTE 3: A single Uplink CC is configured for all tests.			

8.1.2.4 Test coverage for different number of component carriers

For FDD tests specified in 8.2.1.1.1, 8.2.1.3.1, 8.2.1.4.2, and 8.7.1.1, if corresponding CA tests are tested, the test coverage can be considered fulfilled without executing single carrier tests.

For TDD tests specified in 8.2.2.1.1, 8.2.2.3.1, 8.2.2.4.2, and 8.7.2.1, if corresponding CA tests are tested, the test coverage can be considered fulfilled without executing single carrier tests.

For TDD FDD tests specified in 8.2.3.1, 8.2.3.2, 8.2.3.3, and 8.7.5, if corresponding TDD FDD CA tests are tested, the test coverage can be considered fulfilled without executing both FDD and TDD single carrier tests.

For FDD CA tests specified in 8.2.1.1.1_A, 8.2.1.4.2_A, and 8.7.1.1_A, among all supported CA capabilities, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the CA tests with less than the largest number of CCs supported by the UE.

For FDD CA tests specified in 8.2.1.3.1_A, for each supported CA capability, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the CA tests with less than the largest number of CCs supported by the UE.

For TDD CA tests specified in 8.2.2.1.1_A, 8.2.2.4.2_A, and 8.7.2.1_A, among all supported CA capabilities, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the CA tests with less than the largest number of CCs supported by the UE.

For TDD CA tests specified in 8.2.2.3.1_A, for each supported CA capability, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the CA tests with less than the largest number of CCs supported by the UE.

For TDD FDD CA tests specified in 8.2.3.1, 8.2.3.3, and 8.7.5, among all supported CA capabilities, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the TDD FDD CA tests with less than the largest number of CCs supported by the UE.

For TDD FDD CA tests specified in 8.2.3.2, for each supported CA capability, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the TDD FDD CA tests with less than the largest number of CCs supported by the UE.

For FDD CA power imbalance tests specified in 8.2.1.7, if they are tested with FDD intra-band contiguous CA configurations with 2 DL CCs, the test coverage can be considered fulfilled with FDD intra-band contiguous CA configurations with 3 DL CCs supported by the UE.

For TDD CA power imbalance tests specified in 8.2.2.7, if they are tested with TDD intra-band contiguous CA configurations with 2 DL CCs, the test coverage can be considered fulfilled with TDD intra-band contiguous CA configurations with 3 DL CCs supported by the UE.

For LAA SCell(s) with FDD PCell tests specified in 8.2.4.1.1 and 8.3.3.1.1, for each supported CA capability, if corresponding CA with LAA SCell(s) tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the CA with LAA SCell(s) tests with less than the largest number of CCs supported by the UE.

For LAA SCell(s) with TDD PCell tests specified in 8.2.4.1.2 and 8.3.3.1.2, for each supported CA capability, if corresponding CA with LAA SCell(s) tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the CA with LAA SCell(s) tests with less than the largest number of CCs supported by the UE.

8.1.2.6 Applicability of performance requirements for 4Rx capable UEs

For 4Rx capable UEs, the 2Rx supported RF bands and 4Rx supported RF bands are up to UE’s declaration.

8.1.2.6.1 Applicability rule and antenna connection for single carrier tests with 2Rx

For 4Rx capable UEs all single carrier tests specified in 8.2 to 8.8 with 2Rx are tested on any of the 2 Rx supported RF bands by connecting 2 out of the 4Rx with data source from system simulator, and the other 2 Rx are connected with zero input, depending on UE’s declaration and AP configuration. Same requirements specified with 2Rx should be applied.

For 4Rx capable UEs without any 2Rx RF bands, all single carrier tests specified in 8.2 to 8.8 with 2Rx are tested on any of the 4Rx supported RF bands by duplicating the fading channel from each Tx antenna and add independent noise for each Rx antenna. Figure 8.1.2.6.1-1 shows an example of antenna connection for 4Rx UE in any one 4Rx supported RF band to perform a 2Rx performance test with antenna configuration as 2x2 without interference for information. The SNR requirements should be applied with 1.5 dB less than the number specified with 2Rx for test configuration with CRS-based TM and with 1.5 dB less than the number specified with 2Rx for test configuration with DMRS-based TM.

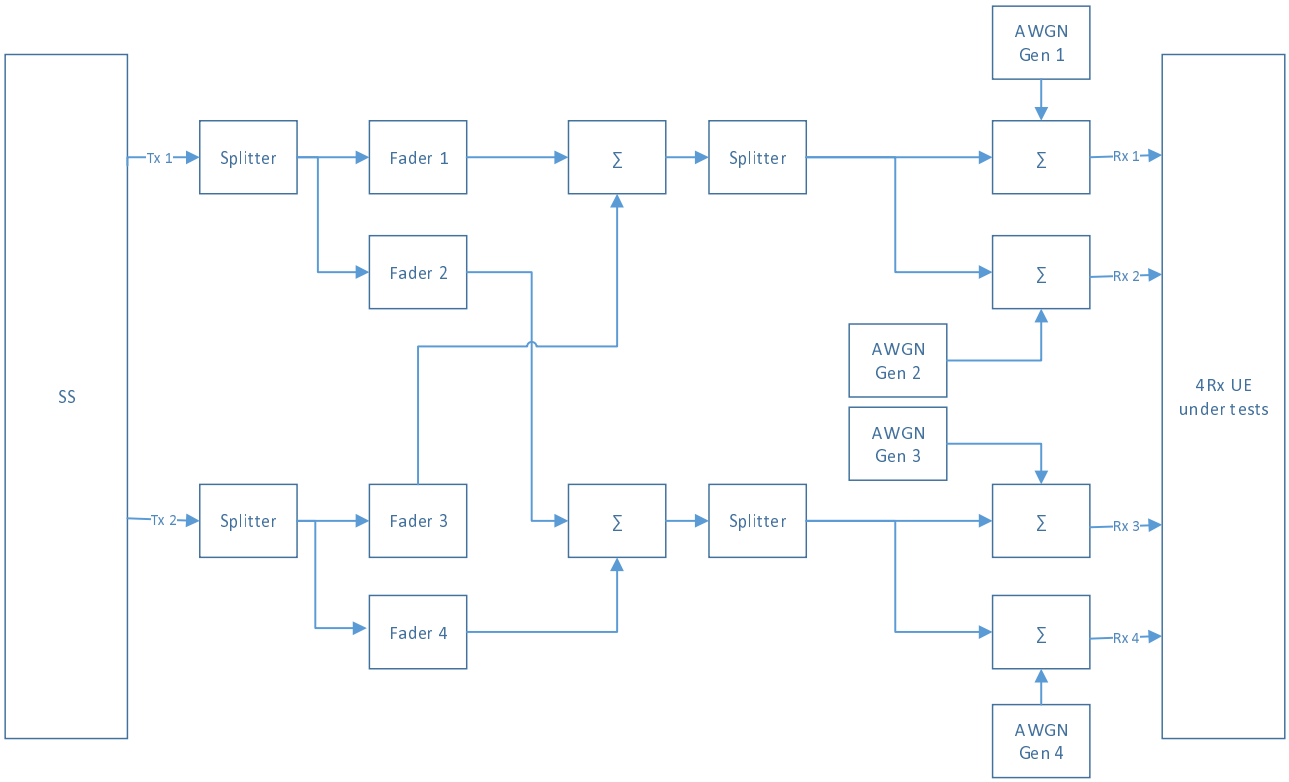


Figure 8.1.2.6.1-1: Antenna connection example for 2Rx tests with antenna configuration as 2x2 without interference (informative)

For 4Rx capable UEs without any 2Rx supported RF bands, for all single carrier tests listed in Table 8.1.2.6.1-0 specified from 8.2 to 8.8 with 2Rx can be skipped.

Table 8.1.2.6.1-0: Requirement lists for 4Rx capable UEs

Requirement lists
Enhanced downlink control channel performance requirements type A
Enhanced downlink control channel performance requirements type B
Enhanced performance requirements type B
Enhanced performance requirements type C
Requirements with demodulation subframe overlaps with aggressor cell ABS
Requirements with demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured
Requirements with CRS assistance information configured

For 4Rx capable UEs, if corresponding tests listed from the 4Rx test lists from Table 8.1.2.6.1-1 are tested, the test coverage can be considered fulfilled without executing the corresponding tests listed from the 2Rx test lists from Table 8.1.2.6.1-1.

Table 8.1.2.6.1-1: Applicability rules for single carrier tests with 2Rx

4Rx test lists	2Rx test lists
8.10.1.1.1 Test 1	8.2.1.2.1 Test 1
8.10.1.1.2 Test 1	8.2.1.3.1 Test 1
8.10.1.1.3 Test 1	8.2.1.4.1B Test 1
8.10.1.1.4 Test 1	8.2.1.4.2 Test 1
8.10.1.1.4 Test 2	8.2.1.4.2 Test 3
8.10.1.1.5 Test 1	8.3.1.1A Test 1
8.10.1.1.6 Test 1	8.3.1.2 Test 1
8.10.1.2.1 Test 1	8.2.2.2.1 Test 1
8.10.1.2.2 Test 1	8.2.2.3.1 Test 1
8.10.1.2.3 Test 1	8.2.2.4.1B Test 1
8.10.1.2.4 Test 1	8.2.2.4.2 Test 1
8.10.1.2.4 Test 2	8.2.2.4.2 Test 3
8.10.1.2.5 Test 1	8.3.2.1B Test 1
8.10.1.2.6 Test 1	8.3.2.2 Test 2
8.10.2.1.1 Test 1	8.4.1.1 Test 1
8.10.2.1.2 Test 1	8.4.1.2.1 Test 1
8.10.2.1.3 Test 1	8.4.1.2.2 Test 1
8.10.2.2.1 Test 1	8.4.2.1 Test 1
8.10.2.2.2 Test 1	8.4.2.2.1 Test 1
8.10.2.2.3 Test 1	8.4.2.2.2 Test 1
8.10.3.1.1 Test 1	8.5.1.1 Test 1
8.10.3.1.2 Test 1	8.5.1.2.1 Test 1
8.10.3.1.3 Test 1	8.5.1.2.2 Test 1
8.10.3.2.1 Test 1	8.5.2.1 Test 1
8.10.3.2.2 Test 1	8.5.2.2.1 Test 1
8.10.3.2.3 Test 1	8.5.2.2.2 Test 1
8.10.4.1.1 Test 1	8.8.1.1 Test 1
8.10.4.1.1 Test 2	8.8.1.1 Test 2
8.10.4.1.2 Test 1	8.8.1.2 Test 1
8.10.4.1.2 Test 2	8.8.1.2 Test 2
8.10.4.2.1 Test 1	8.8.2.1 Test 1
8.10.4.2.1 Test 2	8.8.2.1 Test 2
8.10.4.2.2 Test 1	8.8.2.2 Test 1
8.10.4.2.2 Test 2	8.8.2.2 Test 2

8.1.2.6.2 Applicability rule and antenna connection for CA and DC tests with 2Rx

All tests specified in 8.2 to 8.8 with 2Rx with CA, TDD-FDD CA and DC are tested with 4 Rx capable UEs.

Within the CA/DC configuration if any of the PCell and/or the SCells and/or PSCells is a 2Rx supported RF band, the antenna connection should follow the same method as defined in 8.1.2.6.1 for single carrier tests on any of the 2Rx supported RF bands, with same requirements specified with 2Rx applied. Within the CA configuration if any of the PCell and/or the SCells and/or PSCells is a 4Rx supported RF band, the antenna connection should follow the same as defined in 8.1.2.6.1 for single carrier tests on any of the 4 Rx supported RF bands, with the SNR requirements applied with 1.5 dB less than the number specified with 2Rx.

Same applicability rules defined in 8.1.2.3, 8.1.2.3A, and 8.1.2.3B for CA, TDD-FDD CA and DC applied for different CA and DC configurations and bandwidth combination sets should be applied for 4 Rx capable UEs.

8.1.2.6.3 Applicability rule and antenna connection for single carrier tests with 4Rx

For 4Rx capable UEs all single carrier tests specified in 8.10 with 4Rx are tested on any of the 4Rx supported RF bands by connecting all 4Rx with data source from system simulator.

8.1.2.6.4 Applicability rule for 256QAM tests

For 256QAM capable UE, if corresponding tests specified in 8.10.1.1.4 Test 2 and 8.10.1.2.4 Test 2 are tested, the test coverage can be considered fulfilled without executing the tests specified in 8.10.1.1.4 Test 1 and 8.10.1.2.4 Test 1. For a UE which does not have 256QAM capability, the test specified in 8.10.1.1.4 Test 1 and 8.10.1.2.4 Test 1 should be used.

8.1.2.6.5 Applicability rule and antenna connection for CA and DC tests with 4Rx

All tests specified in 8.13 with FDD CA/DC, TDD CA/DC and TDD-FDD CA/DC are tested with 4 Rx capable UEs.

Within the CA/DC configuration if any of the PCell and/or the SCells/PSCell is a 2Rx supported RF band, 2 out of the 4Rx should be connected with data source from system simulator, and the other 2Rx are connected with zero input, depending on UE's declaration and AP configuration. Within the CA/DC configuration if any of the PCell and/or the SCells is a 4Rx supported RF band, all 4Rx should be connected with data source from system simulator.

For 4Rx capable UEs supporting different CA/DC configurations and bandwidth combination sets, the applicability and test rules are defined in Table 8.1.2.6.5-1 for FDD CA/DC, TDD CA/DC and TDD-FDD CA/DC. For simplicity, CA/DC configuration below refers to combination of CA/DC configuration and bandwidth combination set.

Table 8.1.2.6.5-1: Applicability and test rules for CA/DC/TDD-FDD CA UE demodulation tests

Tests	Step 1	Step 2	Step 3	Step 4
CA tests in Clause 8.13.1.1.1, 8.13.1.2.1	Select FDD CA configurations with the maximum number of CCs excluding the 2Rx only CA configuration among all supported FDD CA configurations with any CA capability	Select FDD CA configurations with maximum number of 4Rx CCs among all the selected FDD CA configurations from Step 1	Select any one of the FDD CA configuration with the largest aggregated CA bandwidth combination among all the selected FDD CA configurations from Step 2	NA
DC tests in Clause 8.13.1.1.2	Select FDD DC configurations with the maximum number of CCs excluding the 2Rx only DC configuration among all supported FDD DC configurations with any DC capability	Select FDD DC configurations with maximum number of 4Rx CCs among all the selected FDD DC configurations from Step 1	Select any one of the FDD DC configuration with the largest aggregated DC bandwidth combination among all the selected FDD DC configurations from Step 2	NA
CA tests in Clause 8.13.2.1.1, 8.13.2.2.1	Select TDD CA configurations with the maximum number of CCs excluding the 2Rx only CA configuration among all supported TDD CA configurations with any CA capability	Select TDD CA configurations with maximum number of 4Rx CCs among all the selected TDD CA configurations from Step 1	Select any one of the TDD CA configuration with the largest aggregated CA bandwidth combination among all the selected TDD CA configurations from Step 2	NA
DC tests in Clause 8.13.2.1.2	Select TDD DC configurations with the maximum number of CCs excluding the 2Rx only DC configuration among all supported TDD DC configurations with any DC capability	Select TDD DC configurations with maximum number of 4Rx CCs among all the selected TDD DC configurations from Step 1	Select any one of the TDD DC configuration with the largest aggregated DC bandwidth combination among all the selected TDD DC configurations from Step 2	NA
CA tests in Clause 8.13.3.1.1, 8.13.3.1.2, 8.13.3.2.1, 8.13.3.2.2	Select TDD-FDD CA configurations with the maximum number of CCs excluding the 2Rx only CA configuration among all supported TDD-FDD CA configurations with any CA capability	Select TDD-FDD CA configurations with maximum number of 4Rx CCs among all the selected TDD-FDD CA configurations from Step 1	Select any one of the TDD-FDD CA configuration with the largest aggregated CA bandwidth combination among all the selected TDD-FDD CA configurations from Step 2	NA
DC tests in Clause 8.13.3.5.1, 8.13.3.5.2	Select TDD-FDD DC configurations with the maximum number of CCs excluding the 2Rx only DC configuration among all supported TDD-FDD DC configurations with any DC capability	Select TDD-FDD DC configurations with maximum number of 4Rx CCs among all the selected TDD-FDD DC configurations from Step 1	Select any one of the TDD-FDD DC configuration with the largest aggregated DC bandwidth combination among all the selected TDD-FDD DC configurations from Step 2	NA

CA tests in Clause 8.13.1.3.1, 8.13.1.4.1, 8.13.1.1.3	Select FDD CA configurations with the maximum number of CCs excluding the 2Rx only CA configuration among all supported FDD CA configurations with any CA capability	Select FDD CA configurations with maximum number of 4Rx CCs among all the selected FDD CA configurations from Step 1	Select any one of the FDD CA configuration with the largest aggregated CA bandwidth combination among all the selected FDD CA configurations from Step 2	Select 2CCs with maximum number of 4Rx CCs with the largest aggregated CA bandwidth combination among the selected FDD CA configuration from Step 3
CA tests in Clause 8.13.2.3.1, 8.13.2.4.1, 8.13.2.1.3	Select TDD CA configurations with the maximum number of CCs excluding the 2Rx only CA configuration among all supported TDD CA configurations with any CA capability	Select TDD CA configurations with maximum number of 4Rx CCs among all the selected TDD CA configurations from Step 1	Select any one of the TDD CA configuration with the largest aggregated CA bandwidth combination among all the selected TDD CA configurations from Step 2	Select 2CCs with maximum number of 4Rx CCs with the largest aggregated CA bandwidth combination among the selected TDD CA configuration from Step 3
CA tests in Clause 8.13.3.3.1, 8.13.3.3.2, 8.13.3.4.1, 8.13.3.4.2, 8.13.3.6.1, 8.13.3.6.2	Select TDD-FDD CA configurations with the maximum number of CCs excluding the 2Rx only CA configuration among all supported TDD-FDD CA configurations with any CA capability	Select TDD-FDD CA configurations with maximum number of 4Rx CCs among all the selected TDD-FDD CA configurations from Step 1	Select any one of the TDD-FDD CA configuration with the largest aggregated CA bandwidth combination among all the selected TDD CA configurations from Step 2	Select 2CCs with maximum number of 4Rx CCs with the largest aggregated CA bandwidth combination among the selected TDD-FDD CA configuration from Step 3
CA tests in Clause 8.13.1.1.4	Select FDD CA configurations with the maximum number of CCs supporting 4 layers MIMO among all supported FDD CA configurations with any CA capability	Select any one of the FDD CA configuration with the largest aggregated CA bandwidth combinations on any 2CCs among all the CCs among all the selected FDD CA configuration from Step 1	NA	NA
CA tests in Clause 8.13.2.1.4	Select TDD CA configurations with the maximum number of CCs supporting 4 layers MIMO among all supported TDD CA configurations with any CA capability	Select any one of the TDD CA configuration with the largest aggregated CA bandwidth combinations on any 2CCs among all the CCs among all the selected TDD CA configuration from Step 1	NA	NA
CA tests in Clause 8.13.3.7.1, 8.13.3.7.2	Select TDD-FDD CA configurations with the maximum number of CCs supporting 4 layers MIMO among all supported TDD-FDD CA configurations with any CA capability	Select any one of the TDD-FDD CA configuration with the largest aggregated CA bandwidth combinations on any 2CCs among all the CCs among all the selected TDD-FDD CA configuration from Step 1	NA	NA
NOTE 1: The applicability and test rules are specified in this table, unless otherwise stated. NOTE 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. NOTE 3: A single Uplink CC is configured for all CA tests and 2 Uplink CCs are configured for all DC tests.				

For 4Rx capable UEs, if corresponding tests listed from the 4Rx CA/DC test lists from Table 8.1.2.6.5-2 are tested, the test coverage can be considered fulfilled without executing the corresponding tests listed from the 2Rx CA/DC test lists from Table 8.1.2.6.5-2.

Table 8.1.2.6.5-2: Test lists for applicability rules for CA/DC/TDD-FDD CA tests with 4Rx

4Rx test lists	2Rx test lists
8.13.1.1.1 CA tests	8.2.1.4.3 CA tests
8.13.1.1.2 DC tests	8.2.1.4.3A DC tests
8.13.1.2.1 CA tests	8.2.1.1.1 CA tests
8.13.2.1.1 CA tests	8.2.2.4.3 CA tests
8.13.2.1.2 DC tests	8.2.2.4.3A DC tests
8.13.2.2.1 CA tests	8.2.2.1.1 CA tests
8.13.3.1.1 CA tests	8.2.3.3.1 CA tests
8.13.3.1.2 CA tests	8.2.3.3.2 CA tests
8.13.3.2.1 CA tests	8.2.3.1.1 CA tests
8.13.3.2.2 CA tests	8.2.3.1.2 CA tests
8.13.1.1.3 CA tests	8.2.1.4.2 test 3 and 8.10.1.1.4 test 2
8.13.1.1.4 CA tests	8.10.1.1.8 test 1
8.13.1.3.1 CA tests	8.2.1.4.1B test 1 and 8.10.1.1.3 test 1
8.13.1.4.1 CA tests	8.3.1.1A test 1 and 8.10.1.1.5 test 1
8.13.2.1.3 CA tests	8.2.2.4.2 test 3 and 8.10.1.2.4 test 2
8.13.2.1.4 CA tests	8.10.1.2.8 test 1
8.13.2.3.1 CA tests	8.2.2.4.1B test 1 and 8.10.1.2.3 test 1
8.13.2.4.1 CA tests	8.3.2.1B test 1 and 8.10.1.2.5 test 1

8.1.2.6.6 Applicability rule for Type C with 4Rx

For Type C with 4Rx capable UEs, if the tests from the 4Rx test lists are tested from Table 8.1.2.6.6-1, the test coverage can be considered fulfilled without executing the corresponding test from 2Rx test lists from Table 8.1.2.6.6-1.

Table 8.1.2.6.6-1: Applicability rules for Type C with 4Rx

Test category	Type C with 2Rx test lists	Type C with 4Rx test lists
FDD Tests	8.2.1.3.1B	8.2.1.3.1B
	8.2.1.3.1C	8.2.1.3.1C
	8.2.1.4.2A	8.10.1.1.4A
	8.3.1.2A	8.10.1.1.6A
TDD Tests	8.2.2.3.1B	8.2.2.3.1B
	8.2.2.3.1C	8.2.2.3.1C
	8.2.2.4.2A	8.10.1.2.4A
	8.3.2.2A	8.10.1.2.6A

8.2 Demodulation of PDSCH (Cell-Specific Reference Symbols)

8.2.1 FDD (Fixed Reference Channel)

The parameters specified in Table 8.2.1-1 are valid for all FDD tests unless otherwise stated.

Table 8.2.1-1: Common Test Parameters (FDD)

Parameter	Unit	Value	Comments
Inter-TTI Distance		1	
Number of HARQ processes	Processes	8	For FDD, 8 HARQ processes in the DL, as specified in TS 36.213 [10] clause 7. All 8 HARQ processes are used.
Scheduling of retransmissions			1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur.
Maximum number of HARQ transmission		4	It is always 4 for FDD, as specified in TS 36.213 [10] clause 8
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM	
Number of OFDM symbols for PDCCH	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths unless otherwise stated	The PCFICH carries information about the number of OFDM symbols used for transmission of PDCCHs in a subframe, as specified in TS 36.211 [8] clause 6.7
Cyclic Prefix		Normal	CP consist of the following physical resource blocks (RBs) parameters: 12 consecutive subcarriers at a 15 kHz spacing and 7 OFDM symbols, as specified in TS 36.211 [8] clause 6.2.3
Cell ID		0 (Note 1)	The Cell ID is uniquely defined by a number in the range of 0 to 503, representing the physical-layer cell identity, as specified in TS 36.211 [8] clause 6.11.
Cross carrier scheduling		Not configured	
Note 1: For CA tests, Cell ID = 0 applies to P-Cell. For (n)*th* S-Cell, Cell ID = n is used.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.

8.2.1.1 FDD PDSCH Single Antenna Port Performance (Cell-Specific Reference Symbols)

8.2.1.1.1 FDD PDSCH Single Antenna Port Performance

Editor's note: SNR requirement for 4Rx UE without 2Rx RF bands are still in square brackets

8.2.1.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.1.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.1.1.3-2 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.1.1.1.3-1: Test Parameters for Testing

Parameter		Unit	Test 1- 5	Test 6- 8	Test 9- 15	Test 16-18
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)
	σ	dB	0	0	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)
Modulation			QPSK	16QAM	64QAM	16QAM
PDSCH transmission mode			1	1	1	1

Note 1: $P_B = 0$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UE′s with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.2.1.1.1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz (Note 1)	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0	≥1
2	10 MHz	R.2 FDD	OP.1 FDD	ETU70	1x2 Low	70	-0.4	≥1
3	10 MHz	R.2 FDD	OP.1 FDD	ETU300	1x2 Low	70	0.0	≥1
4	10 MHz	R.2 FDD	OP.1 FDD	HST	1x2	70	-2.4	≥1
5	1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	0.0	≥1
6	10 MHz	R.3 FDD	OP.1 FDD	EVA5	1x2 Low	70	6.7	≥2
	5 MHz (Note 2)	R.3-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	6.7	≥2
7	10 MHz	R.3 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.4	≥2
	5 MHz (Note 2)	R.3-1 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.4	≥2
8	10 MHz	R.3 FDD	OP.1 FDD	ETU300	1x2 High	70	9.4	≥2
	5 MHz (Note 2)	R.3-1 FDD	OP.1 FDD	ETU300	1x2 High	70	9.4	≥2
9	3 MHz	R.5 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.6	≥1
10	5 MHz	R.6 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.4	≥2
11	10 MHz	R.7 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.7	≥2
12	10 MHz	R.7 FDD	OP.1 FDD	ETU70	1x2 Low	70	19.0	≥2
13	10 MHz	R.7 FDD	OP.1 FDD	EVA5	1x2 High	70	19.1	≥2
14	15 MHz	R.8 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.7	≥2
15	20 MHz	R.9 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.6	≥3
16	3 MHz	R.0 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.9	≥1
17	10 MHz	R.1 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.9	≥1
18	20 MHz	R.1 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.9	≥1

Note 1: Test 1 may not be executed for UE-s for which Test 1 in section 8.2.1.1.1_A.2 is applicable.
Note 2: Test case applicability is defined in 8.1.2.1.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1.4 Test description

8.2.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Frequencies to be tested for 1PRB allocation: Low Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.1.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 8.2.1-1and 8.2.1.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.1.1.4.3.

8.2.1.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.1.3-1 and 8.2.1.1.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.1.1.1.5-1as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each subtest in Table 8.2.1.1.1.5-1 as appropriate.

8.2.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.1.1.1.5 Test requirement

Table 8.2.1.1.1.3-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for each throughput test shall meet or exceed the specified value in Table 8.2.1.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.1.5-1: Test requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value			UE Category
						Fraction of Maximum Throughput (%)	SNR (dB) for UE with 2Rx RF band	SNR (dB) for 4Rx UE without 2Rx RF bands	
1	10 MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2	[-1.7]	≥1
2	10 MHz	R.2 FDD	OP.1 FDD	ETU70	1x2 Low	70	+0.4	[-1.1]	≥1
3	10 MHz	R.2 FDD	OP.1 FDD	ETU300	1x2 Low	70	+0.8	[-0.7]	≥1
4	10 MHz	R.2 FDD	OP.1 FDD	HST	1x2	70	-1.8	[-3.3]	≥1
5	1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	+0.8	[-0.7]	≥1
6	10 MHz	R.3 FDD	OP.1 FDD	EVA5	1x2 Low	70	+7.5	[+6.0]	≥2
	5 MHz (Note 2)	R.3-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+7.5	[+6.0]	≥2
7	10 MHz	R.3 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.2	[+0.7]	≥2
	5 MHz (Note 2)	R.3-1 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.2	[+0.7]	≥2
8	10 MHz	R.3 FDD	OP.1 FDD	ETU300	1x2 High	70	+10.2	[+8.7]	≥2
	5 MHz (Note 2)	R.3-1 FDD	OP.1 FDD	ETU300	1x2 High	70	+10.2	[+8.7]	≥2
9	3 MHz	R.5 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.4	[+16.9]	≥1
10	5 MHz	R.6 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.2	[+16.7]	≥2
11	10 MHz	R.7 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.5	[+16.0]	≥2
12	10 MHz	R.7 FDD	OP.1 FDD	ETU70	1x2 Low	70	+19.8	[+18.3]	≥2
13	10 MHz	R.7 FDD	OP.1 FDD	EVA5	1x2 High	70	+19.9	[+18.4]	≥2
14	15 MHz	R.8 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.5	[+17.0]	≥2
15	20 MHz	R.9 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.4	[+16.9]	≥3
16	3 MHz	R.0 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.7	[+1.2]	≥1
17	10 MHz	R.1 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.7	[+1.2]	≥1
18	20 MHz	R.1 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.7	[+1.2]	≥1

Note 1: N/A.
Note 2: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.
NOTE 3: The SNR requirement for 4Rx capable UEs is as specified in 8.1.2.6.1.

8.2.1.1.1_1 FDD PDSCH Single Antenna Port Performance (Release 9 and forward)

8.2.1.1.1_1.1 Test purpose

Same test purpose as in clause 8.2.1.1.1.1.

8.2.1.1.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward of UE category 1 and 2.

8.2.1.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.1.1.3 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_1.3-1.
- Instead of Table 8.2.1.1.1.3-2 → use Table 8.2.1.1.1_1.3-2.

Table 8.2.1.1.1_1.3-1: Test Parameters for Testing

Parameter		Unit	Test 1- 5	Test 6- 8	Test 9	Test 10-15	Test 16-18
Downlink power allocation	ρ_A	dB	N/A	0	N/A	0	N/A
	ρ_B	dB		0 (Note 1)		0 (Note 1)	
	σ	dB		0		0	
N_{oc} at antenna port		dBm/15kHz		-98		-98	
Symbols for unused PRBs				OCNG (Note 2)		OCNG (Note 2)	
Modulation				16QAM		64QAM	
PDSCH transmission mode				1		1	

Note 1: $P_B = 0$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.2.1.1.1_1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	N/A							
2	N/A							
3	N/A							
4	N/A							
5	N/A							
6	5 MHz	R.3-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	6.7	1
7	5 MHz	R.3-1 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.4	1
8	5 MHz	R.3-1 FDD	OP.1 FDD	ETU300	1x2 High	70	9.4	1
9	N/A							
10	5 MHz	R.6-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.5	1
11	10 MHz	R.7-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	16.7	1
12	10 MHz	R.7-1 FDD	OP.1 FDD	ETU70	1x2 Low	70	18.1	1
13	10 MHz	R.7-1 FDD	OP.1 FDD	EVA5	1x2 High	70	17.8	1
14	15 MHz	R.8-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	16.8	1
15	20 MHz	R.9-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.3	2
	20 MHz	R.9-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	16.7	1
16	N/A							
17	N/A							
18	N/A							

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1_1.4 Test description

Same test description as in clause 8.2.1.1.1.4 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_1.3-1.
- Instead of Table 8.2.1.1.1.3-2 → use Table 8.2.1.1.1_1.3-2.
- Instead of Table 8.2.1.1.1.5-1 → use Table 8.2.1.1.1_1.5-1.

8.2.1.1.1_1.5 Test requirement

Same test requirements as in clause 8.2.1.1.1.5 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_1.3-1.
- Instead of Table 8.2.1.1.1.5-1 → use Table 8.2.1.1.1_1.5-1.

Table 8.2.1.1.1_1.5-1: Test requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	N/A							
2	N/A							
3	N/A							
4	N/A							
5	N/A							
6	5 MHz	R.3-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+7.5	1
7	5 MHz	R.3-1 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.2	1
8	5 MHz	R.3-1 FDD	OP.1 FDD	ETU300	1x2 High	70	+10.2	1
9	N/A							
10	5 MHz	R.6-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.3	1
11	10 MHz	R.7-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+17.5	1
12	10 MHz	R.7-1 FDD	OP.1 FDD	ETU70	1x2 Low	70	+18.9	1
13	10 MHz	R.7-1 FDD	OP.1 FDD	EVA5	1x2 High	70	+18.6	1
14	15 MHz	R.8-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+17.6	1
15	20 MHz	R.9-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.1	2
	20 MHz	R.9-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+17.5	1
16	N/A							
17	N/A							
18	N/A							

8.2.1.1.1_2 FDD PDSCH Single Antenna Port Performance (Release 10 and forward)

8.2.1.1.1_2.1 Test purpose

Same test purpose as in clause 8.2.1.1.1.1.

8.2.1.1.1_2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward.

8.2.1.1.1_2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.1.1.3 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_2.3-1.
- Instead of Table 8.2.1.1.1.3-2 → use Table 8.2.1.1.1_2.3-2.

Table 8.2.1.1.1_2.3-1: Test Parameters for Testing

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1
Note 1: $P_B = 0$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.2.1.1.1_2.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.41 FDD	OP.1 FDD	EVA5	1x2 Low	70	-5.4	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1_2.4 Test description

Same test description as in clause 8.2.1.1.1.4 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_2.3-1.
- Instead of Table 8.2.1.1.1.3-2 → use Table 8.2.1.1.1_2.3-2.
- Instead of Table 8.2.1.1.1.5-1 → use Table 8.2.1.1.1_2.5-1.

8.2.1.1.1_2.5 Test requirement

Same test requirements as in clause 8.2.1.1.1.5 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_2.3-1.
- Instead of Table 8.2.1.1.1.5-1 → use Table 8.2.1.1.1_2.5-1.

Table 8.2.1.1.1_2.5-1: Test requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	

1	10 MHz	R.41 FDD	OP.1 FDD	EVA5	1x2 Low	70	-4.6	≥1

8.2.1.1.1_A FDD PDSCH Single Antenna Port Performance for CA

8.2.1.1.1_A.1 FDD PDSCH Single Antenna Port Performance for CA (2DL CA)

8.2.1.1.1_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.1.1.1_A.1.2 Test applicability

This test applies to E-UTRA FDD release 10 and forward UE of category 2 or higher that supports inter-band OR intra-band contiguous DL CA.
This test also applies to E-UTRA FDD release 11 and forward UE of category 2 or higher that supports intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports

8.2.1.1.1_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.1.1_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.1.1_A.1.3-2 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.1.1.1_A.1.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1

Note 1: $P_B = 0$.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 3: PUCCH format 1b with channel selection is used to feedback ACK/NACK for Tests in Table 8.2.1.1.1_A.1.3-2.
Note 4: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.1.1.1_A.1.3-2: Minimum performance (FRC) for CA with 2DL CCs

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE category
						Fraction of maximum throughput (%)	SNR (dB)	
1	2x10 MHz	R.2 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-1.1	≥3 (Note 2)
2	2x20 MHz	R.42 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-1.3	≥5
3	2x5 MHz	R.42-2 FDD	OP.1 FDD (NOTE 1)	EVA5	1x2 Low	70	-1.0	≥2
4	10MHz+5 MHz	R.2 FDD for 10MHz CC	OP.1 FDD	EVA5	1x2 Low	70	-1.7	≥3
		R.42-2 FDD for 5MHz CC	OP.1 FDD			70	-1.0	
5	15MHz+5 MHz	R.42-3 FDD for 15MHz CC	OP.1 FDD	EVA5	1x2 Low	70	-1.6	≥3
		R.42-2 FDD for 5MHz CC	OP.1 FDD			70	-1.0	
Note 1: The OCNG pattern applies for each CC. Note 2: 30usec timing difference between two CCs is applied in inter-band CA case. Note 3: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.1 with 2 DL CCs.

8.2.1.1.1_A.1.4 Test description

8.2.1.1.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.1.1_A.1.4-1.

CA Capability to be tested: Select one according to Table 8.2.1.1.1_A.1.4-1

Table 8.2.1.1.1_A.1.4-1: Test point selection for TM1 CA

CA Capability	Bandwidth combination				
	10+10	20+20	5+5	10+5	15+5
Inter-band CA (two bands) (CA2_A2)	Test1	Test2	Test3	Test4	Test5
Intra-band contiguous CA (CA2_C)	Test1	Test2	Test3	Test4	Test5
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test1	Test2	Test3	Test5	Test5
Note 1: Only one test point is tested. Select any one of the UE supported CA capabilities and then moving from left to right select the first CA bandwidth combination supported by the UE within the chosen CA capability.					

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.35 as appropriate for CC on 2Rx supported RF band and Annex A, Figure A.86 for CC on 4Rx supported RF band.

2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.1.1_A.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.1.1_A.1.4.3.

8.2.1.1.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.1.1_A.1.4.3

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.1_A.1.3-1 and 8.2.1.1.1_A.1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.1.1_A.1.5-1 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.1.1.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

8.2.1.1.1_A.1.5 Test requirement

Table 8.2.1.1.1_A.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.1.1_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.1_A.1.5-1: Test requirement (FRC)

Test num.	Bandwidth Combination	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value			UE category
						Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band	
1	2x10 MHz	R.2 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-0.3	-1.8	≥3
2	2x20 MHz	R.42 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-0.5	-2.0	≥5
3	2x5 MHz	R.42-2 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-0.2	-1.7	≥2
4	10MHz+5MHz	R.2 FDD for 10MHz CC	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4	≥3
		R.42-2 FDD for 5MHz CC	OP.1 FDD			70	-0.2	-1.7	
5	15MHz+5MHz	R.42-3 FDD for 15MHz CC	OP.1 FDD	EVA5	1x2 Low	70	-0.8	-2.3	≥3
		R.42-2 FDD for 5MHz CC	OP.1 FDD			70	-0.2	-1.7	

Note 1: The OCNG pattern applies for each CC.
Note 2: 30usec or 922*Ts timing difference between two CCs is applied in inter-band CA case.
Note 3: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.
Note 4: The SNR requirement for CC on 4Rx supported RF band is as specified in 8.1.2.6.2.

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.1.1_A.2 FDD PDSCH Single Antenna Port Performance for CA (3DL CA)

8.2.1.1.1_A.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.1.1.1_A.2.2 Test applicability

This test case applies to all types of E-UTRA FDD release 10 and forward UE of categories 5 or higher that support 3DL intra-band contiguous CA, or 3DL inter-band CA, or 3DL with intra-band contiguous and inter-band CA (UE categories 5 and onwards).

This test case also applies to all types of E-UTRA FDD release 11 and forward UE of categories 5 or higher that support 3DL with intra-band non-contiguous and inter-band CA, or 3DL with intra-band non-contiguous and intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.1.1_A.2.3 Minimum conformance requirements

For CA with 3DL CCs, the requirements are specified in Table 8.2.1.1.1_A.2.3-3, based on single carrier requirement specified in Table 8.2.1.1.1_A.2.3-2, with the addition of the parameters in Table 8.2.1.1.1_A.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.1.1_A.2.3-1: Test Parameters for CA (3DL CA)

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1
Note 1: $P_B = 0$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			
Note 3: PUCCH format 3 is used to feedback ACK/NACK for Tests in Table 8.2.1.1.1_A.2.3-3.			
Note 4: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.1.1_A.2.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propagation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.1.1.1_A.2.3-3: Minimum performance (FRC) based on single carrier performance for CA with 3DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
3	20MHz+20MHz+10MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
4	20MHz+15MHz+15MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
5	20MHz+15MHz+10MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
6	20MHz+10MHz+10MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
7	15MHz+15MHz+10MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
8	20MHz+10MHz+5MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
9	20MHz+15MHz+5MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
10	10MHz+10MHz+5MHz	As specified in Table 8.2.1.1.1_A.2.3-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			
Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1_A.2.4 Test description

8.2.1.1.1_A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.1.1_A.2.4-1.

CA Capability to be tested: Select one according to Table 8.2.1.1.1_A.2.4-1

Table 8.2.1.1.1_A.2.4-1: Test point selection for TM1 CA

CA Capability	Bandwidth combination									
	3x20	20+20+15	20+20+10	20+15+15	20+15+10	20+10+10	15+15+10	20+10+5	20+15+5	10+10+5
Intra-band contiguous CA (CA3_C)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Inter-band CA (two bands) (CA3_A2)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Inter-band CA (three bands) (CA3_A3)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Intra-band non-contiguous CA (with two sub-blocks) (CA3_N2)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.										

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.1.1_A.2.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.1.1_A.2.4.3.

8.2.1.1.1_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.1.1_A.2.4.3.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.1_A.2.3-1 and 8.2.1.1.1_A.2.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.1.1_A.2.5-1 as appropriate.

6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.1.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.1.1.1_A.2.5 Test requirement

Table 8.2.1.1.1_A.1.3-1 defines the primary level settings.

For CA with 3DL CCs, the requirements are specified in Table 8.2.1.1.1_A.2.5-2, based on single carrier requirement specified in Table 8.2.1.1.1_A.2.5-1.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.1.1_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.1_A.2.5-1: Single carrier Test requirement for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propagation condition	Correlation matrix and antenna config.	Reference value		
					Fraction of maximum throughput (%)	SNR (dB) for CC on 2RX Supported RF band	SNR (dB) for CC on 4RX Supported RF band
1.4MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5	-2.0
3MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3	-1.8
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2	-1.7
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8	-2.3
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4

Table 8.2.1.1.1_A.2.5-2: Test requirement (FRC) based on single carrier performance for CA with 3DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
3	20MHz+20MHz+10MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
4	20MHz+15MHz+15MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
5	20MHz+15MHz+10MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
6	20MHz+10MHz+10MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
7	15MHz+15MHz+10MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
8	20MHz+10MHz+5MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
9	20MHz+15MHz+5MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
10	10MHz+10MHz+5MHz	As specified in Table 8.2.1.1.1_A.2.5-1 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3 Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.1.1_A.3 Void

8.2.1.1.1_A.4 FDD PDSCH Single Antenna Port Performance for CA (4DL CA)

8.2.1.1.1_A.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.1.1.1_A.4.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of categories 8 or higher that support 4DL inter-band CA, or 4DL with intra-band contiguous and inter-band CA, or 4DL with intra-band non-contiguous and inter-band CA, or 4DL with intra-band non-contiguous and intra-band contiguous CA.

8.2.1.1.1_A.4.3 Minimum conformance requirements

For CA with 4DL CCs, the requirements are specified in Table 8.2.1.1.1_A.4.3-3, based on single carrier requirement specified in Table 8.2.1.1.1_A.4.3-2, with the addition of the parameters in Table 8.2.1.1.1_A.4.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.1.1_A.4.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1
Note 1: $P_B = 0$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			
Note 3: PUCCH format 3 is used to feedback ACK/NACK for Tests in Table 8.2.1.1.1_A.4.3-3.			
Note 4: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.1.1_A.4.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propagation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.1.1.1_A.4.3-3: Minimum performance (FRC) based on single carrier performance for CA with 4DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.1.1.1_A.4.3-2 per CC	≥8
2	10MHz+20MHz+20MHz+20MHz	As specified in Table 8.2.1.1.1_A.4.3-2 per CC	≥8
3	10MHz+10MHz+20MHz+20MHz	As specified in Table 8.2.1.1.1_A.4.3-2 per CC	≥8
4	5MHz+10MHz+20MHz+20MHz	As specified in Table 8.2.1.1.1_A.4.3-2 per CC	≥8
5	5MHz+10MHz+10MHz+20MHz	As specified in Table 8.2.1.1.1_A.4.3-2 per CC	≥8
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.			
NOTE 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1_A.4.4 Test description

8.2.1.1.1_A.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.1.1_A.4.4-1.

CA Capability to be tested: Select one according to Table 8.2.1.1.1_A.4.4-1

Table 8.2.1.1.1_A.4.4-1: Test point selection for TM1 CA

CA Capability	**Bandwidth combination**				
	4x20	10+20+20+20	10+10+20+20	5+10+20+20	5+10+10+20
Inter-band CA (two bands) (CA4_A2)	Test1	Test2	Test3	Test4	Test5
Inter-band CA (three bands) (CA4_A3)	Test1	Test2	Test3	Test4	Test5
Inter-band CA (four bands) (CA4_A4)	Test1	Test2	Test3	Test4	Test5
Intra-band non-contiguous CA (with two sub-blocks) (CA4_N2)	Test1	Test2	Test3	Test4	Test5
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.					

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59.
2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.1.1_A.4.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.1.1_A.4.4.3.

8.2.1.1.1_A.4.4.2 Test procedure

1. Configure SCCs according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.1.1_A.4.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.1_A.4.3-1 and 8.2.1.1.1_A.4.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.1.1_A.4.5-1 as appropriate.

6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.1.1_A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.1.1.1_A.4.5 Test requirement

Table 8.2.1.1.1_A.1.3-1 defines the primary level settings.

For CA with 4DL CCs, the requirements are specified in Table 8.2.1.1.1_A.4.5-2, based on single carrier requirement specified in Table 8.2.1.1.1_A.4.5-1.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.1.1_A.4.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.1_A.4.5-1: Single carrier Test requirement for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propagation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5
3MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9

Table 8.2.1.1.1_A.4.5-2: Test requirement (FRC) based on single carrier performance for CA with 4DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.1.1.1_A.4.5-2 per CC	≥8
2	10MHz+20MHz+20MHz+20MHz	As specified in Table 8.2.1.1.1_A.4.5-2 per CC	≥8
3	10MHz+10MHz+20MHz+20MHz	As specified in Table 8.2.1.1.1_A.4.5-2 per CC	≥8
4	5MHz+10MHz+20MHz+20MHz	As specified in Table 8.2.1.1.1_A.4.5-2 per CC	≥8
5	5MHz+10MHz+10MHz+20MHz	As specified in Table 8.2.1.1.1_A.4.5-2 per CC	≥8
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3 NOTE 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.1.1_A.5 FDD PDSCH Single Antenna Port Performance for CA (5 DL CA)

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The test case needs to be added to Annex G

8.2.1.1.1_A.5.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.1.1.1_A.5.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of categories 8, category 11 or higher that support 5DL with intra-band contiguous and inter-band CA, or 5DL with intra-band non-contiguous and inter-band CA, or 5DL with intra-band non-contiguous and intra-band contiguous CA.

This test case also applies to all types of E-UTRA FDD release 12 and forward UE of categories 8, category 11 or higher that support 5DL inter-band CA.

8.2.1.1.1_A.5.3 Minimum conformance requirements

For CA with 5DL CCs, the requirements are specified in Table 8.2.1.1.1_A.5.3-3, based on single carrier requirement specified in Table 8.2.1.1.1_A.5.3-2, with the addition of the parameters in Table 8.2.1.1.1_A.5.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.1.1_A.5.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1
Note 1: $P_B = 0$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			
Note 3: PUCCH format 3 is used to feedback ACK/NACK for Tests in Table 8.2.1.1.1_A.5.3-3.			
Note 4: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.1.1_A.5.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propagation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.1.1.1_A.5.3-3: Minimum performance (FRC) based on single carrier performance for CA with 5DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	5x20MHz	As specified in Table 8.2.1.1.1_A.5.3-2 per CC	8, ≥11
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3 NOTE 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1_A.5.4 Test description

8.2.1.1.1_A.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.1.1_A.5.4-1.

CA Capability to be tested: Select one according to Table 8.2.1.1.1_A.5.4-1

Table 8.2.1.1.1_A.5.4-1: Test point selection for TM1 CA

CA Capability	Bandwidth combination
	5x20
Inter-band CA (two bands) (CA5_A2)	Test1
Inter-band CA (three bands) (CA5_A3)	Test1
Inter-band CA (four bands) (CA5_A4)	Test1
Inter-band CA (five bands) (CA5_A5)	Test1
Intra-band non-contiguous CA (with two sub-blocks) (CA5_N2)	Test1
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.	

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59.
2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.1.1_A.5.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.1.1_A.5.4.3.

8.2.1.1.1_A.5.4.2 Test procedure

1. Configure SCCs according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.1.1_A.5.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.1_A.5.3-1 and 8.2.1.1.1_A.5.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.1.1_A.5.5-1 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.1.1_A.5.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.1.1.1_A.5.5 Test requirement

Table 8.2.1.1.1_A.1.3-1 defines the primary level settings.

For CA with 5DL CCs, the requirements are specified in Table 8.2.1.1.1_A.5.5-2, based on single carrier requirement specified in Table 8.2.1.1.1_A.5.5-1.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.1.1_A.5.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.1_A.5.5-1: Single carrier Test requirement for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propagation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5
3MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9

Table 8.2.1.1.1_A.5.5-2: Test requirement (FRC) based on single carrier performance for CA with 5DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	5x20MHz	As specified in Table 8.2.1.1.1_A.5.5-2 per CC	8, ≥11
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.			
NOTE 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.1.2 FDD PDSCH Single Antenna Port Performance with 1 PRB in presence of MBSFN

8.2.1.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS for 1 PRB allocation in presence of MBSFN.

8.2.1.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.2.1.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.1.2.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.1.1.2.3-2, for the specified SNR.

Table 8.2.1.1.2.3-1: Test Parameters for Testing 1 PRB allocation

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for MBSFN portion of MBSFN subframes (Note 2)			OCNG (Note 3)
PDSCH transmission mode			1
Note 1: $P_B = 0$ Note 2: The MBSFN portion of an MBSFN subframe comprises the whole MBSFN subframe except the first two symbols in the first slot. Note 3: The MBSFN portion of the MBSFN subframes shall contain QPSK modulated data. Cell-specific reference signals are not inserted in the MBSFN portion of the MBSFN subframes, QPSK modulated MBSFN data is used instead.			

Table 8.2.1.1.2.3-2: Minimum performance 1 PRB allocation (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.29 FDD	OP.3 FDD	ETU70	1x2 Low	30	2.0	1-8

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.2.4 Test description

8.2.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Low Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Tables 8.2.1.1.2.3-2as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.1.1.2.3-1as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.1.2.4.3.

8.2.1.1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.2.3-1 and 8.2.1.1.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.1.2.5-1as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.1.2.4.3-1: *SystemInformationBlockType2*: Additional FDD PDSCH Single Antenna Port Performance for 1 PRB allocation with MBSFN subframes test point 1 requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 SystemInformationBlockType2			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType2 ::= SEQUENCE {			
mbsfn-SubframeConfig ::= SEQUENCE {			
radioframeAllocationPeriod	n1	Every radio frame is with MBSFN subframe	
radioframeAllocationOffset	0		
subframeAllocation CHOICE {			
oneFrame	111111	Subframe 1, 2, 3, 6, 7, 8 is used for MBSFN	FDD
}			
}			

8.2.1.1.2.5 Test requirement

Table 8.2.1.1.2.3-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.1.2.5-1for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.2.5-1: Test requirement 1 PRB allocation with MBSFN subframes (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.29 FDD	OP.3 FDD	ETU70	1x2 Low	30	+2.8	1-8

8.2.1.2 FDD PDSCH Transmit Diversity Performance (Cell-Specific Reference Symbols)

8.2.1.2.1 FDD PDSCH Transmit Diversity 2x2

Editor's note: SNR requirement for 4Rx UE without 2Rx RF bands are still in square brackets

8.2.1.2.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity (SFBC).

8.2.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.2.1.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 transmitter antennas as specified.

Table 8.2.1.2.1.3-1: Test Parameters for Testing Transmit Diversity Performance

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.1.2.1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Medium	70	6.8	2-8
	5 MHz (Note 1)	R.11-2 FDD	OP.1 FDD	EVA5	2x2 Medium	70	5.9	2-8
2	10 MHz	R.10 FDD	OP.1 FDD	HST	2x2	70	-2.3	1-8
Note 1: Test case applicability is defined in 8.1.2.1.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.

8.2.1.2.1.4 Test description

8.2.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.2.1.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.1.4.3.

8.2.1.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.2.1.3-1 and 8.2.1.2.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.2.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each test interval in Table 8.2.1.2.1.5-1 as appropriate.

8.2.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.1.2.1.5 Test requirement

Table 8.2.1.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.2.1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value			UE Category
						Fraction of Maximum Throughput (%)	SNR (dB) for UE with 2Rx RF band	SNR (dB) for 4Rx UE without 2Rx RF bands	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Medium	70	7.7	NA	2-8
	5 MHz (Note 1)	R.11-2 FDD	OP.1 FDD	EVA5	2x2 Medium	70	6.8	NA	2-8
2	10 MHz	R.10 FDD	OP.1 FDD	HST	2x2	70	-1.7	[-3.2]	1-8

Note 1: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.
NOTE 2: The SNR requirement for 4Rx capable UEs is as specified in 8.1.2.6.1

8.2.1.2.1_1 FDD PDSCH Transmit Diversity 2x2 (Release 9 and forward)

8.2.1.2.1_1.1 Test purpose

Same test purpose as in clause 8.2.1.2.1.1.

8.2.1.2.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward of UE category 1.

8.2.1.2.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.2.1.3 with the following exceptions:

- Instead of Table 8.2.1.2.1.3-1 → use Table 8.2.1.2.1_1.3-1.
- Instead of Table 8.2.1.2.1.3-2 → use Table 8.2.1.2.1_1.3-2.

Table 8.2.1.2.1_1.3-1: Test Parameters for Testing Transmit Diversity Performance

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.1.2.1_1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	5 MHz	R.11-2 FDD	OP.1 FDD	EVA5	2x2 Medium	70	5.9	1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.

8.2.1.2.1_1.4 Test description

Same test description as in clause 8.2.1.2.1.4 with the following exceptions:

- Instead of Table 8.2.1.2.1.3-1 → use Table 8.2.1.2.1_1.3-1.
- Instead of Table 8.2.1.2.1.3-2 → use Table 8.2.1.2.1_1.3-2.
- Instead of Table 8.2.1.2.1.5-1 → use Table 8.2.1.2.1_1.5-1.

8.2.1.2.1_1.5 Test requirement

Same test requirements as in clause 8.2.1.2.1.5 with the following exceptions:

- Instead of Table 8.2.1.2.1.3-1 → use Table 8.2.1.2.1_1.3-1.
- Instead of Table 8.2.1.2.1.5-1 → use Table 8.2.1.2.1_1.5-1.

Table 8.2.1.2.1_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	5 MHz	R.11-2 FDD	OP.1 FDD	EVA5	2x2 Medium	70	+6.8	1

8.2.1.2.2 FDD PDSCH Transmit Diversity 4x2

8.2.1.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity (SFBC-FSTD).

8.2.1.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.2.1.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.2.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.2.2.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 4 transmitter antennas as specified.

Table 8.2.1.2.2.3-1: Test Parameters for Testing Transmit Diversity Performance

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.1.2.2.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	1.4 MHz	R.12 FDD	OP.1 FDD	EPA5	4x2 Medium	70	0.6	1-8

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.

8.2.1.2.2.4 Test description

8.2.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.2.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.2.4.3.

8.2.1.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.2.2.3-1 and 8.2.1.2.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.2.2.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.2.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH transmit diversity performance downlink power allocation test point 1 requirement

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

8.2.1.2.2.5 Test requirement

Table 8.2.1.2.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.2.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.2.2.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	1.4 MHz	R.12 FDD	OP.1 FDD	EPA5	4x2 Medium	70	1.5	1-8

8.2.1.2.2_1 FDD PDSCH Transmit Diversity 4x2 (Release 9 and forward)

8.2.1.2.2_1.1 Test purpose

Same test purpose as in clause 8.2.1.2.2.1.

8.2.1.2.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.2.1.2.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.2.2.3 with the following exceptions:

- Instead of Table 8.2.1.2.2.3-1 → use Table 8.2.1.2.2_1.3-1.

- Instead of Table 8.2.1.2.2.3-2 → use Table 8.2.1.2.2_1.3-2.

Table 8.2.1.2.2_1.3-1: Test Parameters for Testing Transmit Diversity Performance

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.1.2.2_1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	ETU70	4x2 Low	70	-0.9	1-8

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.

8.2.1.2.2_1.4 Test description

Same test description as in clause 8.2.1.2.2.4 with the following exceptions:

- Instead of Table 8.2.1.2.2.3-1 → use Table 8.2.1.2.2_1.3-1.
- Instead of Table 8.2.1.2.2.3-2 → use Table 8.2.1.2.2_1.3-2.
- Instead of Table 8.2.1.2.2.5-1 → use Table 8.2.1.2.2_1.5-1.

8.2.1.2.2_1.5 Test requirement

Same test requirements as in clause 8.2.1.2.2.5 with the following exceptions:

- Instead of Table 8.2.1.2.2.3-1 → use Table 8.2.1.2.2_1.3-1.
- Instead of Table 8.2.1.2.2.5-1 → use Table 8.2.1.2.2_1.5-1.

Table 8.2.1.2.2_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	ETU70	4x2 Low	70	0	1-8

8.2.1.2.3

8.2.1.2.3_C FDD PDSCH Transmit diversity 2x2 for eICIC

8.2.1.2.3_C.1 FDD PDSCH Transmit diversity 2x2 for eICIC (non-MBSFN ABS)

8.2.1.2.3_C.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.2.1.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.1.2.3_C.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.2.3_C.1.3-1.

In Table 8.2.1.2.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Table C.3.2-1 in Annex C.3.2 and for Cell 2 is according to Table C.3.3-1 in Annex C.3.3, respectively.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.2.3_C.1.3-2 for the specified SNR.

Table 8.2.1.2.3_C.1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A

$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.2.3_C.1.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 5)			N/A	11000100 11000000 11000000 11000000` 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000100 11000000 11000000 11000000 11000000	N/A
	$C_{CSI,1}$		00111011 00111111 00111111 00111111 00111111	N/A
Number of control OFDM symbols			2	2
PDSCH transmission mode			2	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.1.2.3_C.1.3-2: Minimum Performance Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	

1	R.11-4 FDD Note 4	OP.1 FDD	OP.1 FDD	EVA5	EVA 5	2x2 Medium	70	3.4	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									
Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.									
Note 5: The maximum Throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.3.

8.2.1.2.3_C.1.4 Test description

8.2.1.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.3_C.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.2.1-1 and 8.2.1.2.3_C.1.3-1 as appropriate.
3. Downlink signals are initially set up for Cell1 according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.3_C.1.4.3.

8.2.1.2.3_C.1.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.2.1.2.3_C.1.5-1, 8.2.1.2.3_C.1.5-2, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2
2. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.2.3_C.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'10000000100000001000 00001000000010000000'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.2.1.2.3_C.1.4.3-2: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'11000100110000001100 00001100000011000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'00111011001111110011 11110011111100111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.2.1.2.3_C.1.5 Test requirement

Table 8.2.1.2.3_C.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.2.3_C.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.2.3_C.1.5-1: Test Parameters for Transmit Diversity (FRC)

Parameter		**Unit**	**Cell 1**	**Cell 2**
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102.1 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.9 (Note 4)	N/A

$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.2.3_C.1.5-2	5.8
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 5)			N/A	11000100 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000100 11000000 11000000 11000000 11000000	N/A
	$C_{CSI,1}$		00111011 00111111 00111111 00111111 00111111	N/A
Number of control OFDM symbols			2	2
PDSCH transmission mode			2	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.1.2.3_C.1.5-2: Test requirement Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	

1	R.11-4 FDD Note 4	OP.1 FDD	OP.1 FDD	EVA5	EVA 5	2x2 Medium	70	4.3	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									
Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.									
Note 5: The maximum Throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.									

8.2.1.2.3_D

8.2.1.2.3_E FDD PDSCH Transmit diversity 2x2 for feICIC

8.2.1.2.3_E.1 FDD PDSCH Transmit diversity 2x2 for feICIC (non-MBSFN ABS)

8.2.1.2.3_E.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [14] of the aggressor cells with CRS assistance information.

8.2.1.2.3_E.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling – Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.2.1.2.3_E.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.2.3_E.1.3-1.

In Table 8.2.1.2.3_E.1-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information TS 36.331 [5] includes Cell 2 and Cell 3.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.2.3_E.1.3-2 for the specified SNR.

Table 8.2.1.2.3_E.1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.2.3_E.1.3-2	12	10
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 5)			N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000000 11000000 11000000 11000000 11000000	N/A	N/A
	$C_{CSI,1}$		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
PDSCH transmission mode			2	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.
Note 10: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.1.2.3_E.1.3-2: Minimum Performance Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11-4 FDD (Note 4)	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Medium	70	3.4	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.3A.

8.2.1.2.3_E.1.4 Test description

8.2.1.2.3_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.3_E.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.2.3_E.1.3-1 as appropriate.
3. Downlink signals are initially set up for Cell 1 according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.3_E.1.4.3.

8.2.1.2.3_E.1.4.2 Test procedure

1. Set the parameters for Cell 1, Cell 2 and Cell 3, according to Tables 8.2.1.2.3_E.1.5-1, 8.2.1.2.3_E.1.5-2, and C.3.3.2 of Annex C.3.3. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC.
2. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.2.3_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.2.1.2.3_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.2A.5, Table 5.2A.5.1.1-2 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'1000000010000000 1000000010000000 10000000'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.2.1.2.3_E.1.4.3-2: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'11000000 11000000 11000000 11000000 11000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'00111111 00111111 00111111 00111111 00111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.2.1.2.3_E.1.5 Test requirement

Table 8.2.1.2.3_E.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.2.3_E.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.2.3_E.1.5-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.2.3_E.1.5-2	11.8	9.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 5)			N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000000 11000000 11000000 11000000 11000000	N/A	N/A
	$C_{CSI,1}$		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
PDSCH transmission mode			2	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.
Note 10: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.1.2.3_E.1.5-2: Test requirement Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11-4 FDD (Note 4)	OP.1FDD	OP.1FDD	OP.1FDD	EVA5	EVA5	EVA5	2x2 Medium	70	4.3	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.

8.2.1.2.4 FDD PDSCH Transmit Diversity 2x2 with TM3 Interference Model – Enhanced Performance Requirement Type A

8.2.1.2.4.1 Test purpose

The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two dominant interfering cells applying transmission mode 3 interference model defined in clause B.5.2.

8.2.1.2.4.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that support enhanced receiver Type A.

8.2.1.2.4.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.2.4.3-2, with the addition of parameters in Table 8.2.1.2.4.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.1.2.4.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.2.1.2.4.3-1: Test Parameters for Transmit diversity Performance (FRC) with TM3 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0

Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-2.23	-8.06
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM symbols			2	2	2
PDSCH transmission mode			2	N/A	N/A
Interference model			N/A	As specified in clause B.5.2	As specified in clause B.5.2
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Reporting interval		ms	5	N/A	N/A
Reporting mode			PUCCH 1-0	N/A	N/A
Physical channel for CQI reporting			PUSCH(Note5)	N/A	N/A
cqi-pmi-ConfigurationIndex			2	N/A	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: Cell 2 transmission is delayed with respect to Cell 1 by 0.33 ms and Cell 3 transmission is delayed with respect to Cell 1 by 0.67 ms.

Note 5: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5 and #0.

Table 8.2.1.2.4.3-2: Enhanced Performance Requirement Type A, Transmit Diversity (FRC) with TM3 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.46 FDD	OP.1 FDD	N/A	N/A	EVA70	EVA70	EVA70	2x2 Low	70	-1.1	1-8

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.4.

8.2.1.2.4.4 Test description

8.2.1.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.2.4.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.4.4.3.

8.2.1.2.4.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.2.4.5-1 and 8.2.1.2.4.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1 and #6 (Table A.2.2.1.1-1).
2. SS sets up parameters for cell 2 and cell 3 according to table 8.2.1.2.4.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SINR according to Tables 8.2.1.2.4.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5-14 in Annex G clause G.3.

8.2.1.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

Table 8.2.1.2.4.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 8.2.1.2.4.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.2.1.2.4.5 Test requirement

Table 8.2.1.2.4.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.2.1.2.4.5-2 for the specified SINR including test tolerances.

Table 8.2.1.2.4.5-1: Test Parameters for Transmit diversity Performance (FRC) with TM3 interference model

Parameter		**Unit**	**Cell 1**	**Cell 2**	**Cell 3**
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.88	-7.21
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM symbols			2	2	2
PDSCH transmission mode			2	N/A	N/A
Interference model			N/A	As specified in clause B.5.2	As specified in clause B.5.2
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20

Reporting interval	ms	5	N/A	N/A
Reporting mode		PUCCH 1-0	N/A	N/A
Physical channel for CQI reporting		PUSCH(Note5)	N/A	N/A
cqi-pmi-ConfigurationIndex		2	N/A	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: Cell 2 transmission is delayed with respect to Cell 1 by 0.33 ms and Cell 3 transmission is delayed with respect to Cell 1 by 0.67 ms.

Note 5: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5 and #0.

Table 8.2.1.2.4.5-2: Test requirement for Enhanced Performance Requirement Type A, Transmit Diversity (FRC) with TM3 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.46 FDD	OP.1 FDD	N/A	N/A	EVA70	EVA70	EVA70	2x2 Low	70	-0.15	1-8

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

8.2.1.2.5 FDD PDSCH Transmit Diversity 2x2 with TM2 Interference Model – Enhanced Performance Requirement Type B

8.2.1.2.5.1 Test purpose

The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 2 interference model defined in clause B.6.1.

8.2.1.2.5.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward that support enhanced performance requirement Type B.

8.2.1.2.5.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.2.5.3-2, with the addition of parameters in Table 8.2.1.2.5.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.1.2.5.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.2.1.2.5.3-1: Test Parameters for Transmit diversity Performance (FRC) with TM2 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (NOTE 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	6	1
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PDSCH transmission mode			2	2	2
Interference model			N/A	As specified in clause B.6.1	As specified in clause B.6.1
MBSFN			Not configured	Not configured	Not configured
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
NeighCellsInfo-r12 (NOTE 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 8.2.1.2.5.3-2: Minimum Performance for Enhanced Performance Requirement Type B, Transmit Diversity (FRC) with TM2 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.11-10 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	15.5	≥1

NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.5.

8.2.1.2.5.4 Test description

8.2.1.2.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.5.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.2.5.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.5.4.3.

8.2.1.2.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.2.5.5-1 and 8.2.1.2.5.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.2.1.2.5.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.1.2.5.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.
5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.2.1.2.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m).

8.2.1.2.5.5 Test requirement

Table 8.2.1.2.5.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.2.1.2.5.5-2 for the specified SNR including test tolerances.

Table 8.2.1.2.5.5-1: Test Parameters for Transmit diversity Performance (FRC) with TM2 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (NOTE 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	14.71	4.14
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	6	1
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PDSCH transmission mode			2	2	2
Interference model			N/A	As specified in clause B.6.1	As specified in clause B.6.1
MBSFN			Not configured	Not configured	Not configured
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
NeighCellsInfo-r12 (NOTE 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 8.2.1.2.5.5-2: Test Requirement for Enhanced Performance Requirement Type B, Transmit Diversity (FRC) with TM2 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.11-10 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	17.35	≥1

NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

8.2.1.2.6 FDD PDSCH Transmit Diversity 2x2 with TM9 Interference Model – Enhanced Performance Requirement Type B

8.2.1.2.6.1 Test purpose

The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 9 interference model defined in clause B.6.4.

8.2.1.2.6.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward that support enhanced performance requirement Type B.

8.2.1.2.6.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.2.6.3-2, with the addition of parameters in Table 8.2.1.2.6.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.1.2.6.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.2.1.2.6.3-1: Test Parameters for Transmit diversity Performance (FRC) with TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	0	0
	ρ_B	dB	-3 (NOTE 1)	0	0
	σ	dB	0	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	3.28	0.74
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	Random from set {1,2,3}	Random from set {1,2,3}
PDSCH transmission mode			2	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			N/A	Antenna ports 15,16	Antenna ports 15,16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	N/A	10 / 1	10 / 1
CSI reference signal configuration			N/A	6	7
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	6 / 0100000000000000	6 / 0010000000000000
Time offset to cell 1		us	N/A	5	-5
Frequency offset to cell 1		Hz	N/A	600	-600
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (NOTE 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: CSI-RS configurations are according to [8] subclause 6.10.5.2.
NOTE 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 8.2.1.2.6.3-2: Minimum Performance for Enhanced Performance Requirement Type B, Transmit Diversity (FRC) with TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.11-9 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	8.4	≥1
NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.6.

8.2.1.2.6.4 Test description

8.2.1.2.6.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.6.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.2.6.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.6.4.3.

8.2.1.2.6.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.2.6.5-1 and 8.2.1.2.6.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.2.1.2.6.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.1.2.6.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.
5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.2.1.2.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m).

8.2.1.2.6.5 Test requirement

Table 8.2.1.2.6.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.2.1.2.6.5-2 for the specified SNR including test tolerances.

Table 8.2.1.2.6.5-1: Test Parameters for Transmit diversity Performance (FRC) with TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	0	0
	ρ_B	dB	-3 (NOTE 1)	0	0
	σ	dB	0	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	4.08	1.54
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	Random from set {1,2,3}	Random from set {1,2,3}
PDSCH transmission mode			2	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			N/A	Antenna ports 15,16	Antenna ports 15,16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	N/A	10 / 1	10 / 1
CSI reference signal configuration			N/A	6	7
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	6 / 0100000000000000	6 / 0010000000000000
Time offset to cell 1		us	N/A	5	-5
Frequency offset to cell 1		Hz	N/A	600	-600
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (NOTE 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: CSI-RS configurations are according to [8] subclause 6.10.5.2.
NOTE 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 8.2.1.2.6.5-2: Test Requirement for Enhanced Performance Requirement Type B, Transmit Diversity (FRC) with TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.11-9 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	9.94	≥1
NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

8.2.1.3 FDD PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.1.3.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2

8.2.1.3.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 8 and forward UE of category 2 or higher..

8.2.1.3.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.1.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.1.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$			

Table 8.2.1.3.1.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1 (Note 1)	10 MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.0	≥2
2 (Note 2)	5 MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.7	≥2
Note 1: Test 1 may not be executed for UE-s for which Test 1 in 8.2.1.3.1_A.2 is applicable. Note 2: Test case applicability is defined in 8.1.2.1.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.1.4 Test description

8.2.1.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.3.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1.4.3.

8.2.1.3.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1.3-1 and 8.2.1.3.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.3.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.1.5 Test requirement

Table 8.2.1.3.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1.5-1: Test Requirement Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.9	≥2
2 (Note 2)	5 MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.6	≥2
Note 1: N/A Note 2: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.								

8.2.1.3.1_1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 (Release 11 and forward)

8.2.1.3.1_1.1 Test purpose

Same test purpose as in clause 8.2.1.3.1.1.

8.2.1.3.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD release 11 and forward UE of category 2 or higher

8.2.1.3.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.3.1.3 with the following exceptions:

- Instead of Table 8.2.1.3.1.3-1 → use Table 8.2.1.3.1_1.3-1.
- Instead of Table 8.2.1.3.1.3-2 → use Table 8.2.1.3.1_1.3-2.

Table 8.2.1.3.1_1.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$			

Table 8.2.1.3.1_1.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.35 FDD	OP.1 FDD	EVA200	2x2 Low	70	20.2	≥2
2	10 MHz	R.35-4 FDD	OP.1 FDD	ETU300	2x2 Low	70	19.7	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.1_1.4 Test description

Same test description as in clause 8.2.1.3.1.4 with the following exceptions:

- Instead of Table 8.2.1.3.1.3-1 → use Table 8.2.1.3.1_1.3-1.
- Instead of Table 8.2.1.3.1.3-2 → use Table 8.2.1.3.1_1.3-2.
- Instead of Table 8.2.1.3.1.5-1 → use Table 8.2.1.3.1_1.5-1.

8.2.1.3.1_1.5 Test requirement

Same test requirements as in clause 8.2.1.3.1.5 with the following exceptions:

- Instead of Table 8.2.1.3.1.3-1 → use Table 8.2.1.3.1_1.3-1.
- Instead of Table 8.2.1.3.1.5-1 → use Table 8.2.1.3.1_1.5-1.

Table 8.2.1.3.1_1.5-1: Test Requirement Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.35 FDD	OP.1 FDD	EVA200	2x2 Low	70	[21.1]	≥2
2	10 MHz	R.35-4 FDD	OP.1 FDD	ETU300	2x2 Low	70	20.6	≥2

8.2.1.3.1_A FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA

8.2.1.3.1_A.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (2DL CA)

8.2.1.3.1_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1_A.1.2 Test applicability

This test applies to

E-UTRA FDD release 10 and forward UE of category 2 or higher that supports inter-band OR intra-band contiguous DL CA

This test also applies to E-UTRA FDD release 11 and forward UE of category 2 or higher that supports intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.3.1_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.1_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.1_A.1.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.1_A.1.3-1: Test Parameters for Large Delay CDD (FRC) for CA

Parameter		Unit	Test 1 -5
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
dB N_{oc} 0at antenna port		dBm/15kHz	-98
PDSCH Transmission mode			3
Note 1: $P_B = 1$ Note 2: PUCCH format 1b with channel selection is used to feedback ACK/NACK. Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.3.1_A.1.3-2: Minimum performance Large Delay CDD (FRC) for CA

Test num	Bandwidth	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE category
						Fraction of maximum Throughput (%)	SNR (dB)	
1	2x10 MHz	R.11 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.7	≥3
2	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.2	≥5
3	2x5 MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.7	≥2
4	10MHz+5 MHz	R.11 FDD for 10MHz CC,	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.0	≥3
		R.11-2 FDD for 5MHz CC	OP.1 FDD (Note 1)			70	12.7	
5	15MHz+5 MHz	R.11-7 FDD for 15MHz CC	OP.1 FDD (NOTE 1)	EVA70	2x2 Low	70	12.8	≥3
		R.11-2 FDD for 5MHz CC	OP.1 FDD (NOTE 1)			70	12.7	
Note 1: The OCNG pattern applies for each CC. Note 2: Void Note 3: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.1_A.1.4 Test description

8.2.1.3.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select according to Table 8.2.1.3.1_A.1.4.1-1.

CA Capability to be tested: Select according to Table 8.2.1.3.1_A.1.4.1-1

Table 8.2.1.3.1_A.1.4.1-1: Test point selection for TM3 2DLCA

CA Capability	Bandwidth Combination				
	10+10	20+20	5+5	10+5	15+5
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test 3	Test4	Test5
Intra-band contiguous CA (CA2_C)	Test 1	Test 2	Test 3	Test4	Test5
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test 1	Test 2	Test 3	Test4	Test5
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the first bandwidth combination (moving from left to right) supported by the UE within the chosen CA capability.					

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate for UE supporting only 2Rx RF bands on all CC and Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.3.1_A.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1_A.1.4.3.

8.2.1.3.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.1.3.1_A.1.4.3-1, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.2.1.3.1_A.1.4.3-1A.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1_A.1.3-1 and 8.2.1.3.1_A.1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carrier according to Table 8.2.1.3.1_A.1.5-1 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval on both the component carrier.

7. Repeat steps from 1 to 6 for each subtest in Table 8.2.1.3.1_A.1.5-1 depending on UE CA capability as defined in Table 8.2.1.3.1_A.1.4.1-1 and as appropriate.

8.2.1.3.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions

Table 8.2.1.3.1_A.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.1_A.1.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.1_A.1.5 Test requirement

Table 8.2.1.3.1_A.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for the throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1_A.1.5-1: Test Requirement Large Delay CDD (FRC) for CA

Test num	**Bandwidth**	**Reference channel**	**OCNG pattern**	**Propa-gation condi-tion**	**Correlation matrix and antenna config.**	**Reference value**		
						Fraction of maximum Throughput (%)	**SNR (dB) for CC on 2Rx supported RF band**	**SNR (dB) for CC on 4Rx supported RF band**
1	2x10 MHz	R.11 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	14.6	13.1
2	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	14.1	12.6
3	2x5 MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.6	12.1
4	10MHz+5 MHz	R.11 FDD for 10MHz CC,	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.9	12.4
		R.11-2 FDD for 5MHz CC	OP.1 FDD (Note 1)			70	12.6	11.1
5	15MHz+5 MHz	R.11-7 FDD for 15MHz CC	OP.1 FDD (NOTE 1)	EVA70	2x2 Low	70	13.7	12.2
		R.11-2 FDD for 5MHz CC	OP.1 FDD (NOTE 1)			70	13.6	12.1

Note 1: The OCNG pattern applies for each CC.
Note 2: Void.
Note 3: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.3.1_A.2 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (3DL CA)

8.2.1.3.1_A.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1_A.2.2 Test applicability

This test case applies to all types of E-UTRA FDD release 10 and forward UE of category 5 or higher that support 3DL Intra-band contiguous CA or 3DL Inter-band CA, or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA FDD release 11 and forward UE of category 5 or higher that support 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.3.1_A.2.3 Minimum conformance requirements

For CA with 3 DL CCs, the requirements are specified in Table 8.2.1.3.1_A.2.3-3, based on single carrier requirement specified in Table 8.2.1.3.1_A.2.3-2, with the addition of the parameters in Table 8.2.1.3.1_A.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.3.1_A.2.3-1: Test Parameters for Large Delay CDD (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$.			
Note 2: PUCCH format 3 with channel selection is used to feedback ACK/NACK for Tests in Table 8.2.1.3.1_A.2.3-3.			
Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.3.1_A.2.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.6
3MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.8
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9

Table 8.2.1.3.1_A.2.3-2: Minimum performance (FRC) based on single carrier performance for CA with 3DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
3	20MHz+20MHz+10MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
4	20MHz+15MHz+15MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
5	20MHz+15MHz+10MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
6	20MHz+10MHz+10MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
7	15MHz+15MHz+10MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
8	20MHz+10MHz+5MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
9	20MHz+15MHz+5MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
10	10MHz+10MHz+5MHz	As specified in Table 8.2.1.3.1_A.2.3-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.1_A.2.4 Test description

8.2.1.3.1_A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select according to Table 8.2.1.3.1_A.2.4.1-1.

CA Capability to be tested: Select according to Table 8.2.1.3.1_A.2.4.1-1.

Table 8.2.1.3.1_A.2.4.1-1: Test point selection for TM3 3DL CA

CA Capability	Bandwidth combination									
	3x20	20+20+15	20+20+10	20+15+15	20+15+10	20+10+10	15+15+10	20+10+5	20+15+5	10+10+5
Intra-band contiguous (CA3_C)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Inter-band CA (two bands) (CA3_A2)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Inter-band CA (three bands) (CA3_A3)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Intra-band non-contiguous CA (with two sub-blocks) (CA3_N2)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.										

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.60 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.
2. Theparameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.3.1_A.2.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1_A.2.4.3.

8.2.1.3.1_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.3.1_A.2.4.3.
3. The SS activates SCCs by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. The SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1_A.2.3-1 and 8.2.1.3.1_A.2.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.3.1_A.2.5-1 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.3.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions

Table 8.2.1.3.1_A.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.1_A.2.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.1_A.2.5 Test requirement

Table 8.2.1.3.1_A.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.3.1_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1_A.2.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value		
					Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5	13
3MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7	12.2
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3

Table 8.2.1.3.1_A.2.5-2: Test requirement (FRC) based on single carrier performance for CA with 3DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
3	20MHz+20MHz+10MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
4	20MHz+15MHz+15MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
5	20MHz+15MHz+10MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
6	20MHz+10MHz+10MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
7	15MHz+15MHz+10MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
8	20MHz+10MHz+5MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
9	20MHz+15MHz+5MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
10	10MHz+10MHz+5MHz	As specified in Table 8.2.1.3.1_A.2.5-1 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.3.1_A.3 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (4DL CA)

8.2.1.3.1_A.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1_A.3.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of categories 8 or higher that support 4DL inter-band CA, or 4DL with intra-band contiguous and inter-band CA, or 4DL with intra-band non-contiguous and inter-band CA, or 4DL with intra-band non-contiguous and intra-band contiguous CA.

8.2.1.3.1_A.3.3 Minimum conformance requirements

For CA with 4 DL CCs, the requirements are specified in Table 8.2.1.3.1_A.3.3-3, based on single carrier requirement specified in Table 8.2.1.3.1_A.3.3-2, with the addition of the parameters in Table 8.2.1.3.1_A.3.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.3.1_A.3.3-1: Test Parameters for Large Delay CDD (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$.			
Note 2: PUCCH format 3 with channel selection is used to feedback ACK/NACK for Tests in Table 8.2.1.3.1_A.3.3-3.			
Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.3.1_A.3.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.6
3MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.8
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9

Table 8.2.1.3.1_A.3.3-2: Minimum performance (FRC) based on single carrier performance for CA with 4DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.1.3.1_A.3.3-2 per CC	≥8
2	10MHz+20MHz+20MHz+20MHz	As specified in Table 8.2.1.3.1_A.3.3-2 per CC	≥8
3	10MHz+10MHz+20MHz+20MHz	As specified in Table 8.2.1.3.1_A.3.3-2 per CC	≥8
4	5MHz+10MHz+20MHz+20MHz	As specified in Table 8.2.1.3.1_A.3.3-2 per CC	≥8
5	5MHz+10MHz+10MHz+20MHz	As specified in Table 8.2.1.3.1_A.3.3-2 per CC	≥8
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.1_A.3.4 Test description

8.2.1.3.1_A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select according to Table 8.2.1.3.1_A.3.4.1-1.

CA Capability to be tested: Select according to Table 8.2.1.3.1_A.3.4.1-1.

Table 8.2.1.3.1_A.3.4.1-1: Test point selection for TM3 4DL CA

CA Capability	Bandwidth combination				
	4x20	10+20+20+20	10+10+20+20	5+10+20+20	5+10+10+20
Inter-band CA (two bands) (CA4_A2)	Test1	Test2	Test3	Test4	Test5
Inter-band CA (three bands) (CA4_A3)	Test1	Test2	Test3	Test4	Test5
Inter-band CA (four bands) (CA4_A4)	Test1	Test2	Test3	Test4	Test5
Intra-band non-contiguous CA (with two sub-blocks) (CA4_N2)	Test1	Test2	Test3	Test4	Test5
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.					

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.60.
2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.3.1_A.3.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1_A.3.4.3.

8.2.1.3.1_A.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.3.1_A.3.4.3.
3. The SS activates SCCs by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. The SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1_A.3.3-1 and 8.2.1.3.1_A.3.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.3.1_A.3.5-1 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.3.1_A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions

Table 8.2.1.3.1_A.3.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.1_A.3.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.1_A.3.5 Test requirement

Table 8.2.1.3.1_A.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.3.1_A.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1_A.3.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5
3MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8

Table 8.2.1.3.1_A.3.5-2: Test requirement (FRC) based on single carrier performance for CA with 4DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.1.3.1_A.3.5-1 per CC	≥8
2	10MHz+20MHz+20MHz+20MHz	As specified in Table 8.2.1.3.1_A.3.5-1 per CC	≥8
3	10MHz+10MHz+20MHz+20MHz	As specified in Table 8.2.1.3.1_A.3.5-1 per CC	≥8
4	5MHz+10MHz+20MHz+20MHz	As specified in Table 8.2.1.3.1_A.3.5-1 per CC	≥8
5	5MHz+10MHz+10MHz+20MHz	As specified in Table 8.2.1.3.1_A.3.5-1 per CC	≥8
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.3.1_A.4 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (5DL CA)

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The test case needs to be added to Annex G

8.2.1.3.1_A.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1_A.4.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of categories 8, category 11 or higher that support 5DL with intra-band contiguous and inter-band CA, or 5DL with intra-band non-contiguous and inter-band CA, or 5DL with intra-band non-contiguous and intra-band contiguous CA.

This test case also applies to all types of E-UTRA FDD release 12 and forward UE of categories 8, category 11 or higher that support 5DL inter-band CA.

8.2.1.3.1_A.4.3 Minimum conformance requirements

For CA with 5 DL CCs, the requirements are specified in Table 8.2.1.3.1_A.4.3-3, based on single carrier requirement specified in Table 8.2.1.3.1_A.4.3-2, with the addition of the parameters in Table 8.2.1.3.1_A.4.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.3.1_A.4.3-1: Test Parameters for Large Delay CDD (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$.			
Note 2: PUCCH format 3 with channel selection is used to feedback ACK/NACK for Tests in Table 8.2.1.3.1_A.4.3-3.			
Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.3.1_A.4.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.6
3MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.8
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9

Table 8.2.1.3.1_A.4.3-2: Minimum performance (FRC) based on single carrier performance for CA with 5DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	5x20MHz	As specified in Table 8.2.1.3.1_A.4.3-2 per CC	8, ≥11
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.1_A.4.4 Test description

8.2.1.3.1_A.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select according to Table 8.2.1.3.1_A.4.4.1-1.

CA Capability to be tested: Select according to Table 8.2.1.3.1_A.4.4.1-1.

Table 8.2.1.3.1_A.4.4.1-1: Test point selection for TM3 5DL CA

CA Capability	Bandwidth combination

	5x20
Inter-band CA (two bands) (CA5_A2)	Test1
Inter-band CA (three bands) (CA5_A3)	Test1
Inter-band CA (four bands) (CA5_A4)	Test1
Inter-band CA (five bands) (CA5_A5)	Test1
Intra-band non-contiguous CA (with two sub-blocks) (CA5_N2)	Test1
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.	

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.60.
2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.3.1_A.4.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1_A.4.4.3.

8.2.1.3.1_A.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.3.1_A.4.4.3.
3. The SS activates SCCs by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. The SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1_A.4.3-1 and 8.2.1.3.1_A.4.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.3.1_A.4.5-1 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.3.1_A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions

Table 8.2.1.3.1_A.4.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.1_A.4.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.1_A.4.5 Test requirement

Table 8.2.1.3.1_A.4.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.3.1_A.4.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1_A.4.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5
3MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8

Table 8.2.1.3.1_A.4.5-2: Test requirement (FRC) based on single carrier performance for CA with 5DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	5x20MHz	As specified in Table 8.2.1.3.1_A.4.5-1 per CC	8, ≥11
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.3.1A FDD Soft buffer management test

8.2.1.3.1A_A.1 FDD PDSCH Soft buffer management test for CA (2 DL CA)

8.2.1.3.1A_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1A_A.1.2 Test applicability

This test applies to E-UTRA FDD UE category 3 and 4 release 10 and forward that support intra-band contiguous DL CA or inter-band DL CA.

This test applies also to E-UTRA FDD UE category 3 and 4 release 11 and forward that support intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.3.1A_A.1.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.3.1A_A.1.3-2, with the addition of the parameters in Table 8.2.1.3.1A_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C. The purpose is to verify the UE performance with proper instantaneous buffer implementation.

Table 8.2.1.3.1A_A.1.3-1: Test Parameters for soft buffer management test (FRC) for CA

Parameter		Unit	Test 1-7
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$ Note 2: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK. Note 3: For CA test cases, the same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.3.1A_A.1.3-2: Minimum performance soft buffer management test (FRC) for CA

Test num	Bandwidth	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of maximum Throughput (%)	SNR (dB)
1	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.2
2	15MHz + 10MHz	R.35-2 FDD for 15MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.1
		R.35-3 FDD for 10MHz CC	OP.1 FDD (Note 1)			70	15.1
3	20MHz + 10MHz	R.30 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.5
		R.11 FDD for 10MHz CC	OP.1 FDD (Note 1)			70	13.5
4	20MHz + 15MHz	R.30 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.5
		R.30-1 FDD for 15MHz CC	OP.1 FDD (Note 1)			70	13.5
5	2x20 MHz	R.35-1 FDD	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.8
6	20MHz + 10MHz	R.35-1 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.9
		R.35-3 FDD for 10MHz CC	OP.1 FDD (Note 1)			70	15.9
7	20MHz + 15MHz	R.35-1 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.9
		R.35-2 FDD for 15MHz CC	OP.1 FDD (Note 1)			70	15.9

Note 1: For CA test cases, the OCNG pattern applies for each CC.
Note 2: For Test 2, 3, 4, 6, 7 the Fraction of maximum Throughput applies to each CC.
Note 3: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

Table 8.2.1.3.1A_A.1.3-3: Test points for soft buffer management tests for CA

UE category	Bandwidth combination with maximum aggregated bandwidth (Note 1)			
	2x20MHz	15MHz+10MHz	20MHz+10MHz	20MHz+15MHz
3	1	2	3	4
4	5	N/A	6	7

Note 1: Maximum over all supported CA configurations and bandwidth combination sets according to Table 5.4.2A.1-1 and Table 5.4.2A.1-2.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.1A.

8.2.1.3.1A_A.1.4 Test description

8.2.1.3.1A_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.3.1A_A.1.4-1.

CA Capability to be tested: Select one according to Table 8.2.1.3.1A_A.1.4-1.

Table 8.2.1.3.1A_A.1.4-1: Test point selection soft buffer management tests for CA

CA Capability	Bandwidth combination			
	20+20	20+15	20+10	15+10
Inter-band CA (two bands) (CA2_A2)	Test 1 or 5	Test 4 or 7	Test 3 or 6	Test 2
Intra-band contiguous CA (CA2_C)	Test 1 or 5	Test 4 or 7	Test 3 or 6	Test 2
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test 1 or 5	Test 4 or 7	Test 3 or 6	Test 2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: One of the two tests per table position is selected, depending on UE category.				

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.3.1A_A.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1_A.1.4.3.

8.2.1.3.1A_A.1.4.2 Test procedure

1 Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.1.3.1_A.1.4.3-1, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.2.1.3.1_A.1.4.3-1A.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1A_A.1.3-1 and 8.2.1.3.1A_A.1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carrier according to Table 8.2.1.3.1A_A.1.5-1 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval on both the component carrier.

8.2.1.3.1A_A.1.4.3 Message contents

Same Message contents as 8.2.1.3.1_A.1.4.3

8.2.1.3.1A_A.1.5 Test requirement

Table 8.2.1.3.1A_A.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for the throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1A_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1A_A.1.5-1: Test Requirement soft buffer management test (FRC) for CA

Test num	Bandwidth	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value		
						Fraction of maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	14.1	12.6
2	15MHz + 10MHz	R.35-2 FDD for 15MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	16.0	14.5
		R.35-3 FDD for 10MHz CC	OP.1 FDD (Note 1)			70	16.0	14.5
3	20MHz + 10MHz	R.30 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	14.4	12.9
		R.11 FDD for 10MHz CC	OP.1 FDD (Note 1)			70	14.4	12.9
4	20MHz + 15MHz	R.30 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	14.4	12.9
		R.30-1 FDD for 15MHz CC	OP.1 FDD (Note 1)			70	14.4	12.9
5	2x20 MHz	R.35-1 FDD	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	16.7	15.2
6	20MHz + 10MHz	R.35-1 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	16.8	15.3
		R.35-3 FDD for 10MHz CC	OP.1 FDD (Note 1)			70	16.8	15.3
7	20MHz + 15MHz	R.35-1 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	16.8	15.3
		R.35-2 FDD for 15MHz CC	OP.1 FDD (Note 1)			70	16.8	15.3

Note 1: For CA test cases, the OCNG pattern applies for each CC.
Note 2: For Test 2, 3, 4, 6, 7 the Fraction of maximum Throughput applies to each CC.
Note 3: There is no applicable test point for a UE supporting max 10+10 MHz bandwidth combination.
Note 4: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

Decide pass or fail for each subtest according to Annex G.3A.4.

8.2.1.3.1A_A.2 Void

8.2.1.3.1B FDD PDSCH Open Loop Spatial Multiplexing 2x2 – Enhanced Performance Requirement Type C

8.2.1.3.1B.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1B.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward UE of Category 2 or higher that support enhanced receiver Type C.

8.2.1.3.1B.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.1B.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.1B.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.1B.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$.			

Table 8.2.1.3.1B.3-2: Enhanced Performance Requirement Type C, Large Delay CDD (FRC)

Test num	Bandwidth	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate gory
						Fraction of maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Medium	70	17.8	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.1B.

8.2.1.3.1B.4 Test description

8.2.1.3.1B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.1B.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.3.1B.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1B.4.3.

8.2.1.3.1B.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1B.3-1 and 8.2.1.3.1B.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.3.1B.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.1B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.1B.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.1B.5 Test requirement

Table 8.2.1.3.1B.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1B.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1B.5-1: Test requirement for Enhanced Performance Requirement Type C, Large Delay CDD (FRC)

Test num	Bandwidth	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate gory
						Fraction of maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Medium	70	18.7	≥2

8.2.1.3.1C FDD PDSCH Open Loop Spatial Multiplexing 2x2 with TM1 Interference – Enhanced Performance Requirement Type C

8.2.1.3.1C.1 Test purpose

The purpose is to verify the performance of open-loop spatial multiplexing performance with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell with transmission mode 1.

8.2.1.3.1C.2 Test applicability

This test applies to all types of E-UTRA FDD release 12 and forward UE of Category 2 or higher that support enhanced receiver Type C.

8.2.1.3.1C.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.3.1C.3-2, with the addition of parameters in Table 8.2.1.3.1C.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.1.3.1C.3-1, Cell 1 is the serving cell, and Cell 2 is interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2 respectively.

Table 8.2.1.3.1C.3-1: Test Parameters for Large Delay CDD (FRC) with TM1 interference

Parameter		Unit	Cell 1	Cell 2
Bandwidth		MHz	10 MHz	
Downlink power allocation	ρ_A	dB	-3	0
	ρ_B		-3 (Note 1)	0
	σ		0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna port 0
Cyclic Prefix			Normal	Normal
Cell ID			0	1
Transmission mode			3	Note 2
N_{oc} at antenna port		dBm/15kHz	-98	N/A
$\hat{E}_s / N_{oc}$ (Note 3)		dB	Reference Value in Table 8.2.1.3.1C.3-2	12.95
Correlation and antenna configuration			Medium (2x2)	Medium(1x2)
Number of OFDM symbols for PDCCH			2	N/A
Max number of HARQ transmissions			4	N/A
Redundancy version coding sequence			{0,1,2,3}	N/A

Note 1: $P_B = 1$
Note 2: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.2 applying OCNG pattern OP.5 FDD as defined in Annex A.5.1.5.
Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.
Note 4: All cells are time-synchronous.
Note 5: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.1.3.1C.3-2: Enhanced Performance Requirement Type C, Large Delay CDD (FRC) with TM1 interference

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-8 FDD	OP.1 FDD	OP.5 FDD	EVA70	EVA70	70	19.9	≥2
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: SNR corresponds to $\hat{E}_s/N_{oc}$ of Cell 1.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.1C.

8.2.1.3.1C.4 Test description

8.2.1.3.1C.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.1C.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.62.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.3.1C.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1C.4.3.

8.2.1.3.1C.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1C.5-1 and 8.2.1.3.1C.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 according to Table 8.2.1.3.1C.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.3.1C.5-1 and Table 8.2.1.3.1C.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.1C.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.1C.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.1C.5 Test requirement

Table 8.2.1.3.1C.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1C.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1C.5-1: Test Parameters for Large Delay CDD (FRC) with TM1 interference

Parameter		**Unit**	**Cell 1**	**Cell 2**
Bandwidth		MHz	10 MHz	
Downlink power allocation	ρ_A	dB	-3	0
	ρ_B		-3 (Note 1)	0
	σ		0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna port 0
Cyclic Prefix			Normal	Normal
Cell ID			0	1
Transmission mode			3	Note 2
N_{oc} at antenna port		dBm/15kHz	-98	N/A
$\hat{E}_s / N_{oc}$ (Note 3)		dB	Reference Value in Table 8.2.1.3.1C.5-2	13.75
Correlation and antenna configuration			Medium (2x2)	Medium(1x2)
Number of OFDM symbols for PDCCH			2	N/A
Max number of HARQ transmissions			4	N/A
Redundancy version coding sequence			{0,1,2,3}	N/A
Note 1: $P_B = 1$				
Note 2: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.2 applying OCNG pattern OP.5 FDD as defined in Annex A.5.1.5.				
Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.				
Note 4: All cells are time-synchronous.				
Note 5: SIB-1 will not be transmitted in Cell2 in this test.				

Table 8.2.1.3.1C.5-2: Test requirement for Enhanced Performance Requirement Type C, Large Delay CDD (FRC) with TM1 interference

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-8 FDD	OP.1 FDD	OP.5 FDD	EVA70	EVA70	70	21.8	≥2
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: SNR corresponds to $\hat{E}_s/N_{oc}$ of Cell 1.								

8.2.1.3.2 FDD PDSCH Open Loop Spatial Multiplexing 4x2

8.2.1.3.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward of UE category $\geq$2.

8.2.1.3.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.2.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.2.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$			

Table 8.2.1.3.2.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.14 FDD	OP.1 FDD	EVA70	4x2 Low	70	14.3	2-8

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.2.4 Test description

8.2.1.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.2.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.3.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.2.4.3.

8.2.1.3.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.2.3-1 and 8.2.1.3.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.3.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.3.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm3	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.2.5 Test requirement

Table 8.2.1.3.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.2.5-1: Test Requirement Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.14 FDD	OP.1 FDD	EVA70	4x2 Low	70	15.2	2-8

8.2.1.3.3_C FDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC

8.2.1.3.3_C.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC (non-MBSFN ABS)

8.2.1.3.3_C.1.1 Test purpose

To verify the UE's performance of large delay CDD with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.2.1.3.3_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.1.3.3_C.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.3_C.1.3-1.

In Table 8.2.1.3.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Table C.3.2-1 in Annex C.3.2 and for Cell 2 is according to Table C.3.3-1 in Annex C.3.3, respectively.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.3_C.1.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.3_C.1.3-1: Test Parameters for Large Delay CDD (FRC) non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.3.3_C.1.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Cell Id			0	1
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	11000100 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern(Note 6)			10000000 10000000 10000000 10000000 10000000	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		11000100 11000000 11000000 11000000 11000000	N/A
	$C_{CSI,1}$		00111011 00111111 00111111 00111111 00111111	N/A
Number of control OFDM symbols			2	2
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.1.3.3_C.1.3-2: Minimum performance Large Delay CDD (FRC) non-MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11 FDD Note 4	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	70	13.3	2-8

Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.

Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.

Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.

Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.

Note 5: The maximum Throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.3.

8.2.1.3.3_C.1.4 Test description

8.2.1.3.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.3_C.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.3.3_C.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.3_C.1.4.3.

8.2.1.3.3_C.1.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.2.1.3.3_C.1.5-1, 8.2.1.3.3_C.1.5-2, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2.
2. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.3_C.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
`antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	‘10000000100000001000 00001000000010000000’	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.2.1.3.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'11000100110000001100 00001100000011000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'00111011001111110011 11110011111100111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.2.1.3.3_C.1.5 Test requirement

Table 8.2.1.3.3_C.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.3_C.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.3_C.1.5-1: Test Parameters for Large Delay CDD (FRC) non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102.1 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.9 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.3.3_C.1.5-2	5.8
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Cell Id			0	1
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	11000100 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern(Note 6)			10000000 10000000 10000000 10000000 10000000	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		11000100 11000000 11000000 11000000 11000000	N/A
	$C_{CSI,1}$		00111011 00111111 00111111 00111111 00111111	N/A
Number of control OFDM symbols			2	2
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.1.3.3_C.1.5-2: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of	SNR	

							Maximum Throughput (%) Note 5	(dB) (Note 2)	
1	R.11 FDD Note 4	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	70	14.2	2-8

Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.

Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.

Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.

Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.

Note 5: The maximum Throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.

8.2.1.3.3_C.2 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC (MBSFN ABS)

8.2.1.3.3_C.2.1 Test purpose

To verify the UE's performance of large delay CDD with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.2.1.3.3_C.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.1.3.3_C.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.3_C.2.3-1.

In Table 8.2.1.3.3_C.2.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Table C.3.2-1 in Annex C.3.2 and for Cell 2 is according to Table C.3.3-1 in Annex C.3.3, respectively.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.3_C.2.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.3_C.2.3-1: Test Parameters for Large Delay CDD (FRC) MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.3.3_C.2.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Cell Id			0	126
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0001000000 0100000010 0000001000 0000000000
RLM/RRM Measurement Subframe Pattern (Note 6)			0001000000 0100000010 0000001000 0000000000	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0001000000 0100000010 0000001000 0000000000	N/A
	$C_{CSI,1}$		1110111111 1011111101 1111110111 1111111111	N/A
MBSFN Subframe Allocation (Note 10)			N/A	001000 100001 000100 000000
Number of control OFDM symbols			2	2
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbol #0 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14]. The 4th, 12th, 19th and 27th subframes indicated by ABS pattern are MBSFN ABS subframes.
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.
Note 10: MBSFN Subframe Allocation as defined in [5], four frames with 24 bits is chosen for MBSFN subframe allocation.
Note 11: The maximum number of uplink HARQ transmission is ≤ 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.

Table 8.2.1.3.3_C.2.3-2: Minimum performance Large Delay CDD (FRC) MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11 FDD Note 4	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	70	12.0	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									
Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.									
Note 5: The maximum Throughput is calculated from the total Payload in 4 subframes, averaged over 40ms.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.3.

8.2.1.3.3_C.2.4 Test description

8.2.1.3.3_C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.3_C.2.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.3.3_C.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.3_C.2.4.3.

8.2.1.3.3_C.2.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.2.1.3.3_C.2.5-1, 8.2.1.3.3_C.2.5-2, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2.
2. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.3_C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.3_C.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.3_C.2.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00010000000100000010 00000010000000000000'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.2.1.3.3_C.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00010000000100000010 00000010000000000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11101111111011111101 11111101111111111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

Table 8.2.1.3.3_C.2.4.3-4: *SystemInformationBlockType3*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-2 SystemInformationBlockType3			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType3 ::= SEQUENCE {			
neighCellConfig	'00'B (Not all neighbour cells have the same MBSFN subframe allocation as serving cell)		Cell 1
}			

8.2.1.3.3_C.2.5 Test requirement

Table 8.2.1.3.3_C.2.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.3_C.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.3_C.2.5-1: Test Parameters for Large Delay CDD (FRC) MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102.1 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.9 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.3.3_C.2.5-2	5.8
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Cell Id			0	126
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0001000000 0100000010 0000001000 0000000000
RLM/RRM Measurement Subframe Pattern (Note 6)			0001000000 0100000010 0000001000 0000000000	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0001000000 0100000010 0000001000 0000000000	N/A
	$C_{CSI,1}$		1110111111 1011111101 1111110111 1111111111	N/A
MBSFN Subframe Allocation (Note 10)			N/A	001000 100001 000100 000000
Number of control OFDM symbols			2	2
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbol #0 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14]. The 4th, 12th, 19th and 27th subframes indicated by ABS pattern are MBSFN ABS subframes.
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.
Note 10: MBSFN Subframe Allocation as defined in [5], four frames with 24 bits is chosen for MBSFN subframe allocation.
Note 11: The maximum number of uplink HARQ transmission is ≤ 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.

Table 8.2.1.3.3_C.2.5-2: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11 FDD Note 4	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	70	12.9	2-8

Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.

Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.

Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.

Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.

Note 5: The maximum Throughput is calculated from the total Payload in 4 subframes, averaged over 40ms.

8.2.1.3.3_D

8.2.1.3.3_E FDD PDSCH Open Loop Spatial Multiplexing 2x2 for feICIC

8.2.1.3.3_E.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for feICIC (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured, non-MBSFN ABS)

8.2.1.3.3_E.1.1 Test purpose

To verify the UE's performance of large delay CDD with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cells with CRS assistance information.

8.2.1.3.3_E.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling – Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.2.1.3.3_E.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.3_E.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.3_E.1.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.3_E.1.3-1: Test Parameters for Large Delay CDD (FRC) non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.3.3_E.1.3-2	Reference Value in Table 8.2.1.3.3_E.1.3-2	Reference Value in Table 8.2.1.3.3_E.1.3-2
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	1	126
ABS pattern (Note 5)			N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000000 11000000 11000000 11000000 11000000	N/A	N/A
	$C_{CSI,1}$		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
PDSCH transmission mode			3	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.
Note 10: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.1.3.3_E.1.3-2: Minimum performance Large Delay CDD (FRC) non-MBSFN ABS

Test Number	Reference Channel	$\hat{E}_s/N_{oc2}$		OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11 FDD (Note 4)	9	7	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	70	13.9	≥2
2	R.35 FDD (Note 4)	9	1	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	70	22.6	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s/N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.4.

8.2.1.3.3_E.1.4 Test description

8.2.1.3.3_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.3_E.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.3.3_E.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.2.1.3.3_E.1.4.3.

8.2.1.3.3_E.1.4.2 Test procedure

1. Set the parameters for Cell 1, Cell 2 and Cell 3 according to Tables 8.2.1.3.3_E.1.5-1, 8.2.1.3.3_E.1.5-2 and C.3.3-2 of Annex C.3.3 as appropriate. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC.
2. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.3_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.2.1.3.3_E.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.3_E.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.2A.5, Table 5.2A.5.1.1-2 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'1000000010000000 1000000010000000 10000000'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	1		Cell 2
	126		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.2.1.3.3_E.1.4.3-3: PhysicalConfigDedicated-DEFAULT: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.1.3.3_E.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'11000000 11000000 11000000 11000000 11000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'00111111 00111111 00111111 00111111 00111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.2.1.3.3_E.1.5 Test requirement

Table 8.2.1.3.3_E.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.3_E.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.3_E.1.5-1: Test Parameters for Large Delay CDD (FRC) non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.3.3_E.1.3-2	Reference Value in Table 8.2.1.3.3_E.1.3-2	Reference Value in Table 8.2.1.3.3_E.1.3-2
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	1	126
ABS pattern (Note 5)			N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000000 11000000 11000000 11000000 11000000	N/A	N/A
	$C_{CSI,1}$		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
PDSCH transmission mode			3	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.
Note 10: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.1.3.3_E.1.5-2: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	$\hat{E}_s/N_{oc2}$		OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11 FDD (Note 4)	8.8	6.8	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	70	14.8	≥2
2	R.35 FDD (Note 4)	8.8	0.8	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	70	23.5	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s/N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.

8.2.1.4 FDD PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.1.4.1 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2

8.2.1.4.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.2.1.4.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.4.1.3-1 and 8.2.1.4.1.3-3 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.1.4.1.3-2 and 8.2.1.4.1.3-4 for the specified SNR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.1.4.1.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1	Test 1A	Test 2
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98
Precoding granularity		PRB	6	4	50
PMI delay (Note 2)		ms	8	8	8
Reporting interval		ms	1	1	1
Reporting mode			PUSCH 1-2	PUSCH 1-2	PUSCH 3-1
CodeBookSubsetRestriction bitmap			001111	001111	001111
PDSCH transmission mode			4	4	4

Note 1: $P_B = 1$

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 8.2.1.4.1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 FDD	OP.1 FDD	EVA5	2x2 Low	70	-2.5	1-5
1A(Note 1)	5 MHz	R.10-2 FDD	OP.1 FDD	EVA5	2x2 Low	70	-2.9	1-5
2	10 MHz	R.10 FDD	OP.1 FDD	EPA5	2x2 High	70	-2.3	1-5
Note 1: Test case applicability is defined in 8.1.2.1.								

Table 8.2.1.4.1.3-3: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 3	Test 4	Test 4A
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98
Precoding granularity		PRB	50	50	25
PMI delay (Note 2)		ms	8	8	8
Reporting interval		ms	1	1	1
Reporting mode			PUSCH 3-1	PUSCH 3-1	PUSCH 3-1
CodeBookSubsetRestriction bitmap			110000	110000	110000
PDSCH transmission mode			4	4	4

Note 1: $P_B = 1$

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Table 8.2.1.4.1.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Low	70	12.9	2-5
4	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.3	2-5
4A (Note 1)	5 MHz	R.11-2 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.0	2-5
Note 1: Test case applicability is defined in 8.1.2.1.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.1.4 Test description

8.2.1.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Tables 8.2.1.4.1.3-2 and 8.2.1.4.1.3-4 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.1.4.1.3-1 and 8.2.1.4.1.3-3 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.1.4.3.

8.2.1.4.1.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.1.3-1 and 8.2.1.4.1.3-2. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.1.3-3 and 8.2.1.4.1.3-4. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.4.1.5-1 and 8.2.1.4.1.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.1.4.1.5-1 and 8.2.1.4.1.5-2 as appropriate.

8.2.1.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.4.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation for Test number 1, 1A, 2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	001111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3, 4, 4A

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	110000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.1.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop single -layer spatial multiplexing performance downlink power allocation for Test number 1, 1A

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.1.4.1.4.3-4: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation for Test number 2, 3, 4, 4A

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.1.4.1.5 Test requirement

Tables 8.2.1.4.1.3-1 and 8.2.1.4.1.3-3 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.1.5-1 and 8.2.1.4.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 FDD	OP.1 FDD	EVA5	2x2 Low	70	-1.6	1-5
1A(Note 1)	5 MHz	R.10-2 FDD	OP.1 FDD	EVA5	2x2 Low	70	-2.0	1-5
2	10 MHz	R.10 FDD	OP.1 FDD	EPA5	2x2 High	70	-1.4	1-5
Note 1: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.								

Table 8.2.1.4.1.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Low	70	13.8	2-5
4	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	15.2	2-5
4A (Note 1)	5 MHz	R.11-2 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.9	2-5
Note 1: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.								

8.2.1.4.1_1 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 (Release 9 and forward)

8.2.1.4.1_1.1 Test purpose

Same test purpose as in clause 8.2.1.4.1.1

8.2.1.4.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.2.1.4.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.4.1.3 with the following exceptions:

- Instead of Table 8.2.1.4.1.3-2 → use Table 8.2.1.4.1_1.3-1.
- Instead of Table 8.2.1.4.1.3-4 → use Table 8.2.1.4.1_1.3-2.

Table 8.2.1.4.1_1.3-1: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 FDD	OP.1 FDD	EVA5	2x2 Low	70	-2.5	1-8
1A (Note 1)	5 MHz	R.10-2 FDD	OP.1 FDD	EVA5	2x2 Low	70	-2.9	1-8
2	10 MHz	R.10 FDD	OP.1 FDD	EPA5	2x2 High	70	-2.3	1-8
Note 1: Test case applicability is defined in 8.1.2.1.								

Table 8.2.1.4.1_1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.35 FDD	OP.1 FDD	EPA5	2x2 Low	70	18.9	2-8
4	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.3	2-8
4A (Note 1)	5 MHz	R.11-2 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.0	2-8
Note 1: Test case applicability is defined in 8.1.2.1.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.1_1.4 Test description

Same test description as in clause 8.2.1.4.1.4 with the following exceptions:

- Instead of Table 8.2.1.4.1.3-2 → use Table 8.2.1.4.1_1.3-1.
- Instead of Table 8.2.1.4.1.3-4 → use Table 8.2.1.4.1_1.3-2.
- Instead of Table 8.2.1.4.1.5-1 → use Table 8.2.1.4.1_1.5-1.
- Instead of Table 8.2.1.4.1.5-2 → use Table 8.2.1.4.1_1.5-2.

8.2.1.4.1_1.5 Test requirement

Same test requirement as in clause 8.2.1.4.1.5 with the following exceptions:

- Instead of Table 8.2.1.4.1.5-1 → use Table 8.2.1.4.1_1.5-1.
- Instead of Table 8.2.1.4.1.5-2 → use Table 8.2.1.4.1_1.5-2.

Table 8.2.1.4.1_1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 FDD	OP.1 FDD	EVA5	2x2 Low	70	-1.6	1-8
1A (Note 1)	5 MHz	R.10-2 FDD	OP.1 FDD	EVA5	2x2 Low	70	-2.0	1-8
2	10 MHz	R.10 FDD	OP.1 FDD	EPA5	2x2 High	70	-1.4	1-8
Note 1: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.								

Table 8.2.1.4.1_1.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.35 FDD	OP.1 FDD	EPA5	2x2 Low	70	+19.8	2-8
4	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	+15.2	2-8
4A (Note 1)	5 MHz	R.11-2 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.9	2-8
Note 1: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.								

8.2.1.4.1_A to D

8.2.1.4.1_E FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 for feICIC

8.2.1.4.1_E.1 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)

8.2.1.4.1_E.1 Test purpose

To verify The purpose is to verify the closed loop rank-one performance with wideband precoding if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [14] of the aggressor cell with CRS assistance information.

8.2.1.4.1_E.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.2.1.4.1_E.1.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.4.1_E.1.3-2, with the addition of parameters in Table 8.2.1.4.1_E.1.3-1. In Table 8.2.1.4.1_E.1.3-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information TS 36.331 [5] includes Cell 2 and Cell 3.

Table 8.2.1.4.1_E.1.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.4.1_E.1.3-2	12	10
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 5)			N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000000 11000000 11000000 11000000 11000000	N/A	N/A
	$C_{CSI,1}$		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
PDSCH transmission mode			6	Note 9	Note 9
Precoding granularity		PRB	50	N/A	N/A
PMI delay (Note 10)		ms	8	N/A	N/A
Reporting interval		ms	1	N/A	N/A
Reporting mode			PUSCH 3-1	N/A	N/A
CodeBookSubsetRestriction bitmap			1111	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.
Note 10: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 11: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 12: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.1.4.1_E.1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11 FDD (Note 4)	OP.1FDD	OP.1FDD	OP.1FDD	EPA5	EPA5	EPA5	2x2 High	70	6.1	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.1C.

8.2.1.4.1_E.1.4 Test description

8.2.1.4.1_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.4.1_E.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Tables 8.2.1.4.1_E.1.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.2.1.4.1_E.1.4.3.

8.2.1.4.1_E.1.4.2 Test procedure

1. Set the parameters for Cell 1, Cell 2 and Cell 3, according to Tables 8.2.1.4.1_E.1.5-1, 8.2.1.4.1_E.1.5-2, and C.3.3.2 of Annex C.3.3. SS transmits PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC.

2. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2

3. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

4. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.1.4.1_E.1.5-2 as appropriate.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.4.1_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.2.1.4.1_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.2A.5, Table 5.2A.5.1.1-2 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'1000000010000000 1000000010000000 10000000'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.2.1.4.1_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT: Additional FDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.1.4.1_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'11000000 11000000 11000000 11000000 11000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'00111111 00111111 00111111 00111111 00111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

Table 8.2.1.4.1_E.1.4.3-4: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.4.1_E.1.5 Test requirement

Table 8.2.1.4_E.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.1_E.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.1_E.1.5-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.4.1_E.1.5-2	11.8	9.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 5)			N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000000 11000000 11000000 11000000 11000000	N/A	N/A
	$C_{CSI,1}$		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
PDSCH transmission mode			6	Note 9	Note 9
Precoding granularity		PRB	50	N/A	N/A
PMI delay (Note 10)		ms	8	N/A	N/A
Reporting interval		ms	1	N/A	N/A
Reporting mode			PUSCH 3-1	N/A	N/A
CodeBookSubsetRestriction bitmap			1111	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14]. Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.
Note 10: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 11: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 12: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.1.4.1_E.1.5-2: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11 FDD (Note 4)	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 High	70	7.0	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.

8.2.1.4.1_H FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 for 256QAM in DL

8.2.1.4.1_H.1 Test purpose

Same test purpose as in clause 8.2.1.4.1.1

8.2.1.4.1_H.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward that support 256QAM in DL.

8.2.1.4.1_H.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.4.1_H.3-2,with the addition of the parameters in Table 8.2.1.4.1_H.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

Table 8.2.1.4.1_H.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1-2	Test 2A	Test 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98
Precoding granularity		PRB	50	25	6
PMI delay (Note 2)		ms	8	8	8
Reporting interval		ms	1	1	1
Reporting mode			PUSCH 3-1	PUSCH 3-1	PUSCH 1-2
CodeBookSubsetRestriction bitmap			110000	110000	110000
PDSCH transmission mode			4	4	4
Number of OFDM symbols for PDCCH per component carrier		OFDM symbol	2	3	2

Note 1: $P_B = 1$.

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 8.2.1.4.1_H.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)		
3	10MHz 256QAM	R. 65 FDD	OP.1 FDD	EVA5	2x2 Low	70	25.3	11-12	≥11

Note 1: Void.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.2.

8.2.1.4.1_H.4 Test description

8.2.1.4.1_H.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.4.1_H.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.4.1_H.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.1_H.4.3.

8.2.1.4.1_H.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.1_H.3-1 and 8.2.1.4.1_H.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.4.1_H.5-1 as appropriate.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.1.4.1_H.5-1 as appropriate.

8.2.1.4.1_H.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.4.1_H.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	110000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.1_H.4.3-2: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.1.4.1_H.5 Test requirement

Tables 8.2.1.4.1_H.3-1 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.1_H.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.1_H.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)		
3	10MHz 256QAM	R.65 FDD	OP.1 FDD	EVA5	2x2 Low	70	26.2	11-12	≥11
Note 1: Void.									

8.2.1.4.2A FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 – Enhanced Performance Requirement Type C

8.2.1.4.2A.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed loop rank-two spatial multiplexing with wideband and frequency selective precoding.

8.2.1.4.2A.2 Test applicability

This test applies to all types of E-UTRA FDD release 12 and forward UE of Category ≥ 2 that support enhanced receiver Type C.

8.2.1.4.2A.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.4.2A.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.4.2A.3-2 for the specified SNR.

Table 8.2.1.4.2A.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	50
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 3-1
CodeBookSubsetRestriction bitmap			110000
PDSCH transmission mode			4
Note 1: $P_B = 1$.			
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			

Table 8.2.1.4.2A.3-2: Enhanced Performance Requirement Type C, Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Medium	70	18.3	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.2A.

8.2.1.4.2A.4 Test description

8.2.1.4.2A.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.4.2A.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.4.2A.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.2A.4.3.

8.2.1.4.2A.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2A.3-1 and 8.2.1.4.2A.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.1.4.2A.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.4.2A.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.4.2A.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	110000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.2A.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.1.4.2A.5 Test requirement

Table 8.2.1.4.2A.3-1 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.4.2A.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2A.5-1: Test requirement for Enhanced Performance Requirement Type C, Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Medium	70	19.2	≥2

8.2.1.4.2 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 4x2

8.2.1.4.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.2.1.4.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.4.2.3-1 and 8.2.1.4.2.3-3 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.1.4.2.3-2 and 8.2.1.4.2.3-4 for the specified SNR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.1.4.2.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000 00000000000000 00000000000000 00000011111111 11111111
PDSCH transmission mode			4
Note 1: $P_B = 1$ Note 2:			

Table 8.2.1.4.2.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	EVA5	4x2 Low	70	-3.2	1-5

Table 8.2.1.4.2.3-3: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000 00000000000000 00001111111111 11111100000000 00000000
PDSCH transmission mode			4
Note 1: $P_B = 1$			
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)			

Table 8.2.1.4.2.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.5	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.2.4 Test description

8.2.1.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Tables 8.2.1.4.2.3-2 and 8.2.1.4.2.3-4 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.1.4.2.3-1 and 8.2.1.4.2.3-3 as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.2.4.3.

8.2.1.4.2.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2.3-1 and 8.2.1.4.2.3-2. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2.3-3 and 8.2.1.4.2.3-4. The SS sends downlink MAC padding bits on the DL RMC.

2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.4.2.5-1 and 8.2.1.4.2.5-2 as appropriate.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.1.4.2.5-1 and 8.2.1.4.2.5-2 as appropriate.

8.2.1.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.4.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop spatial multiplexing performance downlink power allocation for Test numbers 1, 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.4.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop single-layer spatial multiplexing performance downlink power for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000000000000 00000001111111111111 1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation Test number 2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000111111111111111110000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.2.4.3-4: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation Test number 1, 2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.1.4.2.5 Test requirement

Tables 8.2.1.4.2.3-1 and 8.2.1.4.2.3-3 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.25-1 and 8.2.1.4.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	EVA5	4x2 Low	70	-2.3	1-5

Table 8.2.1.4.2.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.4	2-5

8.2.1.4.2_1 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 4x2 (Release 9 and forward)

8.2.1.4.2_1.1 Test purpose

Same test purpose as in clause 8.2.1.4.2.1

8.2.1.4.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.2.1.4.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.4.2.3 with the following exceptions:

- Instead of Table 8.2.1.4.2.3-2 → use Table 8.2.1.4.2_1.3-1.
- Instead of Table 8.2.1.4.2.3-4 → use Table 8.2.1.4.2_1.3-2.

Table 8.2.1.4.2_1.3-1: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	EVA5	4x2 Low	70	-3.2	1-8

Table 8.2.1.4.2_1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.36 FDD	OP.1 FDD	EPA5	4x2 Low	70	14.7	2-8

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.2_1.4 Test description

Same test description as in clause 8.2.1.4.2.4 with the following exceptions:

- Instead of Table 8.2.1.4.2.3-2 → use Table 8.2.1.4.2_1.3-1.
- Instead of Table 8.2.1.4.2.3-4 → use Table 8.2.1.4.2_1.3-2.
- Instead of Table 8.2.1.4.2.5-1 → use Table 8.2.1.4.2_1.5-1.
- Instead of Table 8.2.1.4.2.5-2 → use Table 8.2.1.4.2_1.5-2.

8.2.1.4.2_1.5 Test requirement

Same test requirement as in clause 8.2.1.4.2.5 with the following exceptions:

- Instead of Table 8.2.1.4.2.5-1 → use Table 8.2.1.4.2_1.5-1.
- Instead of Table 8.2.1.4.2.5-2 → use Table 8.2.1.4.2_1.5-2.

Table 8.2.1.4.2_1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	EVA5	4x2 Low	70	-2.3	1-8

Table 8.2.1.4.2_1.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.36 FDD	OP.1 FDD	EPA5	4x2 Low	70	+15.6	2-8

8.2.1.4.2_A FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA

8.2.1.4.2_A.1 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (2DL CA)

8.2.1.4.2_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.2_A.1.2 Test applicability

This test applies to E-UTRA FDD release10 and forward UE of category ≥ 2 which supports inter-band OR intra-band contiguous DL CA.

This test also applies to E-UTRA FDD release 11 and forward UE of category ≥ 2 that supports intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.4.2_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.4.2_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.1.4.2_A.1.3-2 for the specified SNR. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.1.4.2_A.1.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000 00111111111111111000000000000000
CSI request field (Note 3)			'10'
PDSCH transmission mode			4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.
Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for Tests in Table 8.2.1.4.2_A.1.3-2.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.1.4.2_A.1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC) for CA with 2DL CCs

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE category
						Fraction of maximum throughput (%)	SNR (dB)	
1	2x10 MHz	R.14 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.8	≥3
2	2x20 MHz	R.14-3 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.9	≥5
3	2x5 MHz	R.14-6 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	9.5	≥2
4	10MHz +5MHz	R.14 FDD for 10MHz CC	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.1	≥3
		R.14-6 FDD for 5MHz CC	OP.1 FDD (Note 1)			70	9.5	
5	15MHz +5MHz	R.14-7 FDD for 15MHz CC	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.1	≥3
		R.14-6 FDD for 5MHz CC	OP.1 FDD (Note 1)			70	9.5	

Note 1: The OCNG pattern applies for each CC.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.3 for 2 DL CC.

8.2.1.4.2_A.1.4 Test description

8.2.1.4.2_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.4.2_A.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.1.4.2_A.1.4.1-1.

Table 8.2.1.4.2_A.1.4.1-1: Test point selection for TM4 2DL CA

CA Capability	Bandwidth combination				
	10+10	20+20	5+5	10+5	15+5
Inter-band CA (two bands) (CA2_A2)	Test1	Test2	Test3	Test4	Test5
Intra-band contiguous CA (CA2_C)	Test1	Test2	Test3	Test4	Test5
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test1	Test2	Test3	Test5	Test5
Note 1: Only one test point is tested. Select any one of the UE supported CA capabilities and then moving from left to right select the first CA bandwidth combination supported by the UE within the chosen CA capability.					

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.46 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.1.4.2_A.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.2_A.1.4.3.

8.2.1.4.2_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-1, *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-2, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-2A, *CQI-ReportConfig-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-6, *PUSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-7.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2_A.1.3-1 and 8.2.1.4.2_A.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.

5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to ‘10’ and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.4.2_A.1.5-1 as appropriate.

7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.4.2_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions:

Table 8.2.1.4.2_A.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.4.2_A.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000000011111111111111111000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.1.4.2_A.1.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000000000000000000011111111111111110000000000000000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 8.2.1.4.2_A.1.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			RBC
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.1.4.2_A.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.1.4.2_A.1.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.1.4.2_A.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.1.4.2_A.1.4.3-7: PUSCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.2.1.4.2_A.1.5 Test requirement

Tables 8.2.1.4.2_A.1.3-1 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.2_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2_A.1.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC) for CA

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value			UE catego
						Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band	
1	2x10 MHz	R.14 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	11.7	10.2	≥3
2	2x20 MHz	R.14-3 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	11.8	10.3	≥5
3	2x5 MHz	R.14-6 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.4	8.9	≥2
4	10MHz +5MHz	R.14 FDD for 10MHz CC	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	11.0	9.5	≥3
		R.14-6 FDD for 5MHz CC	OP.1 FDD (Note 1)			70	10.4	8.9	
5	15MHz +5MHz	R.14-7 FDD for 15MHz CC	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	11.0	9.5	≥3
		R.14-6 FDD for 5MHz CC	OP.1 FDD (NOTE 1)			70	10.4	8.9	
Note 1: The OCNG pattern applies for each CC.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.4.2_A.2 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (3DL CA)

8.2.1.4.2_A.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.2_A.2.2 Test applicability

This test case applies to all types of E-UTRA FDD release 10 and forward UE of category ≥ 5 that support 3DL Intra-band contiguous CA or 3DL Inter-band CA, or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA FDD release 11 and forward UE of category ≥ 5 that support 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.4.2_A.2.3 Minimum conformance requirements

For CA with 3 DL CCs, the requirements are specified in Table 8.2.1.4.2_A.2.3-3, based on single carrier requirement specified in Table 8.2.1.4.2_A.2.3-2, with the addition of the parameters in Table 8.2.1.4.2_A.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.4.2_A.2.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000011111111111111111000000000000000
CSI request field (Note 3)			'10'
PDSCH transmission mode			4
Note 1: $P_B = 1$.			
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			
Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.			
Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3 with channel selection configured for Tests in Table 8.2.1.4.2_A.2.3-3.			
Note 5: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.4.2_A.2.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
3MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
10 MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.3

Table 8.2.1.4.2_A.2.3-3: Minimum performance (FRC) based on single carrier performance for CA with 3DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
3	20MHz+20MHz+10MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
4	20MHz+15MHz+15MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
5	20MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
6	20MHz+10MHz+10MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
7	15MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
8	20MHz+10MHz+5MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
9	20MHz+15MHz+5MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
10	10MHz+10MHz+5MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.2_A.2.4 Test description

8.2.1.4.2_A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.4.2_A.2.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.1.4.2_A.2.4.1-1.

Table 8.2.1.4.2_A.2.4.1-1: Test point selection for TM4 3DL CA

CA Capability	Bandwidth combination									
	3x20	20+20+15	20+20+10	20+15+15	20+15+10	20+10+10	15+15+10	20+10+5	20+15+5	10+10+5
Intra-band contiguous (CA3_C)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Inter-band CA (two bands) (CA3_A2)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Inter-band CA (three bands) (CA3_A3)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Intra-band non-contiguous CA (with two sub-blocks) (CA3_N2)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.										

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.4.2_A.2.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.2_A.2.4.3.

8.2.1.4.2_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.4.2_A.2.4.3.

3. The SS activates SCCs by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.

4. The SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1_A.2.3-1 and 8.2.1.3.1_A.2.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.4.2_A.2.5-1 as appropriate.

7. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.4.2_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 8.2.1.4.2_A.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.4.2_A.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.1.4.2_A.2.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000000000000000000011111111111111110000000000000000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 8.2.1.4.2_A.2.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			RBC
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.1.4.2_A.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.1.4.2_A.2.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11100000	P-Cell, S-Cells report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.1.4.2_A.2.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.1.4.2_A.2.4.3-7: PUSCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.2.1.4.2_A.2.5 Test requirement

Table 8.2.1.4.2_A.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.2.1.4.2_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2_A.2.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		
					Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3	9.8
3MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2	9.7

Table 8.2.1.4.2_A.2.5-2: Test requirement (FRC) based on single carrier performance for CA with 3DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
3	20MHz+20MHz+10MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
4	20MHz+15MHz+15MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
5	20MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
6	20MHz+10MHz+10MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
7	15MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
8	20MHz+10MHz+5MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
9	20MHz+15MHz+5MHz	As specified in Table 8.2.1.4.2_A.2.5-1 per CC	≥5
10	10MHz+10MHz+5MHz	As specified in Table 8.2.1.4.2_A.2.3-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.4.2_A.3 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (4DL CA)

8.2.1.4.2_A.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.2_A.3.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of category ≥ 5 that support 4DL Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA, or 4DL with Intra-band non-contiguous and Inter-band CA, or 4DL with Intra-band non-contiguous and Intra-band contiguous CA or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

8.2.1.4.2_A.3.3 Minimum conformance requirements

For CA with 3 DL CCs, the requirements are specified in Table 8.2.1.4.2_A.3.3-3, based on single carrier requirement specified in Table 8.2.1.4.2_A.3.3-2, with the addition of the parameters in Table 8.2.1.4.2_A.3.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.4.2_A.3.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000011111111111111111000000000000000
CSI request field (Note 3)			'10'
PDSCH transmission mode			4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.
Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3 with channel selection configured for Tests in Table 8.2.1.4.2_A.3.3-3.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.1.4.2_A.3.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
3MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
10 MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.3

Table 8.2.1.4.2_A.3.3-3: Minimum performance (FRC) based on single carrier performance for CA with 4DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
2	20MHz+20MHz+20MHz+15MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
3	20MHz+20MHz+20MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
4	20MHz+20MHz+15MHz+15MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
5	20MHz+20MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
6	20MHz+20MHz+10MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
7	20MHz+15MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
8	20MHz+15MHz+10MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
9	20MHz+10MHz+10MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
10	15MHz+15MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
11	20MHz+20MHz+10MHz+5MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5
12	5MHz+10MHz+10MHz+20MHz	As specified in Table 8.2.1.4.2_A.3.3-2 per CC	≥5

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.2_A.3.4 Test description

8.2.1.4.2_A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.4.2_A.3.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.1.4.2_A.3.4.1-1.

Table 8.2.1.4.2_A.3.4.1-1: Test point selection for TM4 4DL CA

CA Capability	Bandwidth combination											
	4x20	20+20+ 20+15	20+20+ 20+10	20+20+ 15+15	20+20+ 15+10	20+20+ 10+10	20+15+ 15+10	20+15+ 10+10	20+10+ 10+10	15+15+ 15+10	20+20+ 10+5	5+10 10+2
Intra-band contiguous (CA4_C)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10	Test11	Test
Inter-band CA (three bands) (CA4_A3)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10	Test11	Test
Inter-band CA (four bands) (CA4_A4)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10	Test11	Test
Intra-band non-contiguous CA (with two sub-blocks) (CA4_N2)	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10	Test11	Test
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities												

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61.
2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.4.2_A.3.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.2_A.3.4.3.

8.2.1.4.2_A.3.4.2 Test procedure

Same test procedure as in clause 8.2.1.4.2_A.2.4.2 with the following exceptions:

- Instead of Table 8.2.1.4.2_A.2.5-1 → use Table 8.2.1.4.2_A.3.5-1

8.2.1.4.2_A.3.4.3 Message contents

Same message contents as in clause 8.2.1.4.2_A.2.4.3 with the following exceptions:

Table 8.2.1.4.2_A.3.4.3-1: *CQI-ReportAperiodic-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11110000	P-Cell, S-Cells report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.1.4.2_A.3.5 Test requirement

Table 8.2.1.4.2_A.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.2.1.4.2_A.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2_A.3.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3
3MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2

Table 8.2.1.4.2_A.3.5-2: Test requirement (FRC) based on single carrier performance for CA with 4DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
2	20MHz+20MHz+20MHz+15MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
3	20MHz+20MHz+20MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
4	20MHz+20MHz+15MHz+15MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
5	20MHz+20MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
6	20MHz+20MHz+10MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
7	20MHz+15MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
8	20MHz+15MHz+10MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
9	20MHz+10MHz+10MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
10	15MHz+15MHz+15MHz+10MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
11	20MHz+20MHz+10MHz+5MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
12	5MHz+10MHz+10MHz+20MHz	As specified in Table 8.2.1.4.2_A.3.5-1 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.4.2_A.4 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (5DL CA)

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The test applicability needs to be added to TS36.521-2
- The test case needs to be added to Annex G

8.2.1.4.2_A.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by th9.e SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.2_A.4.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of category 8, 11 or higher that support 5DL with Intra-band contiguous and Inter-band CA, or 5DL with Intra-band non-contiguous and Inter-band CA, or 5DL with Intra-band non-contiguous and Intra-band contiguous CA

This test case also applies to all types of E-UTRA FDD release 12 and forward UE of category 8, 11 or higher that support 5DL with Inter-band CA.

8.2.1.4.2_A.4.3 Minimum conformance requirements

For CA with 5 DL CCs, the requirements are specified in Table 8.2.1.4.2_A.4.3-3, based on single carrier requirement specified in Table 8.2.1.4.2_A.4.3-2, with the addition of the parameters in Table 8.2.1.4.2_A.4.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.1.4.2_A.4.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000 00111111111111111000000000000000
CSI request field (Note 3)			'10'
PDSCH transmission mode			4

Note 1: $P_B = 1$.

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.

Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3 with channel selection configured for Tests in Table 8.2.1.4.2_A.4.3-3.

Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.1.4.2_A.4.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
3MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
10 MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.3

Table 8.2.1.4.2_A.4.3-3: Minimum performance (FRC) based on single carrier performance for CA with 5DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	5x20MHz	As specified in Table 8.2.1.4.2_A.4.3-2 per CC	8, ≥11
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.2_A.4.4 Test description

8.2.1.4.2_A.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.1.4.2_A.4.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.1.4.2_A.4.4.1-1.

Table 8.2.1.4.2_A.4.4.1-1: Test point selection for TM4 5DL CA

CA Capability	Bandwidth combination
	5x20
Intra-band contiguous (CA5_C)	Test1
Inter-band CA (two bands) (CA5_A2)	Test1
Inter-band CA (three bands) (CA5_A3)	Test1
Inter-band_CA (four bands) (CA_A4)	Test1
Inter-band_CA (five bands) (CA_A5)	Test1
Intra-band non-contiguous CA (with two sub-blocks) (CA5_N2)	Test1
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.	

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61.

2. The parameter settings for the cell are set up according to Table 8.2.1-1 and 8.2.1.4.2_A.4.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.2_A.4.4.3.

8.2.1.4.2_A.4.4.2 Test procedure

Same test procedure as in clause 8.2.1.4.2_A.2.4.2 with the following exceptions:

- Instead of Table 8.2.1.4.2_A.2.5-1 → use Table 8.2.1.4.2_A.4.5-1

8.2.1.4.2_A.4.4.3 Message contents

Same message contents as in clause 8.2.1.4.2_A.2.4.3

8.2.1.4.2_A.4.5 Test requirement

Table 8.2.1.4.2_A.4.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.2.1.4.2_A.4.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2_A.4.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3
3	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
5	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
10	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0
15	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0
20	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2

Table 8.2.1.4.2_A.4.5-2: Test requirement (FRC) based on single carrier performance for CA with 5DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	5x20MHz	As specified in Table 8.2.1.4.3-5 per CC	8, ≥11
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.4.3 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 with TM4 Interference Model – Enhanced Performance Requirement Type A

8.2.1.4.3.1 Test purpose

The purpose of these tests is to verify the closed loop rank one performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two dominant interfering cells applying transmission mode 4 interference model defined in clause B.5.3.

8.2.1.4.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that support enhanced receiver Type A.

8.2.1.4.3.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.4.3-2, with the addition of parameters in Table 8.2.1.4.3.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.1.4.3.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.2.1.4.3.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.73	-8.66
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM symbols			2	2	2
PDSCH transmission mode			6	N/A	N/A
Interference model			N/A	As specified in clause B.5.3	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Precoding granularity		PRB	50	6	6
PMI delay (Note 4)		ms	8	N/A	N/A
Reporting interval		ms	5	N/A	N/A
Reporting mode			PUCCH 1-1	N/A	N/A
CodeBookSubsetRestriction bitmap			001111	N/A	N/A
Physical channel for CQI reporting			PUSCH(Note6)	N/A	N/A
cqi-pmi-ConfigurationIndex			2	N/A	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Note 6: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5 and #0.

Table 8.2.1.4.3.3-2: Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.47 FDD	OP.1 FDD	N/A	N/A	EVA5	EVA5	EVA5	2x2 Low	70	0.8	1-8
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.1B.

8.2.1.4.3.4 Test description

8.2.1.4.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.4.3.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.4.3.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.3.4.3.

8.2.1.4.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.3.5-1 and 8.2.1.4.3.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1 and #6 (Table A.2.2.1.2-1).
2. SS sets up parameters for cell 2 and cell 3 according to table 8.2.1.4.3.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SINR according to Tables 8.2.1.4.3.5-2 as appropriate.
4. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5-15 in Annex G clause G.3.

8.2.1.4.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.1.4.3.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.3.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	483	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.2.1.4.3.5 Test requirement

Table 8.2.1.4.3.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.2.1.4.3.5-2 for the specified SINR including test tolerances.

Table 8.2.1.4.3.5-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.44	-7.77
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM symbols			2	2	2
PDSCH transmission mode			6	N/A	N/A
Interference model			N/A	As specified in clause B.5.3	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Precoding granularity		PRB	50	6	6
PMI delay (Note 4)		ms	8	N/A	N/A
Reporting interval		ms	5	N/A	N/A
Reporting mode			PUCCH 1-1	N/A	N/A
CodeBookSubsetRestriction bitmap			001111	N/A	N/A
Physical channel for CQI reporting			PUSCH(Note6)	N/A	N/A
cqi-pmi-ConfigurationIndex			2	N/A	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Note 6: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5 and #0.

Table 8.2.1.4.3.5-2: Test requirement for Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.47 FDD	OP.1 FDD	N/A	N/A	EVA5	EVA5	EVA5	2x2 Low	70	1.79	1-8

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

8.2.1.4.3A FDD PDSCH Closed Loop Multi-Layer Spatial Multiplexing 4x2 for Dual Connectivity

8.2.1.4.3A.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing for Dual Connectivity.

8.2.1.4.3A.2 Test applicability

This test case applies to all types of E-UTRA FDD release 12 and forward UE of category ≥ 3 that support Dual Connectivity.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.4.3A.3 Minimum conformance requirements

For dual connectivity the requirements are specified in Table 8.2.1.4.3A.3-3, based on single carrier requirement specified in Table 8.2.1.4.3A.3-2, with the addition of the parameters in Table 8.2.1.4.3A.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.2.1.4.3A.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for dual connectivity

Parameter		Unit	Values
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6 for 1.4MHz, 4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, and 8 for 15MHz CCs and 20MHz CCs
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111000000000000000
PDSCH transmission mode			4
ACK/NACK transmission			Separate ACK/NACK feedbacks with PUCCH format 1b on the MCG and SCG
CSI feedback			Separate PUSCH feedbacks on the MCG and SCG
Time offset between MCG CC and SCG CC		μs	0 for UE under test supporting synchronous dual connectivity; 334 for UE under test supporting both asynchronous and synchronous dual connectivity (Note 4).

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: The same PDSCH transmission mode is applied to each component carrier.
Note 4: Asynchronous and synchronous dual connectivity are defined in TS36.300 [18].
Note 5: If the UE supports both SCG bearer and Split bearer, the SCG bearer is configured.

Table 8.2.1.4.3A.3-2: Single carrier performance for multiple dual connectivity configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.14-4 FDD	OP. 1 FDD	EVA5	4x2 Low	70	10.36
3MHz	R.14-5 FDD	OP. 1 FDD	EVA5	4x2 Low	70	9.5
5MHz	R.14-6 FDD	OP. 1 FDD	EVA5	4x2 Low	70	9.5
10 MHz	R.14 FDD	OP. 1 FDD	EVA5	4x2 Low	70	10.1
15MHz	R.14-7 FDD	OP. 1 FDD	EVA5	4x2 Low	70	10.1
20MHz	R.14-3 FDD	OP. 1 FDD	EVA5	4x2 Low	70	10.3

Table 8.2.1.4.3A.3-3: Minimum performance Multi-Layer Spatial Multiplexing (FRC) for dual connectivity

Test num.	Band-width combination	Requirement	UE category
1	2x20 MHz	As specified in Table 8.2.1.4.3A.3-2 per CC	≥5
2	15+20 MHz	As specified in Table 8.2.1.4.3A.3-2 per CC	≥5
3	10+20MHz	As specified in Table 8.2.1.4.3A.3-2 per CC	≥5
4	2x15 MHz	As specified in Table 8.2.1.4.3A.3-2 per CC	≥5
5	2x10 MHz	As specified in Table 8.2.1.4.3A.3-2 per CC	≥3
Note 1: The OCNG pattern applies for each CC. Note 2: The applicability of requirements for different dual connectivity configurations and bandwidth combination sets is defined in 8.1.2.3A.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.3A.

8.2.1.4.3A.4 Test description

8.2.1.4.3A.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: Select one according to Tables 8.1.2.3A.3-1 and 8.2.1.4.3A.4.1-1.

Table 8.2.1.4.3A.4.1-1: Test point selection for TM4 DC

DC Capability	Band Configuration				
	2x20	15+20	10+20	2x15	2x10
Inter-band DC (two bands) (DC_A_2)	Test1	Test2	Test3	Test4	Test5
Note 1: Only one test point is tested. Select the largest aggregated dual connectivity bandwidth combination supported by the UE among the UE supported dual connectivity capabilities.					

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.46 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.4.3A.3-1 as appropriate.

3. Downlink signals for the MCG CC (PCell) and SCG CC (PSCell) are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. If the Split bearer is only supported, ensure the UE is in State 3A-RF-DC2 according to TS 36.508 [7] clause 5.2A.2B. Otherwise, ensure that the UE is in State 3A-RF-DC1 according to TS 36.508 [7] clause 5.2A.2A. Message contents are defined in clause 8.2.1.4.3A.4.3.

8.2.1.4.3A.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.3A.3-1 and 8.2.1.4.3A.3-2 on both MCG CC and SCG CC. The SS sends downlink MAC padding bits on the DL RMC.

2. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Table 8.2.1.4.3A.5-1 as appropriate.

4. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.4.3A.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 4.6 and 5.5 with the following exceptions:

Table 8.2.1.4.3A.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop spatial multiplexing performance downlink power allocation (PCell and PSCell)

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.4.3A.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation (PCell and PSCell)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.3A.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation (PCell and PSCell)

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2 CQI-ReportConfig-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			RBC
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.1.4.3A.5 Test requirement

Table 8.2.1.4.3A.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.2.1.4.3A.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.3A.5-1: Single carrier performance for multiple dual connectivity configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		
					Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4MHz	R.14-4 FDD	OP. 1 FDD	EVA5	4x2 Low	70	11.26	9.76
3MHz	R.14-5 FDD	OP. 1 FDD	EVA5	4x2 Low	70	10.4	8.9
5MHz	R.14-6 FDD	OP. 1 FDD	EVA5	4x2 Low	70	10.4	8.9
10 MHz	R.14 FDD	OP. 1 FDD	EVA5	4x2 Low	70	11.0	9.5
15MHz	R.14-7 FDD	OP. 1 FDD	EVA5	4x2 Low	70	11.0	9.5
20MHz	R.14-3 FDD	OP. 1 FDD	EVA5	4x2 Low	70	11.2	9.7

Table 8.2.1.4.3A.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC) for dual connectivity

Test num.	Band-width combination	Requirement	UE category
1	2x20 MHz	As specified in Table 8.2.1.4.3A.5-1 per CC	≥5
2	15+20 MHz	As specified in Table 8.2.1.4.3A.5-1 per CC	≥5
3	10+20MHz	As specified in Table 8.2.1.4.3A.5-1 per CC	≥5
4	2x15 MHz	As specified in Table 8.2.1.4.3A.5-1 per CC	≥5
5	2x10 MHz	As specified in Table 8.2.1.4.3A.5-1 per CC	≥3
Note 1: The OCNG pattern applies for each CC. Note 2: The applicability of requirements for different dual connectivity configurations and bandwidth combination sets is defined in 8.1.2.3A.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.4.4 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 with TM4 Interference Model – Enhanced Performance Requirement Type B

8.2.1.4.4.1 Test purpose

The purpose of these tests is to verify the closed loop rank-one performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 4 interference model defined in clause B.6.3.

8.2.1.4.4.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward that support enhanced performance requirement Type B.

8.2.1.4.4.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.4.4-2, with the addition of parameters in Table 8.2.1.4.4.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.1.4.4.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.2.1.4.4.3-1: Test Parameters for Single-layer Spatial Multiplexing (FRC) with TM4 interference model

Parameter		Unit	Cell 1	Cell 2		Cell 3	
Downlink power allocation	ρ_A	dB	-3	-3		-3	
	ρ_B	dB	-3 (Note 1)	-3		-3	
	σ	dB	0	0		0	
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1		Antenna ports 0,1	
N_{oc} at antenna port		dBm/15 kHz	-98				
Test number (Note 4)				Test 1	Test 2	Test 1	Test 2
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.28	3.34	0.74
Cell Id				6	1	1	6
CFI indicated in PCFICH				3	Random from set {1,2,3}	3	Random from set {1,2,3}
$BW_{Channel}$		MHz	10	10		10	
Cyclic Prefix			Normal	Normal		Normal	
Number of control OFDM symbols			3	3		3	
PDSCH transmission mode			4	4		4	
Interference model			N/A	As specified in clause B.6.3		As specified in clause B.6.3	
Precoding			Random wideband precoding per TTI	As specified in clause B.6.3		As specified in clause B.6.3	
Time offset to cell 1		us	N/A	2		3	
Frequency offset to cell 1		Hz	N/A	200		300	
MBSFN			Not configured	Not configured		Not configured	
NeighCellsInfo-r12 (Note 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}		{dB-6, dB-3, dB0}	
	transmissionModeList-r12		N/A	{2,3,4,8,9}		{2,3,4,8,9}	

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331 [5].
Note 4: Test 1 and Test 2 are defined in Table 8.2.1.4.4.3-2.

Table 8.2.1.4.4.3-2: Minimum Performance for Enhanced Performance Requirement Type B, Single-layer Spatial Multiplexing (FRC) with TM4 interference model

Test Num	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-10 FDD	OP.1 FDD	N/A	N/A	EVA 5	EVA 5	EVA 5	2x2 Low	85	17.0	≥1
2	R.11-9 FDD	OP.1 FDD	N/A	N/A	EPA 5	EPA 5	EPA 5	2x2 Low	85	10.1	≥1

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.1D.

8.2.1.4.4.4 Test description

8.2.1.4.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.4.4.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.4.4.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.4.4.3.

8.2.1.4.4.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-1 in TS36.211 [8]) every TTI according to Tables 8.2.1.4.4.5-1 and 8.2.1.4.4.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.2.1.4.4.5-1 as appropriate. The CFIs indicated in PCFICH are randomly selected per TTI.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.1.4.4.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.
5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.
6. Repeat steps from 1 to 5 for each subtest in Tables 8.2.1.4.4.5-1 and 8.2.1.4.4.5-2 as appropriate.

8.2.1.4.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.2.1.4.4.4.3-1: *PhysicalConfigDedicated-DEFAULT* message disabling CQI reporting

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
}			

8.2.1.4.4.5 Test requirement

Table 8.2.1.4.4.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.2.1.4.4.5-2 for the specified SNR including test tolerances.

Table 8.2.1.4.4.5-1: Test Parameters for Single-layer Spatial Multiplexing (FRC) with TM4 interference model

Parameter		Unit	Cell 1	Cell 2		Cell 3	
Downlink power allocation	ρ_A	dB	-3	-3		-3	
	ρ_B	dB	-3 (Note 1)	-3		-3	
	σ	dB	0	0		0	
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1		Antenna ports 0,1	
N_{oc} at antenna port		dBm/15 kHz	-98				
Test number (Note 4)				Test 1	Test 2	Test 1	Test 2
$\widehat{E}_s / N_{oc}$		dB	N/A	14.71	4.08	4.14	1.54
Cell Id				6	1	1	6
CFI indicated in PCFICH				3	Random from set {1,2,3}	3	Random from set {1,2,3}
$BW_{Channel}$		MHz	10	10		10	
Cyclic Prefix			Normal	Normal		Normal	
Number of control OFDM symbols			3	3		3	
PDSCH transmission mode			4	4		4	
Interference model			N/A	As specified in clause B.6.3		As specified in clause B.6.3	
Precoding			Random wideband precoding per TTI	As specified in clause B.6.3		As specified in clause B.6.3	
Time offset to cell 1		us	N/A	2		3	
Frequency offset to cell 1		Hz	N/A	200		300	
MBSFN			Not configured	Not configured		Not configured	
NeighCellsInfo-r12 (Note 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}		{dB-6, dB-3, dB0}	
	transmissionModeList-r12		N/A	{2,3,4,8,9}		{2,3,4,8,9}	

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331 [5].
Note 4: Test 1 and Test 2 are defined in Table 8.2.1.4.4.5-2.

Table 8.2.1.4.4.5-2: Test Requirement for Enhanced Performance Requirement Type B, Single-layer Spatial Multiplexing (FRC) with TM4 interference model

Test Num	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-10 FDD	OP.1 FDD	N/A	N/A	EVA 5	EVA 5	EVA 5	2x2 Low	85	18.85	≥1
2	R.11-9 FDD	OP.1 FDD	N/A	N/A	EPA 5	EPA 5	EPA 5	2x2 Low	85	11.64	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

8.2.1.5

8.2.1.6

8.2.1.7 Carrier aggregation with power imbalance

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD

- Test tolerances are undefined

- The minimum test time need to be added to G.3A.5

8.2.1.7_A.1 FDD Carrier aggregation with power imbalance (intra-band contiguous DL CA)

8.2.1.7_A.1.1 Test purpose

To verify the ability of an intraband adjacent carrier aggregation UE to demodulate the signal transmitted by the PCell or SCell in the presence of a stronger SCell signal on an adjacent frequency. Throughput is measured on the PCell or SCell only.

8.2.1.7_A.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support intra-band contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.1.7_A.1.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.7_A.1.3-2, with the addition of the parameters in Table 8.2.1.7_A.1.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Table 8.2.1.7_A.1.3-1: Test Parameters for CA

Parameter		Unit	Test 1	Test 2-3
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	Off (Note 2)	Off (Note 2)
Symbols for unused PRBs			OCNG (Note 3)	OCNG (Note 3)
Modulation			64 QAM	64 QAM
Maximum number of HARQ transmission			1	1
Redundancy version coding sequence			{0}	{0}
PDSCH transmission mode of PCell			1	3
PDSCH transmission mode of SCell			3	1
OCNG Pattern	PCell		OP.1 FDD	OP.5 FDD
	SCell		OP.5 FDD	OP.1 FDD
Propagation Conditions	PCell		Clause B.1	Clause B.1
	SCell		Clause B.1	Clause B.1
Correlation Matrix and Antenna	PCell		1x2	2x2
	SCell		2x2	1x2

Note 1: $P_B = 0$ for 1x2 and $P_B = 1$ for 2x2 antenna configuration.
Note 2: No external noise sources are applied
Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated. pseudo random data, which is QPSK modulated.
Note 4: Void

Table 8.2.1.7_A.1.3-2: Minimum performance (FRC) for CA

Test Number	Bandwidth (MHz)		Reference channel		Power at antenna port (dBm/15KHz)		Reference value Fraction of Maximum Throughput (%)		UE Category
	PCell	SCell	PCell	SCell	$\hat{E}_{s_PCell}$ for PCell	$\hat{E}_{s_SCell}$ for Scell	PCell	SCell	
1	20	20	R.49 FDD	NA	-85	-79	85	NA	≥5
2	10	10	NA	R.49-1 FDD	-79	[-85.8]	NA	85	≥5
3	5	5	NA	R.49-2 FDD	-79	[-85.9]	NA	85	≥5

Note 1: The OCNG pattern for PCell is used to fill the control channel. The OCNG pattern for SCell is used to fill the control channel and PDSCH.
Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.7.

8.2.1.7_A.1.4 Test description

8.2.1.7_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.7_A.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group TBD for UE supporting only 2Rx RF bands on all CC. Annex A, Figure TBD for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 8.2.1-1and 8.2.1.7_A.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.7_A.1.4.3.

8.2.1.7_A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels except control channel and PDSCH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.7_A.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.7_A.1.3-1 and 8.2.1.7_A.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition and the correlation matrix on each of the component carriers according to Tables 8.2.1.7_A.1.5-1 as appropriate.
6. Measure the average throughput on PCC in test number 1 or measure the average throughput on SCC in test number 2 or 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-1. Count the number of NACKs, ACKs and statDTXs on the UL during the test on PCC in test number 1 or on SCC in test number 2 or 3.

8.2.1.7_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 3, for SCC configuration there are no additional message contents.

8.2.1.7_A.1.5 Test requirement

Table 8.2.1.7_A.1.5-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.7_A.1.5-1 for the specified cell power levels including test tolerances for all throughput tests.

Table 8.2.1.7_A.1.5-1: Test Requirement (FRC) for CA

Test Number	Bandwidth (MHz)		Reference channel		Power at antenna port (dBm/15KHz)		Reference value Fraction of Maximum Throughput (%)		UE Category
	PCell	SCell	PCell	SCell	$\hat{E}_{s_PCell}$ for PCell	$\hat{E}_{s_SCell}$ for Scell	PCell	SCell	
1	20	20	R.49 FDD	NA	-85	-79	85	NA	≥5
2	10	10	NA	R.49-1 FDD	-79	[-85.8]	NA	85	≥5
3	5	5	NA	R.49-2 FDD	-79	[-85.9]	NA	85	≥5
Note 1: The OCNG pattern for PCell is used to fill the control channel. The OCNG pattern for SCell is used to fill the control channel and PDSCH.									
Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.8 FFS

8.2.1.9 FDD PDSCH performance in HST-SFN scenario

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test tolerances are undefined

- 36.521-2 spec need to be introduced

8.2.1.9.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports in the HST-SFN scenario defined in B.3A when *highSpeedEnhancedDemodulationFlag* is received.

8.2.1.9.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 14 and forward that support *demodulationEnhancements-r14*.

8.2.1.9.3 Minimum conformance requirements

The requirements are specified in Table 8.2.1.9.3-2, with the addition of the parameters in Table 8.2.1.9.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.2.1.9.3-1: Test Parameters for UE performance in HST-SFN scenario (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (NOTE 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
NOTE 1: $P_B = 1$.			

Table 8.2.1.9.3-2: Minimum performance UE in HST-SFN scenario (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.87 FDD	OP.1 FDD	HST-SFN	2x2	70	13.3	≥1
NOTE 1: The requirement defined is based on the normalized channel model, i.e., the power of each tap is normalized to the instantaneous total received power from four taps.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.9.

8.2.1.9.4 Test description

8.2.1.9.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.9.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.2.1-1and 8.2.1.9.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.3A.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.9.3.

8.2.1.9.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.9.3-1 and 8.2.1.9.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.1.9.3-2as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.9.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.1.9.5 Test requirement

Table 8.2.1.9.3-2 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.9.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.9.5-1: Test requirement for UE in HST-SFN scenario (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.hh FDD	OP.1 FDD	HST-SFN	2x2	70	13.3 +TT	≥1
NOTE 1: The requirement defined is based on the normalized channel model.								

8.2.2 TDD (Fixed Reference Channel)

The parameters specified in Table 8.2.2-1 are valid for all TDD tests unless otherwise stated.

Table 8.2.2-1: Common Test Parameters (TDD)

Parameter	Unit	Value	Comments
Uplink downlink configuration (Note 1)		1	
Special subframe configuration (Note 2)		4	
Inter-TTI Distance		1	
Number of HARQ processes	Processes	7	For TDD, 7 HARQ processes in the DL, as specified in TS 36.213 [10] clause 7. All 7 HARQ processes are used.
Scheduling of retransmissions			1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur. 3. In case when the initial transmission and the retransmissions are scheduled in subframes with a different N_{PRB} (in terms of TS 36.213 [10] subclause 7.1.7) $29 \le I_{MCS} \le 31$ according to TS 36.213 [10] subclause 7.1.7.2 and the appropriate modulation is used.
Maximum number of HARQ transmission		4	It is always 4 for TDD, as specified in TS 36.213 [10] clause 8
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM	
Number of OFDM symbols for PDCCH	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths unless otherwise stated	The PCFICH carries information about the number of OFDM symbols used for transmission of PDCCHs in a subframe, as specified in TS 36.211 [8] clause 6.7
Cyclic Prefix		Normal	CP consist of the following physical resource blocks (RBs) parameters: 12 consecutive subcarriers at a 15 kHz spacing and 7 OFDM symbols, as specified in TS 36.211 [8] clause 6.2.3
Cell ID		0 (Note 3)	The Cell ID is uniquely defined by a number in the range of 0 to 503, representing the physical-layer cell identity, as specified in TS 36.211 [8] clause 6.11.
Cross carrier scheduling		Not configured	

Note 1: as specified in Table 4.2-2 in TS 36.211 [8]
Note 2: as specified in Table 4.2-1 in TS 36.211 [8]
Note 3: For CA tests, Cell ID = 0 applies only to P-Cell. For (n)*th* S-Cell, Cell ID = n is used.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1 TDD PDSCH Single Antenna Port Performance (Cell-Specific Reference Symbols)

8.2.2.1.1 TDD PDSCH Single Antenna Port Performance

8.2.2.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.2.1.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.1, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.1.1.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.1.1.3-2 for the specified SNR.

Table 8.2.2.1.1.3-1: Test Parameters

Parameter		Unit	Test 1- 5	Test 6- 8	Test 9- 15	Test 16- 18
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)
	σ	dB	0	0	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)
Modulation			QPSK	16QAM	64QAM	16QAM
ACK/NACK feedback mode			Multiplexing	Multiplexing	Multiplexing	Multiplexing
PDSCH transmission mode			1	1	1	1

Note 1: $P_B = 0$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.2.2.1.1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2	≥1
2	10 MHz	R.2 TDD	OP.1 TDD	ETU70	1x2 Low	70	-0.6	≥1
3	10 MHz	R.2 TDD	OP.1 TDD	ETU300	1x2 Low	70	-0.2	≥1
4	10 MHz	R.2 TDD	OP.1 TDD	HST	1x2	70	-2.6	≥1
5	1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0	≥1
6	10 MHz	R.3 TDD	OP.1 TDD	EVA5	1x2 Low	70	6.7	≥2
7	10 MHz	R.3 TDD	OP.1 TDD	ETU70	1x2 Low	30	1.4	≥2
8	10 MHz	R.3 TDD	OP.1 TDD	ETU300	1x2 High	70	9.3	≥2
9	3 MHz	R.5 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	≥1
10	5 MHz	R.6 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	≥2
11	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	≥2
12	10 MHz	R.7 TDD	OP.1 TDD	ETU70	1x2 Low	70	19.1	≥2
13	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 High	70	19.1	≥2
14	15 MHz	R.8 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.8	≥2
15	20 MHz	R.9 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	≥3
16	3 MHz	R.0 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.1	≥1
17	10 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.0	≥1
18	20 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.1	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1.1.4 Test description

8.2.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Frequencies to be tested for 1PRB allocation: Low Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.1.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9.

2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.1.1.4.3.

8.2.2.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.1.1.3-1 and 8.2.2.1.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.2.1.1.5-1as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each subtest in Tables 8.2.2.1.1.5-1 as appropriate.

8.2.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.2.1.1.5 Test requirement

Table 8.2.2.1.1.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A for each throughput test shall meet or exceed the specified value in Tables 8.2.2.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.1.1.5-1: Test Requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4	≥1
2	10 MHz	R.2 TDD	OP.1 TDD	ETU70	1x2 Low	70	0.2	≥1
3	10 MHz	R.2 TDD	OP.1 TDD	ETU300	1x2 Low	70	0.6	≥1
4	10 MHz	R.2 TDD	OP.1 TDD	HST	1x2	70	-2.0	≥1
5	1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.8	≥1
6	10 MHz	R.3 TDD	OP.1 TDD	EVA5	1x2 Low	70	7.5	≥2
7	10 MHz	R.3 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.2	≥2
8	10 MHz	R.3 TDD	OP.1 TDD	ETU300	1x2 High	70	10.1	≥2
9	3 MHz	R.5 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.4	≥1
10	5 MHz	R.6 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.4	≥2
11	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.4	≥2
12	10 MHz	R.7 TDD	OP.1 TDD	ETU70	1x2 Low	70	19.9	≥2
13	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 High	70	19.9	≥2
14	15 MHz	R.8 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.6	≥2
15	20 MHz	R.9 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.5	≥3
16	3 MHz	R.0 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.9	≥1
17	10 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.8	≥1
18	20 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.9	≥1

8.2.2.1.1_1 TDD PDSCH Single Antenna Port Performance (Release 9 and forward)

8.2.2.1.1_1.1 Test purpose

Same test purpose as in clause 8.2.2.1.1.1.

8.2.2.1.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward of UE category 1 and 2.

8.2.2.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.1.1.3 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-2 → use Table 8.2.2.1.1_1.3-2.

Table 8.2.2.1.1_1.3-1: Void

Table 8.2.2.1.1_1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	N/A							
2	N/A							
3	N/A							
4	N/A							
5	N/A							
6	5 MHz	R.3-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	6.7	1
7	5 MHz	R.3-1 TDD	OP.1 TDD	ETU70	1x2 Low	30	1.4	1
8	5 MHz	R.3-1 TDD	OP.1 TDD	ETU300	1x2 High	70	9.3	1
9	N/A							
10	5 MHz	R.6-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	1
11	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	1
12	10 MHz	R.7-1 TDD	OP.1 TDD	ETU70	1x2 Low	70	19.1	1
13	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 High	70	19.1	1
14	15 MHz	R.8-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.8	1
15	20 MHz	R.9-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	2
	20 MHz	R.9-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	1
16	N/A							
17	N/A							
18	N/A							

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1.1_1.4 Test description

Same test description as in clause 8.2.2.1.1.4 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-1 → use Table 8.2.2.1.1_1.3-1.
- Instead of Table 8.2.2.1.1.3-2 → use Table 8.2.2.1.1_1.3-2.
- Instead of Table 8.2.2.1.1.5-1 → use Table 8.2.2.1.1_1.5-1.

8.2.2.1.1_1.5 Test requirement

Same test requirements as in clause 8.2.2.1.1.5 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-1 → use Table 8.2.2.1.1_1.3-1.
- Instead of Table 8.2.2.1.1.5-1 → use Table 8.2.2.1.1_1.5-1.

Table 8.2.2.1.1_1.5-1: Test Requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	N/A							
2	N/A							
3	N/A							
4	N/A							
5	N/A							
6	5 MHz	R.3-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	7.5	1
7	5 MHz	R.3-1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.2	1
8	5 MHz	R.3-1 TDD	OP.1 TDD	ETU300	1x2 High	70	10.1	1
9	N/A							
10	5 MHz	R.6-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.4	1
11	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.4	1
12	10 MHz	R.7-1 TDD	OP.1 TDD	ETU70	1x2 Low	70	+19.9	1
13	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 High	70	+19.9	1
14	15 MHz	R.8-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.6	1
15	20 MHz	R.9-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.5	2
	20 MHz	R.9-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.5	1
16	N/A							
17	N/A							
18	N/A							

8.2.2.1.1_2 TDD PDSCH Single Antenna Port Performance (Release 10 and forward)

8.2.2.1.1_2.1 Test purpose

Same test purpose as in clause 8.2.2.1.1.1.

8.2.2.1.1_2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward.

8.2.2.1.1_2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.1.1.3 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-1 → use Table 8.2.2.1.1_2.3-1.
- Instead of Table 8.2.2.1.1.3-2 → use Table 8.2.2.1.1_2.3-2.

Table 8.2.2.1.1_2.3-1: Test Parameters

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
ACK/NACK feedback mode			Multiplexing
PDSCH transmission mode			1
Note 1: $P_B = 0$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.2.2.1.1_2.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.41 TDD	OP.1 TDD	EVA5	1x2 Low	70	-5.3	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.1.

8.2.2.1.1_2.4 Test description

Same test description as in clause 8.2.2.1.1.4 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-1 → use Table 8.2.2.1.1_2.3-1.
- Instead of Table 8.2.2.1.1.3-2 → use Table 8.2.2.1.1_2.3-2.
- Instead of Table 8.2.2.1.1.5-1 → use Table 8.2.2.1.1_2.5-1.

8.2.2.1.1_2.5 Test requirement

Same test requirements as in clause 8.2.2.1.1.5 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-1 → use Table 8.2.2.1.1_2.3-1.
- Instead of Table 8.2.2.1.1.5-1 → use Table 8.2.2.1.1_2.5-1.

Table 8.2.2.1.1_1.5-1: Test Requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.41 TDD	OP.1 TDD	EVA5	1x2 Low	70	-4.5	≥1

8.2.2.1.1_A TDD PDSCH Single Antenna Port Performance for CA

8.2.2.1.1_A.1 TDD PDSCH Single Antenna Port Performance for CA (2DL CA)

8.2.2.1.1_A.1.1 Test purpose

Same test purpose as 8.2.2.1.1.

8.2.2.1.1_A.1.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UE of category 5 or higher that supports inter-band OR intra-band contiguous DL CA

This test also applies to E-UTRA TDD release 11 and forward UE of category 5 or higher that supports intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.1.1_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.1, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.1.1_A.1.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.1.1_A.1.3-2 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.2.1.1_A.1.3-1: Test Parameters for CA

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
ACK/NACK feedback mode			PUCCH format 1b with channel selection
PDSCH transmission mode			1
Note 1: $P_B = 0$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.2.1.1_A.1.3-2: Minimum performance (FRC) for CA

Test number	Band-width	Refe-rence Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Cate-gory
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	2x20 MHz	R.42 TDD	OP.1 TDD (Note 1)	EVA5	1x2 Low	70	-1.2	`≥5
2	20MHz+ 15MHz	R.42 TDD for 20MHz CC	OP.1 TDD (Note 1)	EVA5	1x2 Low	70	-1.4	≥5
		R.42-3 TDD for 15MHz CC	OP.1 TDD (Note 1)			70	-1.4	
Note 1: The OCNG pattern applies for each CC. Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.								

Table 8.2.2.1.1_A.1.3-3: Void

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.1.

8.2.2.1.1_A.1.4 Test description

8.2.2.1.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: Select one according to Table 8.2.2.1.1_A.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.2.1.1_A.1.4.1

Table 8.2.2.1.1_A.1.4.1-1: Test point selection for TM1 2DL CA

CA Capability	Bandwidth Combination	
	20+20	20+15
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2
Intra-band contiguous CA (CA2_C)	Test 1	Test 2
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test 1	Test 2
Note 1: Only one test point to be tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.35 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.1.1_A.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.1.1_A.1.4.3.

8.2.2.1.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.1.1_A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.1.1_A.1.3-1 and 8.2.2.1.1_A.1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.2.1.1_A.1.5-1 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-6 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.2.1.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

In test procedure step 2, for SCC configuration there are no additional message contents.

8.2.2.1.1_A.1.5 Test requirement

Table 8.2.2.1.1_A.1.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause 3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.2.1.1_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.1.1_A.1.5-1: Test Requirement (FRC) for CA

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value			UE Category
						Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band	
1	2x20 MHz	R.42 TDD	OP.1 TDD (Note 1)	EVA5	1x2 Low	70	-0.4	-1.9	≥5
2	20MHz+ 15MHz	R.42 TDD for 20MHz CC	OP.1 TDD (Note 1)	EVA5	1x2 Low	70	-0.6	-2.1	≥5
		R.42-3 TDD for 15MHz CC	OP.1 TDD (Note 1)			70	-0.6	-2.1	
	Note 1: The OCNG pattern applies for each CC. Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.								

Table 8.2.2.1.1_A.1.5-3: Void

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.1.1_A.2 TDD PDSCH Single Antenna Port Performance for CA (3DL CA)

8.2.2.1.1_A.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.2.1.1_A.2.2 Test applicability

This test case applies to all types of E-UTRA TDD UE release 10 and forward of UE categories 5 and onwards that support 3DL Intra-band contiguous CA or 3DL Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA TDD UE release 11 and forward of UE categories 5 and onwards that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.1.1_A.2.3 Minimum conformance requirements

For CA with 3 DL CCs, the requirements are specified in Table 8.2.2.1.1_A.2.3-2, based on single carrier requirement specified in Table 8.2.2.1.1_A.2.3-1, with the addition of the parameters in Table 8.2.2.1.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.2.1.1_A.2.3-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.2.1.1_A.2.3-2: Minimum performance (FRC) based on single carrier performance for CA with 3 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.2.1.1_A.2.3-1 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.2.1.1_A.2.3-1 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.2.1.1_A.2.4 Test description

8.2.2.1.1_A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.2.1.1_A.2.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.2.1.1_A.2.4.1-1

Table 8.2.2.1.1_A.2.4.1-1: Test point selection for TM1 CA

CA Capability	Bandwidth combination	
	3x20	20+20+15
Intra-band contiguous (CA3_C)	Test1	NA
Inter-band (CA3_A2)	Test1	Test2
Inter-band CA (three bands) (CA_A3)	NA	NA
Intra-band non-contiguous (with two sub-blocks) (CA3_N2)	Test1	NA
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.2.2-1 and 8.2.2.1.1_A.2.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.1.1_A.2.4.3.

8.2.2.1.1_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.1.1_A.2.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.1.1_A.1.3-1 and 8.2.2.1.1_A.2.3-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.2.1.1_A.2.5-1 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.1.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.2.1.1_A.2.5 Test requirement

Table 8.2.2.1.1_A.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.2.1.1_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.1.1_A.2.5-1: Single carrier performance test requirement (FRC) for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		
					Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2	-1.3
3MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0	-1.5
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4	-1.9
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8	-2.3
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1

Table 8.2.2.1.1_A.2.5-2: Test requirement (FRC) based on single carrier performance for CA with 3DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.2.1.1_A.2.5-1 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.2.1.1_A.2.5-1 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.1.1_A.3 TDD PDSCH Single Antenna Port Performance for CA (4DL CA)

8.2.2.1.1_A.3.1 Test purpose

Same test purpose as 8.2.2.1.1.1.

8.2.2.1.1_A.3.2 Test applicability

This test case applies to all types of E-UTRA TDD UE release 11 and forward of UE categories 8 and onwards that support 4DL Intra-band contiguous CA or 4DL Inter-band CA or 4DL with Intra-band contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

8.2.2.1.1_A.3.3 Minimum conformance requirements

For CA with 4 DL CCs, the requirements are specified in Table 8.2.2.1.1_A.3.3-2, based on single carrier requirement specified in Table 8.2.2.1.1_A.3.3-1, with the addition of the parameters in Table 8.2.2.1.1_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.2.1.1_A.3.3-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)

1.4MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.2.1.1_A.3.3-2: Minimum performance (FRC) based on single carrier performance for CA with 4 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.2.1.1_A.3.3-1 per CC	≥8
2	20MHz+20MHz+20MHz+15MHz	As specified in Table 8.2.2.1.1_A.3.3-1 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.1.

8.2.2.1.1_A.3.4 Test description

8.2.2.1.1_A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.2.1.1_A.3.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.2.1.1_A.3.4.1-1

Table 8.2.2.1.1_A.3.4.1-1: Test point selection for TM4 4DL CA

CA Capability	Bandwidth combination	
	4x20	20+20+20+15
Intra-band contiguous (CA4_C)	Test1	Test2
Inter-band CA (two bands) (CA4_A2)	Test1	Test2
Inter-band CA (three bands) (CA4_A3)	Test1	Test2
Inter-band CA (four bands) (CA4_A4)	Test1	Test2
Intra-band non-contiguous CA (with two sub-blocks) (CA4_N2)	Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61.
2. The parameter settings for the cell are set up according to Table 8.2.2-1 and 8.2.2.1.1_A.3.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.1.1_A.3.4.3.

8.2.2.1.1_A.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.1.1_A.3.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.1.1_A.1.3-1 and 8.2.2.1.1_A.3.3-1 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.2.1.1_A.3.5-1 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.1.1.1_A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.2.1.1_A.3.5 Test requirement

Table 8.2.2.1.1_A.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.2.1.1_A.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.1.1_A.3.5-1: Single carrier performance test requirement (FRC) for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2
3MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.1.2 TDD PDSCH Single Antenna Port Performance with 1 PRB in the presence of MBSFN

8.2.2.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement

Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS and also for the transmission on a single-antenna port with single RB allocation in the presence of MBSFN.

8.2.2.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.1, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.1.2.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.1.2.3-2 for the specified SNR.

Table 8.2.2.1.2.3-1: Test Parameters for Testing 1 PRB allocation

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for MBSFN portion of MBSFN subframes (Note 2)			OCNG (Note 3)
ACK/NACK feedback mode			Multiplexing
Note 1: $P_B = 0$ Note 2: The MBSFN portion of an MBSFN subframe comprises the whole MBSFN subframe except the first two symbols in the first slot. Note 3: The MBSFN portion of the MBSFN subframes shall contain QPSK modulated data. Cell-specific reference signals are not inserted in the MBSFN portion of the MBSFN subframes, QPSK modulated MBSFN data is used instead.			

Table 8.2.2.1.2.3-2: Minimum performance 1 PRB allocation (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.29 TDD	OP.3 TDD	ETU70	1x2 Low	30	2.0	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1.2.4 Test description

8.2.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Low Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.1.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.1.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.1.2.4.3.

8.2.2.1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.1.2.3-1 and 8.2.2.1.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.2.1.1.2.5-1as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.1.2.4.3-1: SystemInformationBlockType2: Additional TDD PDSCH Single Antenna Port Performance for 1 PRB allocation with MBSFN subframes test point 1 requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 SystemInformationBlockType2			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType2 ::= SEQUENCE {			
mbsfn-SubframeConfig ::= SEQUENCE {			
radioframeAllocationPeriod	n1	Every radio frame is with MBSFN subframe	
radioframeAllocationOffset	0		
subframeAllocation CHOICE {			
oneFrame	01001x	subframe 4 and 9 is used for MBSFN.	TDD
}			
}			
}			

8.2.2.1.2.5 Test requirement

Table 8.2.2.1.2.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A for each throughput test shall meet or exceed the specified value in Tables 8.2.2.1.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.1.2.5-1: Test Requirement 1PRB with MBSFN subframes (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.29 TDD	OP.3 TDD	ETU70	1x2 Low	30	2.8	1-5

8.2.2.2 TDD PDSCH Transmit Diversity Performance (Cell-Specific Reference Symbols)

8.2.2.2.1 TDD PDSCH Transmit Diversity 2x2

8.2.2.2.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity (SFBC).

8.2.2.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.2.1.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 and 4 transmitter antennas as specified.

Table 8.2.2.2.1.3-1: Test Parameters for Testing Transmit Diversity Performance (FRC)

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.2.2.1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 TDD	OP.1 TDD	EVA5	2x2 Medium	70	6.8	≥2
2	10 MHz	R.10 TDD	OP.1 TDD	HST	2x2	70	-2.3	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.1.4 Test description

8.2.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.2.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.1.4.3.

8.2.2.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.2.1.3-1 and 8.2.2.2.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.2.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each test interval in Table 8.2.2.2.1.5-1 as appropriate.

8.2.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.2.2.1.5 Test requirement

Table 8.2.2.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.2.1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 TDD	OP.1 TDD	EVA5	2x2 Medium	70	7.7	≥2
2	10 MHz	R.10 TDD	OP.1 TDD	HST	2x2	70	-1.7	≥1

8.2.2.2.1_1 TDD PDSCH Transmit Diversity 2x2 (Release 9 and forward)

8.2.2.2.1_1.1 Test purpose

Same test purpose as in clause 8.2.2.2.1.1

8.2.2.2.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward of UE category 1.

8.2.2.2.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.2.1.3 with the following exceptions:

- Instead of Table 8.2.2.2.1.3-2 → use Table 8.2.2.2.1_1.3-1.

Table 8.2.2.2.1_1.3-1: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	5 MHz	R.11-2 TDD	OP.1 TDD	EVA5	2x2 Medium	70	6.8	1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.1_1.4 Test description

Same test description as in clause 8.2.2.2.1.4 with the following exceptions:

- Instead of Table 8.2.2.2.1.3-2 → use Table 8.2.2.2.1_1.3-1.
- Instead of Table 8.2.2.2.1.5-1 → use Table 8.2.2.2.1_1.5-1.

8.2.2.2.1_1.5 Test requirement

Same test requirements as in clause 8.2.2.2.1.5 with the following exceptions:

- Instead of Table 8.2.2.2.1.5-1 → use Table 8.2.2.2.1_1.5-1.

Table 8.2.2.2.1_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	5 MHz	R.11-2 TDD	OP.1 TDD	EVA5	2x2 Medium	70	+7.7	1

8.2.2.2.2 TDD PDSCH Transmit Diversity 4x2

8.2.2.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using transmit diversity (SFBC-FSTD).

8.2.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.2.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.2.2.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 and 4 transmitter antennas as specified.

Table 8.2.2.2.2.3-1: Test Parameters for Testing Transmit Diversity Performance (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.2.2.2.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	1.4 MHz	R.12 TDD	OP.1 TDD	EPA5	4x2 Medium	70	0.2	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.2.4 Test description

8.2.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.2.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.

2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.2.2.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.2.4.3.

8.2.2.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.2.2.3-1 and 8.2.2.2.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.2.2.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.2.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH transmit diversity performance downlink power allocation test point 1 requirement

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

8.2.2.2.2.5 Test requirement

Table 8.2.2.2.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.2.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.2.2.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	1.4 MHz	R.12 TDD	OP.1 TDD	EPA5	4x2 Medium	70	1.1	≥1

8.2.2.2.2_1 TDD PDSCH Transmit Diversity 4x2 (Release 9 and forward)

8.2.2.2.2_1.1 Test purpose

Same test purpose as in clause 8.2.2.2.2.1.

8.2.2.2.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.2.2.2.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.2.2.3 with the following exceptions:

- Instead of Table 8.2.2.2.2.3-2 → use Table 8.2.2.2.2_1.3-1.

Table 8.2.2.2.2_1.3-1: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	ETU70	4x2 Low	70	-0.5	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.2_1.4 Test description

Same test description as in clause 8.2.2.2.2.4 with the following exceptions:

- Instead of Table 8.2.2.2.2.3-2 → use Table 8.2.2.2.2_1.3-1.
- Instead of Table 8.2.2.2.2.5-1 → use Table 8.2.2.2.2_1.5-1.

8.2.2.2.2_1.5 Test requirement

Same test requirements as in clause 8.2.2.2.2.5 with the following exceptions:

- Instead of Table 8.2.2.2.2.5-1 → use Table 8.2.2.2.2_1.5-1.

Table 8.2.2.2.2_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	ETU70	4x2 Low	70	+0.4	≥1

8.2.2.2.3_C TDD PDSCH Transmit diversity 2x2 for eICIC

8.2.2.2.3_C.1 TDD PDSCH Transmit diversity 2x2 for eICIC (non-MBSFN ABS)

8.2.2.2.3_C.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.2.2.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.2.2.3_C.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.2.3_C.1.3-1.

In Table 8.2.2.2.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Table C.3.2-1 in Annex C.3.2 and for Cell 2 is according to Table C.3.3-1 in Annex C.3.3, respectively.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.2.3_C.1.3-2 for the specified SNR.

Table 8.2.2.2.3_C.1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.2.3_C. 1.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 5)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			2	2
ACK/NACK feedback mode			Multiplexing	N/A
PDSCH transmission mode			2	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.2.2.3_C.1.3-2: Minimum Performance Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11-4 TDD Note 4	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Medium	70	3.8	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									
Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.									
Note 5: The maximum Throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.3.

8.2.2.2.3_C.1.4 Test description

8.2.2.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.2.3_C.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.2.2-1 and 8.2.2.2.3_C.1.3-1 as appropriate.
3. Downlink signals are initially set up for Cell1 according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.3_C.1.4.3.

8.2.2.2.3_C.1.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.2.2.2.3_C.1.5-1, 8.2.2.2.3_C.1.5-2, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2.
2. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.2.2.3_C.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.2.2.2.3_C.1.4.3-2: *CQI-ReportConfig-r10-DEFAULT*: Additional TDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.2.2.2.3_C.1.5 Test requirement

Table 8.2.2.2.3_C.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Table 8.2.2.2.3_C.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.2.3_C.1.5-1: Test Parameters for Transmit Diversity (FRC)

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102.1 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.9 (Note 4)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.2.3_C. 1.5-2	5.8
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 5)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			2	2
ACK/NACK feedback mode			Multiplexing	N/A
PDSCH transmission mode			2	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.2.2.3_C.1.5-2: Test requirement Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11-4 TDD Note 4	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Medium	70	4.7	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									
Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.									
Note 5: The maximum Throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.									

8.2.2.2.3_D

8.2.2.2.3_E TDD PDSCH Transmit diversity 2x2 for feICIC

8.2.2.2.3_E.1 TDD PDSCH Transmit diversity 2x2 for feICIC (non-MBSFN ABS)

8.2.2.2.3_E.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [14] of the aggressor cells with CRS assistance information.

8.2.2.2.3_E.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE and CRS interference handling and ss-CCH interference handling – Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.2.2.2.3_E.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.2.2.3_E.1.3-1.

In Table 8.2.2.2.3_E.1-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information TS 36.331 [5] includes Cell 2 and Cell 3.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.2.3_E.1.3-2 for the specified SNR.

Table 8.2.2.2.3_E.1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.2.3_E.1.3-2	12	10
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 5)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
ACK/NACK feedback mode			Multiplexing	N/A	N/A
PDSCH transmission mode			2	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.
Note 10: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.2.2.3_E.1.3-2: Minimum Performance Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughp	SNR (dB) (Note 3)	

									ut (%) (Note 5)		
1	R.11-4 TDD (Note 4)	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Medium	70	3.5	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.3A.

8.2.2.2.3_E.1.4 Test description

8.2.2.2.3_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.2.3_E.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.2.2-1 and 8.2.2.2.3_E.1.3-1 as appropriate.
3. Downlink signals are initially set up for Cell1 according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.3_E.1.4.3.

8.2.2.2.3_E.1.4.2 Test procedure

1. Set the parameters for Cell 1, Cell 2 and Cell 3, according to Tables 8.2.2.2.3_E.1.5-1, 8.2.2.2.3_E.1.5-2, and C.3.3.2 of Annex C.3.3. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC.
2. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.2.3_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.2.2.2.3_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.2A.5, Table 5.2A.5.1.1-2 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.2.2.2.3_E.1.4.3-2: *CQI-ReportConfig-r10-DEFAULT*: Additional TDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'1100111000 1100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.2.2.2.3_E.1.5 Test requirement

Table 8.2.2.2.3_E.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.2.2.3_E.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.2.3_E.1.5-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.2.3_E.1.5-2	11.8	9.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 5)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
ACK/NACK feedback mode			Multiplexing	N/A	N/A
PDSCH transmission mode			2	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.
Note 10: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.2.2.3_E.1.5-2: Test requirement Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughp	SNR (dB) (Note 3)	

									ut (%) (Note 5)		
1	R.11-4 TDD (Note 4)	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Medium	70	4.4	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.

8.2.2.2.4 TDD PDSCH Transmit Diversity 2x2 with TM3 Interference Model – Enhanced Performance Requirement Type A

8.2.2.2.4.1 Test purpose

To verify the performance of transmit diversity (SFBC) with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two dominant interfering cells applying transmission mode 3 interference model.

8.2.2.2.4.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward that support enhanced receiver Type A.

8.2.2.2.4.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.2.4.3-1 and 8.2.2.2.4.3-2 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.2.4.3-2 for the specified SINR.

Table 8.2.2.2.4.3-1: Test Parameters for Transmit diversity Performance (FRC) with TM3 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.73	-8.66
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM symbols			2	2	2
PDSCH transmission mode			2	N/A	N/A
Interference model			N/A	As specified in clause B.5.2	As specified in clause B.5.2
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Reporting interval		ms	5	N/A	N/A
Reporting mode			PUCCH 1-0	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Physical channel for CQI reporting			PUSCH(Note5)	N/A	N/A
cqi-pmi-ConfigurationIndex			4	N/A	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: All cells are time-synchronous.

Note 5: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Table 8.2.2.2.4.3-2: Enhanced Performance Requirement Type A, Transmit Diversity (FRC) with TM3 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.46 TDD	OP.1 TDD	N/A	N/A	EVA 70	EVA 70	EVA 70	2x2 Low	70	-1.4	1-8

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.4.4 Test description

8.2.2.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.2.4.5-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell1 are set up according to Tables 8.2.2-1, 8.2.2.2.4.5-1 and 8.2.2.2.4.5-2 as appropriate.
3. Downlink signals are initially set up for cell1 according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.4.4.3.

8.2.2.2.4.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 8.2.2.2.4.5-1 and 8.2.2.2.4.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #4 and #9 (Table A.2.3.1.1-1).
2. SS sets up the parameters for cell 2 and cell 3 according to Tables 8.2.2.2.4.5-1 and 8.2.2.2.4.5-2 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SINR according to Tables 8.2.2.2.4.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5-14 and G.3.6 in Annex G clause G.3.

8.2.2.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

Table 8.2.2.2.4.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 8.2.2.2.4.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	4	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.2.2.2.4.5 Test requirement

Table 8.2.2.2.4.5-1defines the primary level settings.

Table 8.2.2.2.4.5-1: Test Parameters for Transmit diversity Performance (FRC) with TM3 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.44	-7.77
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM symbols			2	2	2
PDSCH transmission mode			2	N/A	N/A
Interference model			N/A	As specified in clause B.5.2	As specified in clause B.5.2
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Reporting interval		ms	5	N/A	N/A
Reporting mode			PUCCH 1-0	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Physical channel for CQI reporting			PUSCH(Note5)	N/A	N/A
cqi-pmi-ConfigurationIndex			4	N/A	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: All cells are time-synchronous.

Note 5: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.4.3.5-2 for the specified SINR including test tolerances for all throughput tests.

Table 8.2.2.2.4.5-2: Enhanced Performance Requirement Type A, Transmit Diversity (FRC) with TM3 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.46 TDD	OP.1 TDD	N/A	N/A	EVA 70	EVA 70	EVA 70	2x2 Low	70	-0.41	1-8

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

8.2.2.2.5 Minimum Requirement 2 Tx Antenna Port (when *EIMTA-MainConfigServCell-r12* is configured)

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The test applicability needs to be added to TS36.521-2
- The message contents need to be updated.
- Test configuration of Set of subframes to monitor the L1 reconfiguration DCI is pending further investigation.

8.2.2.2.5.1 Test purpose

To verify the performance of transmit diversity (SFBC) with 2 transmitter antennas in case of using eIMTA TDD UL-DL reconfiguration for TDD serving cell(s) via monitoring PDCCH with eIMTA-RNTI on a PCell.

8.2.2.2.5.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 13 and forward that support eIMTA TDD UL-DL reconfiguration for TDD serving cell(s) via monitoring PDCCH with eIMTA-RNTI.

8.2.2.2.5.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.2.5.3-1 and 8.2.2.2.5.3-2 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.2.5.3-2 for the specified SINR.

Table 8.2.2.2.5.3-1: Test Parameters for Transmit diversity Performance (FRC) when EIMTA-MainConfigServCell-r12 is configured

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Uplink downlink configuration in SIB1 (Note 2)			0
Downlink HARQ reference configuration (eimta-HarqReferenceConfig-r12) (Note 2)			5
Set of dynamic TDD UL-DL configurations (NOTES 2,3)			{0, 1, 2, 3, 4, 5, 6}
Periodicity of monitoring the L1 reconfiguration DCI (eimta-CommandPeriodicity-r12)		ms	10
Set of subframes to monitor the L1 reconfiguration DCI (eimta-CommandSubframeSet-r12) (Note 4)			{0,1,5,6}
Number of DL HARQ processes		Processes	15
PDSCH transmission mode			2
ACK/NACK feedback mode (Note 5)			Multiplexing

Note 1: $P_B = 1$
Note 2: As specified in Table 4.2-2 in TS 36.211.
Note 3: UL/DL configuration in PDCCH with eIMTA-RNTI is randomly selected from the given set on a per-DCI basis with equal probability.
Note 4: The set of subframes to monitor PDCCH with eIMTA-RNTI for frame n includes subframes {1,5,6} in frame n-1 and subframe 0 in frame n. Subframes for reconfiguration DCI transmission are chosen in a random way on a per-DCI basis with equal probability.
Note 5: PUCCH Format 3 is used for DL HARQ feedback.

Table 8.2.2.2.5.3-2: Minimum performance Transmit diversity when EIMTA-MainConfigServCell-r12 is configured

Test	Reference channel	OCNG Pattern	Propagation Conditions	Correlation Matrix and Antenna Configuration	Reference value		UE Category
					Fraction of Maximum Throughput (%)	SNR (dB)	
1	R.67 TDD	OP.1 TDD	EVA5	2x2 Medium	70	5.0	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.5.

8.2.2.2.5.4 Test description

8.2.2.2.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.2.5.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.2.5.3-1 and 8.2.2.2.5.3-2 as appropriate.
3. Downlink signals are initially set up for cell according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.5.4.3.

8.2.2.2.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table 8.2.2.2.5.3-1 and 8.2.2.2.5.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.2.2.5.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.2.5.4.3 Message contents

FFS.

8.2.2.2.5.5 Test requirement

Table 8.2.2.2.5.3-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.2.5.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.2.5.5-1: Minimum performance Transmit diversity when EIMTA-MainConfigServCell-r12 is configured

Test	Reference channel	OCNG Pattern	Propagation Conditions	Correlation Matrix and Antenna Configuration	Reference value		UE Category
					Fraction of Maximum Throughput (%)	SNR (dB)	
1	R.67 TDD	OP.1 TDD	EVA5	2x2 Medium	70	5.9	≥1

8.2.2.2.6 TDD PDSCH Transmit Diversity 2x2 with TM2 Interference Model – Enhanced Performance Requirement Type B

8.2.2.2.6.1 Test purpose

The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 2 interference model defined in clause B.6.1.

8.2.2.2.6.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward that support enhanced performance requirement Type B.

8.2.2.2.6.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.2.6.3-2, with the addition of parameters in Table 8.2.2.2.6.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.2.2.6.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.2.2.2.6.3-1: Test Parameters for Transmit diversity Performance (FRC) with TM2 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (NOTE 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	6	1
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	3	3
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	2	2
PDSCH transmission mode			2	2	2
Interference model			N/A	As specified in clause B.6.1	As specified in clause B.6.1
MBSFN			Not configured	Not configured	Not configured
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
NeighCellsInfo-r12 (NOTE 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 8.2.2.2.6.3-2: Minimum Performance for Enhanced Performance Requirement Type B, Transmit Diversity (FRC) with TM2 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.11-12 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	15.3	≥1

NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.6.

8.2.2.2.6.4 Test description

8.2.2.2.6.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.2.6.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.2.2.2.6.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.6.4.3.

8.2.2.2.6.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.2.6.5-1 and 8.2.2.2.6.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.2.2.2.6.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.2.6.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.
5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.2.2.2.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m).

8.2.2.2.6.5 Test requirement

Table 8.2.2.2.6.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for throughput test shall meet or exceed the specified value in Table 8.2.2.2.6.5-2 for the specified SNR including test tolerances.

Table 8.2.2.2.6.5-1: Test Parameters for Transmit diversity Performance (FRC) with TM2 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (NOTE 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	14.71	4.14
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	6	1
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	3	3
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	2	2
PDSCH transmission mode			2	2	2
Interference model			N/A	As specified in clause B.6.1	As specified in clause B.6.1
MBSFN			Not configured	Not configured	Not configured
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
NeighCellsInfo-r12 (NOTE 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 8.2.2.2.6.5-2: Test Requirement for Enhanced Performance Requirement Type B, Transmit Diversity (FRC) with TM2 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.11-12 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	17.15	≥1

NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

8.2.2.2.7 TDD PDSCH Transmit Diversity 2x2 with TM9 Interference Model – Enhanced Performance Requirement Type B

8.2.2.2.7.1 Test purpose

The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 9 interference model defined in clause B.6.4.

8.2.2.2.7.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward that support enhanced performance requirement Type B.

8.2.2.2.7.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.2.7.3-2, with the addition of parameters in Table 8.2.2.2.7.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.2.2.7.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.2.2.2.7.3-1: Test Parameters for Transmit diversity Performance (FRC) with TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	0	0
	ρ_B	dB	-3 (NOTE 1)	0	0
	σ	dB	0	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	3.28	0.74
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	Random from set {1,2,3}	Random from set {1,2,3}
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	Random from set {1,2}	Random from set {1,2}
PDSCH transmission mode			2	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			N/A	Antenna ports 15,16	Antenna ports 15,16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	N/A	10 / 4	10 / 4
CSI reference signal configuration			N/A	6	7
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	9 / 0100000000000000	9 / 0010000000000000
Time offset to cell 1		us	N/A	5	-5
Frequency offset to cell 1		Hz	N/A	600	-600
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (NOTE 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: CSI-RS configurations are according to [8] subclause 6.10.5.2.
NOTE 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 8.2.2.2.7.3-2: Minimum Performance for Enhanced Performance Requirement Type B, Transmit Diversity (FRC) with TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.11-11 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	8.1	≥1
NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.7.

8.2.2.2.7.4 Test description

8.2.2.2.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.2.7.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.2.2.7.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.7.4.3.

8.2.2.2.7.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.2.7.5-1 and 8.2.2.2.7.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.2.2.2.7.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.2.7.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.
5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.2.2.2.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m).

8.2.2.2.7.5 Test requirement

Table 8.2.2.2.7.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for throughput test shall meet or exceed the specified value in Table 8.2.2.2.7.5-2 for the specified SNR including test tolerances.

Table 8.2.2.2.7.5-1: Test Parameters for Transmit diversity Performance (FRC) with TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	0	0
	ρ_B	dB	-3 (NOTE 1)	0	0
	σ	dB	0	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	4.08	1.54
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	Random from set {1,2,3}	Random from set {1,2,3}
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	Random from set {1,2}	Random from set {1,2}
PDSCH transmission mode			2	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			N/A	Antenna ports 15,16	Antenna ports 15,16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	N/A	10 / 4	10 / 4
CSI reference signal configuration			N/A	6	7
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	9 / 0100000000000000	9 / 0010000000000000
Time offset to cell 1		us	N/A	5	-5
Frequency offset to cell 1		Hz	N/A	600	-600
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (NOTE 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$

NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: CSI-RS configurations are according to [8] subclause 6.10.5.2.
NOTE 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 8.2.2.2.7.5-2: Test Requirement for Enhanced Performance Requirement Type B, Transmit Diversity (FRC) with TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.11-11 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	9.64	≥1
NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

8.2.2.3 TDD PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.2.3.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2

8.2.2.3.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.2.3.1.2 Test applicability

This test applies to all types of E-UTRA TDD release 8 and forward UE of category 2-8.

8.2.2.3.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.1.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.1.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Bundling
PDSCH transmission mode			3
Note 1: $P_B = 1$			

Table 8.2.2.3.1.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.1	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.

8.2.2.3.1.4 Test description

8.2.2.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.3.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.3.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1.4.3.

8.2.2.3.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1.3-1 and 8.2.2.3.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.3.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.2.3.1.5 Test requirement

Table 8.2.2.3.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.5-1: Test requirement Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.0	≥2

8.2.2.3.1_1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 (Release 11 and forward)

8.2.2.3.1_1.1 Test purpose

Same test purpose as in clause 8.2.2.3.1.1.

8.2.2.3.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD release 11 and forward UE of category 2-8.

8.2.2.3.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.3.1.3 with the following exceptions:

- Instead of Table 8.2.2.3.1.3-2 → use Table 8.2.2.3.1_1.3-1.

Table 8.2.2.3.1_1.3-1: Minimum performance Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.35 TDD	OP.1 TDD	EVA200	2x2 Low	70	20.3	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.

8.2.2.3.1_1.4 Test description

Same test description as in clause 8.2.2.3.1.4 with the following exceptions:

- Instead of Table 8.2.2.3.1.3-2 → use Table 8.2.2.3.1_1.3-1.
- Instead of Table 8.2.2.3.1.5-1 → use Table 8.2.2.3.1_1.5-1.

8.2.2.3.1_1.5 Test requirement

Same test requirements as in clause 8.2.2.3.1.5 with the following exceptions:

- Instead of Table 8.2.2.3.1.5-1 → use Table 8.2.2.3.1_1.5-1.

Table 8.2.2.3.1_1.5-1: Test Requirement Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.35 TDD	OP.1 TDD	EVA200	2x2 Low	70	21.2	≥2

8.2.2.3.1_A TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA

8.2.2.3.1_A.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (2DL CA)

8.2.2.3.1_A.1.1 Test purpose

Same test purpose as 8.2.2.3.1.1.

8.2.2.3.1_A.1.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UE of category 5 or higher that supports inter-band or intra-band contiguous DL CA

This test also applies to E-UTRA TDD release 11 and forward UE of category 5 or higher that supports intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.3.1_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.1_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.1_A.1.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.1_A.1.3-1: Test Parameters for Large Delay CDD (FRC) for CA

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			PUCCH format 1b with channel selection
PDSCH transmission mode			3
Note 1: $P_B = 1$ Note 2: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.2.3.1_A.1.3-2: Minimum performance Large Delay CDD (FRC) for CA

Test number	Band width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	2x20 MHz	R.30-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.7	≥5
2	20MHz +15MHz	R.30-1 TDD for 20MHz CC	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.0	≥5
		R.11-9 TDD for 15MHz CC	OP.1 TDD (Note 1)	EVA70		70	12.9	
Note 1: The OCNG pattern applies for each CC Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.								

Table 8.2.2.3.1_A.1.3-3: Void

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.

8.2.2.3.1_A.1.4 Test description

8.2.2.3.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select according to Table 8.2.2.3.1_A.1.4.1-1.

CA Capability to be tested: Select according to Table 8.2.2.3.1_A.1.4.1

Table 8.2.2.3.1_A.1.4.1-1: Test point selection for TM3 2DL CA

CA Capability	Bandwidth Combination

	20+20	20+15
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2
Intra-band contiguous CA (CA2_C)	Test 1	Test 2
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test 1	Test 2
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.		

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.3.1_A.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1_A.1.4.3.

8.2.2.3.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.2.3.1_A.1.4.3-1. *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.2.3.1_A.1.4.3-1A.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1_A.1.3-1 and 8.2.2.3.1_A.1.5-1 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.1_A.1.5-1 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-7 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers

7. Repeat steps from 1 to 6 for each subtest in Tables 8.2.2.3.1_A.1.5-1 as appropriate depending on UE CA capability as defined in Table 8.2.2.3.1_A.1.4.1-1.

8.2.2.3.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions.

Table 8.2.2.3.1_A.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.3.1_A.1.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.2.3.1_A.1.5 Test requirement

Table 8.2.2.3.1_A.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for the throughput test shall meet or exceed the specified value in Tables 8.2.2.3.1_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.1_A.1.5-1: Test requirement Large Delay CDD (FRC) for CA

Test number	Band width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value			UE Cate
						Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band	
1	2x20 MHz	R.30-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	14.6	13.1	≥5
2	20MHz+15MHz	R.30-1 TDD for 20MHz CC	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.9	12.4	≥5
		R.11-9 TDD for 15MHz CC	OP.1 TDD (Note 1)	EVA70		70	13.8	12.3	
Note 1: For CA capable UE, the OCNG pattern applies for each CC Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.3.1_A.2 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (3DL CA)

8.2.2.3.1_A.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.2.3.1_A.2.2 Test applicability

This test case applies to all types of E-UTRA TDD release 10 and forward UE of category 5 or higher that support 3DL Intra-band contiguous CA or 3DL Inter-band CA, or 3DL with Intra-band contiguous and Inter-band CA.
This test case also applies to all types of E-UTRA TDD release 11 and forward UE of category 5 or higher that support 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.3.1_A.2.3 Minimum conformance requirements

For CA with 3 DL CCs, the requirements are specified in Table 8.2.2.3.1_A.2.3-3, based on single carrier requirement specified in Table 8.2.2.3.1_A.2.3-2, with the addition of the parameters in Table 8.2.2.3.1_A.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.2.3.1_A.2.3-1: Test Parameters for Large Delay CDD (FRC) for CA with 3DL CCs

Parameter		Unit	Test 1, 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			PUCCH format 3
PDSCH transmission mode			3
Note 1: $P_B = 1$ Note 2: Void Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.2.3.1_A.2.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.2
3MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.6
10 MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.9
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.0

Table 8.2.2.3.1_A.2.3-3: Minimum performance (FRC) based on single carrier performance for CA with 3 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.2.3.1_A.2.3-2 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.2.3.1_A.2.3-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3

8.2.2.3.1_A.2.4 Test description

8.2.2.3.1_A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select according to Table 8.2.2.3.1_A.2.4.1-1.

CA Capability to be tested: Select according to Table 8.2.2.3.1_A.2.4.1-1.

Table 8.2.2.3.1_A.2.4.1-1: Test point selection for TM3 3DL CA

CA Capability	Bandwidth combination

	3x20	20+20+15
Intra-band contiguous (CA3_C)	Test1	Test2
Inter-band CA (two bands) (CA3_A2)	Test1	Test2
Inter-band CA (three bands) (CA3_A3)	Test1	Test2
Intra-band non-contiguous CA (with two sub-blocks) (CA3_N2)	Test1	Test2
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.		

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.60 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.2.2-1 and 8.2.2.3.1_A.2.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1_A.2.4.3.

8.2.2.3.1_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.3.1_A.2.4.3.

3. The SS activates SCCs by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.

4. The SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1_A.2.3-1 and 8.2.2.3.1_A.2.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.2.3.1_A.2.5-1 as appropriate.

6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.2.3.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions.

Table 8.2.2.3.1_A.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.3.1_A.2.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.2.3.1_A.2.5 Test requirement

Table 8.2.2.3.1_A.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2.1 for the throughput test shall meet or exceed the specified value in Table 8.2.2.3.1_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.1_A.2.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		
					Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1	12.6
3MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5	12
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8	12.3
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9	12.4

Table 8.2.2.3.1_A.2.5-2: Test requirement (FRC) based on single carrier performance for CA with 3 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.2.3.1_A.2.5-1 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.2.3.1_A.2.5-1 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

2

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.3.1_A.3 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (4DL CA)

8.2.2.3.1_A.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.2.3.1_A.3.2 Test applicability

This test case applies to all types of E-UTRA TDD UE release 11 and forward of UE categories 8 and onwards that support 4DL Intra-band contiguous CA or 4DL Inter-band CA or 4DL with Intra-band contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Intra-band contiguous CA.

8.2.2.3.1_A.3.3 Minimum conformance requirements

For CA with 4 DL CCs, the requirements are specified in Table 8.2.2.3.1_A.3.3-3, based on single carrier requirement specified in Table 8.2.2.3.1_A.3.3-2, with the addition of the parameters in Table 8.2.2.3.1_A.3.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.2.3.1_A.3.3-1: Test Parameters for Large Delay CDD (FRC) for CA with 4DL CCs

Parameter		Unit	Test 1, 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			PUCCH format 3
PDSCH transmission mode			3
Note 1: $P_B = 1$ Note 2: Void. Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.2.3.1_A.3.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)

1.4MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.2
3MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.6
10 MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.9
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.0

Table 8.2.2.3.1_A.3.3-3: Minimum performance (FRC) based on single carrier performance for CA with 4DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.2.3.1_A.3.3-2per CC	≥8
2	20MHz+20MHz+20MHz+15MHz	As specified in Table 8.2.2.3.1_A.3.3-2per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3

8.2.2.3.1_A.3.4 Test description

8.2.2.3.1_A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select according to Table 8.2.2.3.1_A.3.4.1-1.

CA Capability to be tested: Select according to Table 8.2.2.3.1_A.2.4.1-1.

Table 8.2.2.3.1_A.3.4.1-1: Test point selection for TM3 4DL CA

CA Capability	Bandwidth combination	
	4x20	20+20+20+15
Intra-band contiguous (CA4_C)	Test1	Test2
Inter-band CA (two bands) (CA4_A2)	Test1	Test2
Inter-band CA (three bands) (CA4_A3)	Test1	Test2
Inter-band CA (four bands) (CA4_A4)	Test1	Test2
Intra-band non-contiguous CA (with two sub-blocks) (CA4_N2)	Test1	Test2
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.		

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.60.

2. The parameter settings for the cell are set up according to Table 8.2.2-1 and 8.2.2.3.1_A.3.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1_A.3.4.3.

8.2.2.3.1_A.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.3.1_A.3.4.3.
3. The SS activates SCCs by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. The SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1_A.3.3-1 and 8.2.2.3.1_A.3.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.2.3.1_A.3.5-1 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.2.3.1_A.3.4.3 Message contents

Same as the section 8.2.2.3.1_A.2.4.3.

8.2.2.3.1_A.2.5 Test requirement

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2.1 for the throughput test shall meet or exceed the specified value in Table 8.2.2.3.1_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.1_A.3.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1
3MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9

Table 8.2.2.3.1_A.3.5-2: Test requirement (FRC) based on single carrier performance for CA with 4 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.2.3.1_A.3.5-1per CC	≥8
2	20MHz+20MHz+20MHz+15MHz	As specified in Table 8.2.2.3.1_A.3.5-1per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.3.1A TDD Soft buffer management test

8.2.2.3.1A_A.1 TDD PDSCH Soft buffer management test for CA (2 DL CA)

8.2.2.3.1A_A.1.1 Test purpose

The test purpose is to verify UE performance with proper instantaneous buffer implementation.

8.2.2.3.1A_A.1.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UE of category 3 and 4 which support intra-band contiguous DL CA or inter-band DL CA.

This test applies also to E-UTRA TDD release 11 and forward UE of category 3 and 4 which support intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.3.1A_A.1.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.3.1A_A.1.3-2, with the addition of the parameters in Table 8.2.2.3.1A_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C. The purpose is to verify UE performance with proper instantaneous buffer implementation.

Table 8.2.2.3.1A_A.1.3-1: Test Parameters for soft buffer management (FRC) for CA

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			- (Note 2)
PDSCH transmission mode			3
Note 1: $P_B = 1$ Note 2: PUCCH format 1b with channel selection is used to feedback ACK/NACK. Note 3: For CA test cases, the same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.2.3.1A_A.1.3-2: Minimum performance soft buffer management test (FRC) for CA

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		Cat
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	2x20 MHz	R.30-2 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.2	
2	2x20 MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA5	2x2 Low	70	15.7	
Note 1: The OCNG pattern applies for each CC. Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.1A.

8.2.2.3.1A_A.1.4 Test description

8.2.2.3.1A_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.2.3.1A_A.1.4.1-1

CA Capability to be tested: Select one according to Table 8.2.2.3.1A_A.1.4.1-1

Table 8.2.2.3.1A_A.1.4.1-1: Test point selection soft buffer management tests for CA

CA Capability	Bandwidth combination
	20+20
Inter-band CA (two bands) (CA2_A2)	Test 1 or 2
Intra-band contiguous CA (CA2_C)	Test 1 or 2
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test 1 or 2
Only one test point is tested. Note 1: Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: One of the two tests per table position is selected, depending on UE category.	

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.3.1A_A.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1_A.1.4.3.

8.2.2.3.1A_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.2.3.1A.1.4.3-1. *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.2.3.1_A.1.4.3-1A.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1A_A.1.3-1 and 8.2.2.3.1A_A.1.5-1 or 8.2.2.3.1A_A.1.5-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.1A_A.1.5-1 or 8.2.2.3.1A_A.1.5-2 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-14 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers

8.2.2.3.1A_A.1.4.3 Message contents

Same Message contents as 8.2.2.3.1_A.1.4.3.

8.2.2.3.1A_A.1.5 Test requirement

Table 8.2.2.3.1A_A.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for the throughput test shall meet or exceed the specified value in Tables 8.2.2.3.1A_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.1A_A.1.5-1: Test requirement Large Delay CDD (FRC) for CA

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value			UE Category
						Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band	
1	2x20 MHz	R.30-2 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	14.1	12.6	3
2	2x20 MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA5	2x2 Low	70	16.6	15.1	4
Note 1: The OCNG pattern applies for each CC. Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.									

Decide pass or fail for each subtest according to Annex G.3A.4.

8.2.2.3.1A_A.2 Void

8.2.2.3.1A_A.3 Void

8.2.2.3.1B TDD PDSCH Open Loop Spatial Multiplexing 2x2 - Enhanced Performance Requirement Type C

8.2.2.3.1B.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.2.3.1B.2 Test applicability

This test applies to all types of E-UTRA TDD release 12 and forward UE of Category $\geq$ 2 that support enhanced receiver Type C.

8.2.2.3.1B.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.3.1B.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.1B.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.1B.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Bundling
PDSCH transmission mode			3
Note 1: $P_B = 1$			

Table 8.2.2.3.1B.3-2: Enhanced Performance Requirement Type C, Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11-1 TDD	OP.1 TDD	EVA70	2x2 Medium	70	17.4	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.1B.

8.2.2.3.1B.4 Test description

8.2.2.3.1B.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.3.1B.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.3.1B.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1B.4.3.

8.2.2.3.1B.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1B.3-1 and 8.2.2.3.1B.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.1B.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.1B.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.3.1B.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.2.3.1B.5 Test requirement

Table 8.2.2.3.1B.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.1B.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.1B.5-1: Test requirement for Enhanced Performance Requirement Type C, Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11-1 TDD	OP.1 TDD	EVA70	2x2 Medium	70	18.3	≥2

8.2.2.3.1C TDD PDSCH Open Loop Spatial Multiplexing 2x2 with TM1 Interference – Enhanced Performance Requirement Type C

8.2.2.3.1C.1 Test purpose

The purpose is to verify the performance of open-loop spatial multiplexing performance with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell with transmission mode 1.

8.2.2.3.1C.2 Test applicability

This test applies to all types of E-UTRA TDD release 12 and forward UE of Category 2 or higher that support enhanced receiver Type C.

8.2.2.3.1C.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.3.1C.3-2, with the addition of parameters in Table 8.2.2.3.1C.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.2.3.1C.3-1, Cell 1 is the serving cell, and Cell 2 is interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2 respectively.

Table 8.2.2.3.1C.3-1: Test Parameters for Large Delay CDD (FRC) with TM1 interference

Parameter		Unit	Cell 1	Cell 2
Bandwidth		MHz	10 MHz	
Downlink power allocation	ρ_A	dB	-3	0
	ρ_B		-3 (Note 1)	0
	σ		0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna port 0
Cyclic Prefix			Normal	Normal
Cell ID			0	1
Transmission mode			3	Note 2
N_{oc} at antenna port		dBm/15kHz	-98	N/A
$\hat{E}_s/N_{oc}$ (Note 3)		dB	Reference Value in Table 8.2.2.3.1C.3-2	12.95
Correlation and antenna configuration			Medium (2x2)	Medium(1x2)
Number of OFDM symbols for PDCCH			2	N/A
Max number of HARQ transmissions			4	N/A
Redundancy version coding sequence			{0,1,2,3}	N/A

Note 1: $P_B = 1$
Note 2: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.2 applying OCNG pattern OP.5 TDD as defined in Annex A.5.2.5.
Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.
Note 4: All cells are time-synchronous.
Note 5: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.2.3.1C.3-2: Enhanced Performance Requirement Type C, Large Delay CDD (FRC) with TM1 interference

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-10 TDD	OP.1 TDD	OP.5 TDD	EVA70	EVA70	70	19.6	≥2

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s/N_{oc}$ of Cell 1.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.1C.

8.2.2.3.1C.4 Test description

8.2.2.3.1C.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.3.1C.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.62.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.2.2.3.1C.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1C.4.3.

8.2.2.3.1C.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1C.5-1 and 8.2.2.3.1C.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 according to Table 8.2.2.3.1C.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.1C.5-1 and Table 8.2.2.3.1C.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.1C.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.3.1C.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.2.3.1C.5 Test requirement

Table 8.2.2.3.1C.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.1C.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.1C.5-1: Test Parameters for Large Delay CDD (FRC) with TM1 interference

Parameter		**Unit**	**Cell 1**	**Cell 2**
Bandwidth		MHz	10 MHz	
Downlink power allocation	ρ_A	dB	-3	0
	ρ_B		-3 (Note 1)	0
	σ		0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna port 0
Cyclic Prefix			Normal	Normal
Cell ID			0	1
Transmission mode			3	Note 2
N_{oc} at antenna port		dBm/15kHz	-98	N/A
$\hat{E}_s / N_{oc}$ (Note 3)		dB	Reference Value in Table 8.2.2.3.1C.5-2	13.75
Correlation and antenna configuration			Medium (2x2)	Medium(1x2)
Number of OFDM symbols for PDCCH			2	N/A
Max number of HARQ transmissions			4	N/A
Redundancy version coding sequence			{0,1,2,3}	N/A
Note 1: $P_B = 1$				
Note 2: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.2 applying OCNG pattern OP.5 TDD as defined in Annex A.5.2.5.				
Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.				
Note 4: All cells are time-synchronous.				
Note 5: SIB-1 will not be transmitted in Cell2 in this test.				

Table 8.2.2.3.1C.5-2: Test requirement for Enhanced Performance Requirement Type C, Large Delay CDD (FRC) with TM1 interference

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-10 TDD	OP.1 TDD	OP.5 TDD	EVA70	EVA70	70	21.5	≥2
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: SNR corresponds to $\bar{E}_s/N_{oc}$ of Cell 1.								

8.2.2.3.2 TDD PDSCH Open Loop Spatial Multiplexing 4x2

8.2.2.3.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using large delay CDD.

8.2.2.3.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 8 and forward UE of category ≥ 2.

8.2.2.3.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.2.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.2.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Bundling
PDSCH transmission mode			3
Note 1: $P_B = 1$			

Table 8.2.2.3.2.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.14 TDD	OP.1 TDD	EVA70	4x2 Low	70	14.2	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.

8.2.2.3.2.4 Test description

8.2.2.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.3.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.3.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.2.4.3.

8.2.2.3.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.2.3-1 and 8.2.2.3.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions.

Table 8.2.2.3.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.3.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power for Test number 1

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm3	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.2.3.2.5 Test requirement

Table 8.2.2.3.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.2.5-1: Test requirement Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.14 TDD	OP.1 TDD	EVA70	4x2 Low	70	15.1	≥2

8.2.2.3.3_C TDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC

8.2.2.3.3_C.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC (non-MBSFN ABS)

8.2.2.3.3_C.1.1 Test purpose

To verify the UE's performance of large delay CDD with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.2.2.3.3_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.2.3.3_C.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.3_C.1.3-1,and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

The requirements for non-MBSFN ABS are specified in Table 8.2.2.3.3_C.1.3-2, with the addition of parameters in Table 8.2.2.3.3_C.1.3-1and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.3_C.1.3-2for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.3_C.1.3-1: Test Parameters for Large Delay CDD (FRC) – non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.3.3_C.1.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Cell Id			0	1
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0000010001, 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001, 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000010001, 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			2	2
ACK/NACK feedback mode			Multiplexing	N/A
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.2.3.3_C.1.3-2: Minimum performance Large Delay CDD (FRC) – non-MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11 TDD Note 4	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	14.0	2-8

Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.

Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1.

Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.

Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.

Note 5: The maximum Throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.3.

8.2.2.3.3_C.1.4 Test description

8.2.2.3.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.3.3_C.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.2.2.3.3_C.1.3-1 as appropriate.
3. Downlink signa3ls are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.3_C.1.4.3.

8.2.2.3.3_C.1.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.2.2.3.3_C.1.5-1 and 8.2.2.3.3_C.1.5-2 , C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2.
2. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.2.3.3_C.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.3.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.2.2.3.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.2.2.3.3_C.1.5 Test requirement

Table 8.2.2.3.3_C.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.3_C.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.3_C.1.5-1: Test Parameters for Large Delay CDD (FRC) non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102.1 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.9 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.3.3_C.1.5-2	5.8
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Cell Id			0	1
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0000010001, 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001, 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000010001, 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			2	2
ACK/NACK feedback mode			Multiplexing	N/A
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.2.3.3_C.1.5-2: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11 TDD Note 4	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	14.9	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									
Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.									
Note 5: The maximum Throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.									

8.2.2.3.3_C.2 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC (MBSFN ABS)

8.2.2.3.3_C.2.1 Test purpose

To verify the UE's performance of large delay CDD with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.2.2.3.3_C.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.2.3.3_C.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.3_C.2.3-1and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

The requirements for MBSFN ABS are specified in Table 8.2.2.3.3_C.2.3-2, with the addition of parameters in Table 8.2.2.3.3_C.2.3-1and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.3_C.2.3-2for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.3_C.2.3-1: Test Parameters for Large Delay CDD (FRC) – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.3.3_C.2.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Cell Id			0	126
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000000001 0000000001	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A
MBSFN Subframe Allocation (Note 10)			N/A	000010
Number of control OFDM symbols			2	2
ACK/NACK feedback mode			Multiplexing	N/A
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10,#11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbol #0 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14]. The 10th and 20th subframes indicated by ABS pattern are MBSFN ABS subframes.
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.
Note 10: MBSFN Subframe Allocation as defined in [5], one frame with 6 bits is chosen for MBSFN subframe allocation.

Table 8.2.2.3.3_C.2.3-2: Minimum performance Large Delay CDD (FRC) – MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11 TDD Note 4	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	12.2	2-8

Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.

Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.

Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.

Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.

Note 5: The maximum Throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.3.

8.2.2.3.3_C.2.4 Test description

8.2.2.3.3_C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.3.3_C.2.3-2, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.2.2.3.3_C.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.3_C.2.4.3.

8.2.2.3.3_C.2.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.2.2.3.3_C.2.5-1, 8.2.2.3.3_C.2.5-2, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2.
2. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.3_C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.2.3.3_C.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.3.3_C.2.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.2.2.3.3_C.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001110001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 8.2.2.3.3_C.2.4.3-4: *SystemInformationBlockType3* exceptions

Derivation Path: 36.508 [7] clause 4.6.2, Table 4.4.3.3-2 SystemInformationBlockType3			
Information Element	**Value/remark**	**Comment**	**Condition**
neighCellConfig	'00'B (Not all neighbour cells have the same MBSFN subframe allocation as the serving cell)		

8.2.2.3.3_C.2.5 Test requirement

Table 8.2.2.3.3_C.2.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.3_C.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.3_C.2.5-1: Test Parameters for Large Delay CDD (FRC) – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102.1 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.9 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.3.3_C.2.5-2	5.8
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Cell Id			0	126
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000000001 0000000001	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A
MBSFN Subframe Allocation (Note 10)			N/A	000010
Number of control OFDM symbols			2	2
ACK/NACK feedback mode			Multiplexing	N/A
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10,#11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbol #0 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14]. The 10th and 20th subframes indicated by ABS pattern are MBSFN ABS subframes.
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.
Note 10: MBSFN Subframe Allocation as defined in [5], one frame with 6 bits is chosen for MBSFN subframe allocation.

Table 8.2.2.3.3_C.2.5-2: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%) Note 5	SNR (dB) (Note 2)	
1	R.11 TDD Note 4	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	13.1	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent. Note 2: SNR corresponds to of cell 1. Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2. Note 4: Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel. Note 5: The maximum Throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.									

8.2.2.3.3_D

8.2.2.3.3_E TDD PDSCH Open Loop Spatial Multiplexing 2x2 for feICIC

8.2.2.3.3_E.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for feICIC (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured, non-MBSFN ABS)

8.2.2.3.3_E.1.1 Test purpose

To verify the UE's performance of large delay CDD with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cells with CRS assistance information.

8.2.2.3.3_E.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE and CRS interference handling and ss-CCH interference handling – Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.2.2.3.3_E.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.3_E.1.3-1,and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

The requirements for non-MBSFN ABS are specified in Table 8.2.2.3.3_E.1.3-2, with the addition of parameters in Table 8.2.2.3.3_E.1.3-1and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.3_E.1.3-2for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.3_E.1.3-1: Test Parameters for Large Delay CDD (FRC) – non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.3.3_E.1.3-2	Reference Value in Table 8.2.2.3.3_E.1.3-2	Reference Value in Table 8.2.2.3.3_E.1.3-2
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	1	126
ABS pattern (Note 5)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
ACK/NACK feedback mode			Multiplexing	N/A	N/A
PDSCH transmission mode			3	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.
Note 10: The number of the CRS ports in Cell1, Cell2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell2 and Cell 3 in this test.

Table 8.2.2.3.3_E.1.3-2: Minimum performance Large Delay CDD (FRC) – non-MBSFN ABS

Test Number	Reference Channel	$\hat{E}_s/N_{oc2}$		OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11 TDD (Note 4)	9	7	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	70	14.2	≥2
2	R.35 TDD (Note 4)	9	1	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	70	22.7	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s/N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.3.

8.2.2.3.3_E.1.4 Test description

8.2.2.3.3_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.3.3_E.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.2.2.3.3_E.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.2.2.3.3_E.1.4.3.

8.2.2.3.3_E.1.4.2 Test procedure

1. Set the parameters for Cell1, Cell2 and Cell3 according to Tables 8.2.2.3.3_E.1.5-1, 8.2.2.3.3_E.1.5-2 and C.3.3-2 of Annex C.3.3 as appropriate. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2.
2. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.3_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.2.2.3.3_E.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.3.3_E.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.2A.5, Table 5.2A.5.1.1-2 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	1		Cell 2
	126		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.2.2.3.3_E.1.4.3-3: PhysicalConfigDedicated-DEFAULT: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.2.3.3_E.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.2.2.3.3_E.1.5 Test requirement

Table 8.2.2.3.3_E.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.3_E.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.3_E.1.5-1: Test Parameters for Large Delay CDD (FRC) – non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.3.3_E.1.5-2	Reference Value in Table 8.2.2.3.3_E.1.5-2	Reference Value in Table 8.2.2.3.3_E.1.5-2
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	1	126
ABS pattern (Note 5)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
ACK/NACK feedback mode			Multiplexing	N/A	N/A
PDSCH transmission mode			3	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.
Note 10: The number of the CRS ports in Cell1, Cell2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell2 and Cell 3 in this test.

Table 8.2.2.3.3_E.1.5-2: Test Parameters for Large Delay CDD (FRC) non-MBSFN ABS

Test Number	Reference Channel	$\hat{E}_s/N_{oc2}$		OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11 TDD (Note 4)	8.8	6.8	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	70	15.1	≥2
2	R.35 TDD (Note 4)	8.8	0.8	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	70	23.6	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s/N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.

8.2.2.4 TDD PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.2.4.1 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2

8.2.2.4.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed loop spatial multiplexing with wideband and frequency selective precoding.

8.2.2.4.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.2.2.4.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.4.1.3-1 and 8.2.2.4.1.3-3 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.4.1.3-2 and 8.2.2.4.1.3-4 for the specified SNR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.2.4.1.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Precoding granularity		PRB	6	50
PMI delay (Note 2)		ms	10 or 11	10 or 11
Reporting interval		ms	1 or 4 (Note 3)	1or 4 (Note 3)
Reporting mode			PUSCH 1-2	PUSCH 3-1
CodeBookSubsetRestriction bitmap			001111	001111
ACK/NACK feedback mode			Multiplexing	Multiplexing
PDSCH transmission mode			4	4

Note 1: $P_B = 1$
Note 2: If the UE reports in an available uplink reporting instance at SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms

Table 8.2.2.4.1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 TDD	OP.1 TDD	EVA5	2x2 Low	70	-3.1	1-5
2	10 MHz	R.10 TDD	OP.1 TDD	EPA5	2x2 High	70	-2.8	1-5

Table 8.2.2.4.1.3-3: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 3	Test 4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Precoding granularity		PRB	50	50
PMI delay (Note 2)		ms	10 or 11	10 or 11
Reporting interval		ms	1 or 4 (Note 3)	1 or 4 (Note 3)
Reporting mode			PUSCH 3-1	PUSCH 3-1
ACK/NACK feedback mode			Bundling	Bundling
CodeBookSubsetRestriction bitmap			110000	110000
PDSCH transmission mode			4	4

Note 1: $P_B = 1$
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms

Table 8.2.2.4.1.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.11-1 TDD	OP.1 TDD	EVA5	2x2 Low	70	12.8	2-5
4	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	13.9	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.1.4 Test description

8.2.2.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.4.1.3-2 and 8.2.2.4.1.3-4 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.4.1.3-1 and 8.2.2.4.1.3-3 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.1.4.3.

8.2.2.4.1.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.1.3-1 and 8.2.2.4.1.3-2. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.1.3-3 and 8.2.2.4.1.3-4. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.2.4.1.5-1 and 8.2.2.4.1.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.2.4.1.5-1 and 8.2.2.4.1.5-2 as appropriate.

8.2.2.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.4.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation for Test number 1,2

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	001111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3,4

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	110000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.1.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop single -layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.1.4.3-4: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation for Test number 2, 3, 4

Derivation Path: 36.508 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.1.4.3-5: PUCCH-ConfigDedicated-DEFAULT: Additional TDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation for Test number 3, 4

Derivation Path: 36.508 Table 4.6.3-9			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
tddAckNackFeedbackMode	bundling		
}			

8.2.2.4.1.5 Test requirement

Tables 8.2.2.4.1.3-1 and 8.2.2.4.1.3-3 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.4.1.5-1 and 8.2.2.4.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 TDD	OP.1 TDD	EVA5	2x2 Low	70	-2.2	1-5
2	10 MHz	R.10 TDD	OP.1 TDD	EPA5	2x2 High	70	-2.0	1-5

Table 8.2.2.4.1.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.11-1 TDD	OP.1 TDD	EVA5	2x2 Low	70	13.7	2-5
4	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	14.8	2-5

8.2.2.4.1_1 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 (Release 9 and forward)

8.2.2.4.1_1.1 Test purpose

Same test purpose as in clause 8.2.2.4.1.1.

8.2.2.4.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.2.2.4.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.4.1.3 with the following exceptions:

- Instead of Table 8.2.2.4.1.3-2 → use Table 8.2.2.4.1_1.3-1.
- Instead of Table 8.2.2.4.1.3-4 → use Table 8.2.2.4.1_1.3-2.

Table 8.2.2.4.1_1.3-1: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 TDD	OP.1 TDD	EVA5	2x2 Low	70	-3.1	≥1
2	10 MHz	R.10 TDD	OP.1 TDD	EPA5	2x2 High	70	-2.8	≥1

Table 8.2.2.4.1_1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.35 TDD	OP.1 TDD	EPA5	2x2 Low	70	19.5	≥2
4	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	13.9	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.1_1.4 Test description

Same test description as in clause 8.2.2.4.1.4 with the following exceptions:

- Instead of Table 8.2.2.4.1.3-2 → use Table 8.2.2.4.1_1.3-1.
- Instead of Table 8.2.2.4.1.3-4 → use Table 8.2.2.4.1_1.3-2.
- Instead of Table 8.2.2.4.1.5-1 → use Table 8.2.2.4.1_1.5-1.
- Instead of Table 8.2.2.4.1.5-2 → use Table 8.2.2.4.1_1.5-2.

8.2.2.4.1_1.5 Test requirement

Same test requirements as in clause 8.2.2.4.1.5 with the following exceptions:

- Instead of Table 8.2.2.4.1.5-1 → use Table 8.2.2.4.1_1.5-1.
- Instead of Table 8.2.2.4.1.5-2 → use Table 8.2.2.4.1_1.5-2.

Table 8.2.2.4.1_1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 TDD	OP.1 TDD	EVA5	2x2 Low	70	-2.2	≥1
2	10 MHz	R.10 TDD	OP.1 TDD	EPA5	2x2 High	70	-2.0	≥1

Table 8.2.2.4.1_1.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.35 TDD	OP.1 TDD	EPA5	2x2 Low	70	+20.4	≥2
4	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	+14.8	≥2

8.2.2.4.1_A to D

8.2.2.4.1_E TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 for feICIC

8.2.2.4.1_E.1 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)

8.2.2.4.1_E.1 Test purpose

To verify The purpose is to verify the closed loop rank-one performance with wideband precoding if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [14] of the aggressor cell with CRS assistance information.

8.2.2.4.1_E.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE and CRS interference handling and ss-CCH interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.2.2.4.1_E.1.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.4.1_E.1.3-2, with the addition of parameters in Table 8.2.2.4.1_E.1.3-1. In Table 8.2.2.4.1_E.1.3-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information TS 36.331 [5] includes Cell 2 and Cell 3.

Table 8.2.2.4.1_E.1.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.4.1_E.1.3-2	12	10
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 5)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
ACK/NACK feedback mode			Multiplexing	N/A	N/A
PDSCH transmission mode			6	Note 9	Note 9
Precoding granularity		PRB	50	N/A	N/A
PMI delay (Note 10)		ms	10 or 11	N/A	N/A
Reporting interval		ms	1 or 4 (Note 11)	N/A	N/A
Reporting mode			PUSCH 3-1	N/A	N/A
CodeBookSubsetRestriction bitmap			1111	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.
Note 10: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 11: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.
Note 12: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 13: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.2.4.1_E.1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)(Note 5)	SNR (dB) (Note 3)	
1	R.11 TDD (Note 4)	OP.1 TDD	OP.1 FDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 High	70	6.4	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.1C.

8.2.2.4.1_E.1.4 Test description

8.2.2.4.1_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.4.1_E.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Tables 8.2.2.4.1_E.1.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.2.2.4.1_E.1.4.3.

8.2.2.4.1_E.1.4.2 Test procedure

1. Set the parameters for Cell 1, Cell 2 and Cell 3, according to Tables 8.2.2.4.1_E.1.5-1, 8.2.2.4.1_E.1.5-2, and C.3.3.2 of Annex C.3.3. SS transmits PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC.

2. The SS sends downlink MAC padding bits on the DL RMC. Propagation conditions are set according to Annex B clause B.2

3. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

4. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.4.1_E.1.5-2 as appropriate.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.4.1_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.2.2.4.1_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.2A.5, Table 5.2A.5.1.1-2 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.2.2.4.1_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.2.4.1_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'1100111000 1100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 8.2.1.4.1_E.1.4.3-4: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.1_E.1.4.3-3-5: TDD-Config-DEFAULT: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 8.2.1.4.1_E.1.4.3-3-6: PUCCH-ConfigDedicated-DEFAULT: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing		
}			

8.2.2.4.1_E.1.5 Test requirement

Table 8.2.2.4_E.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.2.4.1_E.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.1_E.1.5-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 4)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.4.1_E.1.5-2	11.8	9.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 5)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
ACK/NACK feedback mode			Multiplexing	N/A	N/A
PDSCH transmission mode			6	Note 9	Note 9
Precoding granularity		PRB	50	N/A	N/A
PMI delay (Note 10)		ms	10 or 11	N/A	N/A
Reporting interval		ms	1 or 4 (Note 11)	N/A	N/A
Reporting mode			PUSCH 3-1	N/A	N/A
CodeBookSubsetRestriction bitmap			1111	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14].
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.
Note 10: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 11: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.
Note 12: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 13: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.2.4.1_E.1.5-2: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 3)	
1	R.11 TDD (Note 4)	OP.1TDD	OP.1FDD	OP.1TDD	EPA5	EPA5	EPA5	2x2 High	70	7.3	≥2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.
Note 4: Cell 1 reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: The maximum throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.

8.2.2.4.1_H TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 for 256QAM in DL

8.2.2.4.1_H.1 Test purpose

Same test purpose as defined in clause 8.2.2.4.1.1.

8.2.2.4.1_H.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward that support 256QAM in DL.

8.2.2.4.1_H.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.4.1_H-2, with the addition of the parameters in Table 8.2.2.4.1_H-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

Table 8.2.2.4.1_H.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1-2	Test 3
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Precoding granularity		PRB	50	8
PMI delay (Note 2)		ms	10 or 11	10 or 11
Reporting interval		ms	1 or 4 (Note 3)	1 or 4 (Note 3)
Reporting mode			PUSCH 3-1	PUSCH 1-2
ACK/NACK feedback mode			Bundling	Bundling
CodeBookSubsetRestriction bitmap			110000	110000
PDSCH transmission mode			4	4
Number of OFDM symbols for PDCCH per component carrier		OFDM symbol	2	1

Note 1: $P_B = 1$.

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.

Table 8.2.2.4.1_H.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)		
3	20 MHz 256QAM	R. 65 TDD	OP.1 TDD	EVA5	2x2 Low	70	24.9	11-12	≥11

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.2.

8.2.2.4.1_H.4 Test description

8.2.2.4.1_H.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.4.1_H.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.4.1_H.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.1_H.4.3.

8.2.2.4.1_H.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.1_H.3-1 and 8.2.2.4.1_H.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.4.1_H.5-1 as appropriate.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.2.4.1_H.5-1 as appropriate.

8.2.2.4.1_H.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.4.1_H.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	110000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.1_H.4.3-2: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3

Derivation Path: 36.508 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.1_H.4.3-3: PUCCH-ConfigDedicated-DEFAULT: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3

Derivation Path: 36.508 Table 4.6.3-9			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
tddAckNackFeedbackMode	bundling		
}			

8.2.2.4.1_H.5 Test requirement

Table 8.2.2.4.1_H.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.4.1_H.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.1_H.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)		
3	20 MHz 256QAM	R. 65 TDD	OP.1 TDD	EVA5	2x2 Low	70	25.8	11-12	≥11

8.2.2.4.2 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 4x2

8.2.2.4.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using closed loop spatial multiplexing with wideband and frequency selective precoding.

8.2.2.4.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.2.2.4.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.4.2.3-1 and 8.2.2.4.2.3-3 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.4.3-2 and 8.2.2.4.2.3-4 for the specified SNR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.2.4.2.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			0000000000000 0000000000000 0000000000000 0000000001111 111111111111
ACK/NACK feedback mode			Multiplexing
PDSCH transmission mode			4
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4) Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms			

Table 8.2.2.4.2.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	EVA5	4x2 Low	70	-3.5	1-5

Table 8.2.2.4.2.3-3: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
ACK/NACK feedback mode			Bundling
CodeBookSubsetRestriction bitmap			0000000000000 0000000000000 0000001111111 1111111110000 000000000000
PDSCH transmission mode			4
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4) Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms			

Table 8.2.2.4.2.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.14 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.2.4 Test description

8.2.2.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.4.2.3-2 and 8.2.2.4.2.3-4 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.4.2.3-1 and 8.2.2.4.2.3-3 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.2.4.3.

8.2.2.4.2.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2.3-1 and 8.2.2.4.2.3-2. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2.3-3 and 8.2.2.4.2.3-4. The SS sends downlink MAC padding bits on the DL RMC.

2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.2.4.2.5-1 and 8.2.2.4.2.5-2 as appropriate.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.2.4.2.5-1 and 8.2.2.4.2.5-2 as appropriate.

8.2.2.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.4.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop spatial multiplexing performance downlink power allocation for Test numbers 1,2

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.4.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000000000000 00000001111111111111 1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 2

Derivation Path: 36.508 Table 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000000011111111111111111000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.2.4.3-4: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation for Test number 1, 2

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.2.4.3-5: *PUCCH-ConfigDedicated-DEFAULT:* Additional TDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation for Test number 2

Derivation Path: 36.508 Table 4.6.3-9			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
tddAckNackFeedbackMode	bundling		
}			

8.2.2.4.2.5 Test requirement

Tables 8.2.2.4.2.3-1 and 8.2.2.4.2.3-3 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.4.2.5-1 and 8.2.2.4.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.2.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	EVA5	4x2 Low	70	-2.6	1-5

Table 8.2.2.4.2.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.14 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	2-5

8.2.2.4.2_1 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 4x2 (Release 9 and forward)

8.2.2.4.2_1.1 Test purpose

Same test purpose as in clause 8.2.2.4.2.1.

8.2.2.4.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.2.2.4.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.4.2.3 with the following exceptions:

- Instead of Table 8.2.2.4.2.3-2 → use Table 8.2.2.4.2_1.3-1.
- Instead of Table 8.2.2.4.2.3-4 → use Table 8.2.2.4.2_1.3-2.

Table 8.2.2.4.2_1.3-1: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	EVA5	4x2 Low	70	-3.5	≥1

Table 8.2.2.4.2_1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.36 TDD	OP.1 TDD	EPA5	4x2 Low	70	15.7	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.2_1.4 Test description

Same test description as in clause 8.2.2.4.2.4 with the following exceptions:

- Instead of Table 8.2.2.4.2.3-2 → use Table 8.2.2.4.2_1.3-1.
- Instead of Table 8.2.2.4.2.3-4 → use Table 8.2.2.4.2_1.3-2.
- Instead of Table 8.2.2.4.2.5-1 → use Table 8.2.2.4.2_1.5-1.
- Instead of Table 8.2.2.4.2.5-2 → use Table 8.2.2.4.2_1.5-2.

8.2.2.4.2_1.5 Test requirement

Same test requirements as in clause 8.2.2.4.2.5 with the following exceptions:

- Instead of Table 8.2.2.4.2.5-1 → use Table 8.2.2.4.2_1.5-1.
- Instead of Table 8.2.2.4.2.5-2 → use Table 8.2.2.4.2_1.5-2.

Table 8.2.2.4.2_1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	EVA5	4x2 Low	70	-2.6	≥1

Table 8.2.2.4.2_1.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.36 TDD	OP.1 TDD	EPA5	4x2 Low	70	+16.6	≥2

8.2.2.4.2_A TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA

8.2.2.4.2_A.1 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (2DL CA)

8.2.2.4.2_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.2.4.2_A.1.2 Test applicability

E-UTRA TDD release 10 and forward UE of category 5 or higher that supports inter-band OR intra-band contiguous DL CA

This test also applies to E-UTRA TDD release 11 and forward UE of category 5 or higher that supports intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.4.2_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.2.4.2_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.4.2_A.1.3-2 for the specified SNR. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

For CA with 2 DL CCs except for 2x20MHz, the requirements are specified in Table 8.2.2.4.2_A.1.3-4, based on single carrier requirement specified in Table 8.2.2.4.2_A.1.3-3.

Table 8.2.2.4.2_A.1.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing for CA

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	8
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
ACK/NACK feedback mode			PUCCH format 1b with channel selection
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111000000000000000
CSI request field (Note 4)			'10'
PDSCH transmission mode			4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.
Note 4: Multiple CC-s under test are configured as the 1st set of serving cells by high layers.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.2.4.2_A.1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC) for CA

Test number	Band width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	2x20 MHz	R.43 TDD	OP.1 TDD (Note 1)	EVA5	4x2 Low	70	11.1	≥5
2	20MHz +15MHz	R.43 TDD for 20MHz CC	OP.1 TDD (Note 1)	EVA5	4x2 Low	70	10.7	≥5
		R.43-5TDD for 15MHz CC	OP.1 TDD (Note 1)	EVA5		70	10.6	

Note 1: The OCNG pattern applies for each CC
Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.2_A.1.4 Test description

8.2.2.4.2_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.2.4.2_A.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.2.3.1_A.1.4.1

Table 8.2.2.4.2_A.1.4.1-1: Test point selection for TM4 2DLCA

CA Capability	Bandwidth Combination	
	20+20	20+15
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2
Intra-band contiguous CA (CA2_C)	Test 1	Test 2
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test 1	Test 2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group 46 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.2.4.2_A.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.2_A.1.4.3.

8.2.2.4.2_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-2, *CQI-ReportConfigSCell-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-6.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2_A.1.3-1 and 8.2.2.4.2_A.1.3-2 or 8.2.2.3.1_A.1.3-4. The SS sends downlink MAC padding bits on the DL RMC.
5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to ‘10’ and I_MCS=29 and N_PRB allocated to be less or equal to 20.
6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.2.4.2_A.1.5-1 or 8.2.2.4.2_A.1.5-2 as appropriate.
7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.4.2_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions:

Table 8.2.2.4.2_A.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.4.2_A.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.2_A.1.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000 00000000000011111111 11111111000000000000 0000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			

Table 8.2.2.4.2_A.1.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.2_A.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			RBC
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.2.4.2_A.1.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.2.4.2_A.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.2.4.2_A.1.4.3-7: *PUSCH-ConfigDedicated-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.2.2.4.2_A.1.5 Test requirement

Tables 8.2.2.4.2_A.1.3-1 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.2.4.2_A.1.5-1 or 8.2.2.4.2_A.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.2_A.1.5-1: Test requirement for Multi-Layer Spatial Multiplexing (FRC) for CA

Test number	Band width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value			UE Cate
						Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band	
1	2x20 MHz	R.43 TDD	OP.1 TDD (Note 1)	EVA5	4x2 Low	70	12.0	10.5	≥5
2	20MHz+15MHz	R.43 TDD for 20MHz CC	OP.1 TDD (Note 1)	EVA5	4x2 Low	70	11.6	10.1	≥5
		R.43-5 TDD for 15MHz CC	OP.1 TDD (Note 1)	EVA5		70	11.5	10	
Note 1: For CA capable UE, the OCNG pattern applies for each CC Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.4.2_A.2 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (3DL CA)

8.2.2.4.2_A.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.2.4.2_A.2.2 Test applicability

This test case applies to all types of E-UTRA TDD release 10 and forward UE of category 5 or higher that support 3DL Intra-band contiguous CA or 3DL Inter-band CA, or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA TDD release 11 and forward UE of category 5 or higher that support 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.4.2_A.2.3 Minimum conformance requirements

For CA with 3 DL CCs, the requirements are specified in Table 8.2.2.4.2_A.2.3-3, based on single carrier requirement specified in Table 8.2.2.4.2_A.2.3-2, with the addition of the parameters in Table 8.2.2.4.2_A.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Table 8.2.2.4.2_A.2.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Test 3, 4
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	8
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
ACK/NACK feedback mode			PUCCH format 3
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111110000000000000000
CSI request field (Note 4)			'10'
PDSCH transmission mode			4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.
Note 4: Multiple CC-s under test are configured as the 1st set of serving cells by high layers.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.2.4.2_A.2.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.0
3MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	9.8
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.0
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.5
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.6
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7

Table 8.2.2.4.2_A.2.3-3: Minimum performance (FRC) based on single carrier performance for CA with 3 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.2.4.2_A.2.3-2 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.2.4.2_A.2.3-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4

8.2.2.4.2_A.2.4 Test description

8.2.2.4.2_A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.2.4.2_A.2.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.2.4.2_A.2.4.1-1.

Table 8.2.2.4.2_A.2.4.1-1: Test point selection for TM4 3DL CA

CA Capability	Bandwidth combination	
	3x20	20+20+15
Intra-band contiguous (CA3_C)	Test1	Test2
Inter-band CA (two bands) (CA3_A2)	Test1	Test2
Inter-band CA (three bands) (CA3_A3)	Test1	Test2
Intra-band non-contiguous CA (with two sub-blocks) (CA3_N2)	Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 8.2.2-1 and 8.2.2.4.1_A.2.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.2_A.2.4.3.

8.2.2.4.2_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.4.2_A.2.4.3.

3. The SS activates SCCs by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.

4. The SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2_A.2.3-1 and 8.2.2.4.2_A.2.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. The SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.2.4.2_A.2.5-1 as appropriate.

7. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.2.4.2_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 8.2.2.4.2_A.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.4.2_A.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000111111111111111110000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.2.4.2_A.2.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000000000000000000011111111111111110000000000000000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 8.2.2.4.2_A.2.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			RBC
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.2_A.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.2.4.2_A.2.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11100000	P-Cell, S-Cells report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.2.4.2_A.2.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.2.4.2_A.2.4.3-7: *PUSCH-ConfigDedicated-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.2.2.4.2_A.2.5 Test requirement

Table 8.2.2.4.2_A.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2.2 for the throughput test shall meet or exceed the specified value in Table 8.2.2.4.2_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.2_A.2.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		
					Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9	10.4
3MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	9.2
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9	9.4
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.	9.5
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5	10
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	10.1

Table 8.2.2.4.2_A.2.5-2: Test requirement (FRC) based on single carrier performance for CA with 3 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.2.2.4.2_A.2.5-1 per CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.2.2.4.2_A.2.5-1 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.4.2_A.3 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (4DL CA)

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The feedback mode in table 8.2.2.4.2_A.3.3-1 is not defined for 4DL CA in RAN4 Spec. TS36.101.

8.2.2.4.2_A.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.2.4.2_A.3.2 Test applicability

This test case applies to all types of E-UTRA TDD release 11 and forward UE of category 8 or higher that support 4DL Intra-band contiguous CA or 4DL Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA, or 4DL with Intra-band non-contiguous and Inter-band CA, or 4DL with Intra-band non-contiguous and Intra-band contiguous CA, or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

8.2.2.4.2_A.3.3 Minimum conformance requirements

For CA with 4 DL CCs, the requirements are specified in Table 8.2.2.4.3_A.3.3-3, based on single carrier requirement specified in Table 8.2.2.4.2_A.3.3-2, with the addition of the parameters in Table 8.2.2.4.2_A.3.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.2.2.4.2_A.3.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	8
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
ACK/NACK feedback mode			[TBD]
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111000000000000000
CSI request field (Note 4)			'10'
PDSCH transmission mode			4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.
Note 4: Multiple CC-s under test are configured as the 1st set of serving cells by high layers.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.2.4.2_A.3.3-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.0
3MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	9.8
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.0
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.5
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.6
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7

Table 8.2.2.4.2_A.3.3-3: Minimum performance (FRC) based on single carrier performance for CA with 4 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.2.4.2_A.3.3-2 per CC	≥8
2	20MHz+20MHz+20MHz+15MHz	As specified in Table 8.2.2.4.2_A.3.3-2 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4

8.2.2.4.2_A.3.4 Test description

8.2.2.4.2_A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.2.4.2_A.3.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.2.4.2_A.3.4.1-1.

Table 8.2.2.4.2_A.3.4.1-1: Test point selection for TM4 4DL CA

CA Capability	Bandwidth combination	
	4x20	20+20+20+15
Intra-band contiguous (CA4_C)	Test1	Test2
Inter-band CA (two bands) (CA4_A2)	Test1	Test2
Inter-band CA (three bands) (CA4_A3)	Test1	Test2
Inter-band CA (four bands) (CA4_A4)	Test1	Test2
Intra-band non-contiguous CA (with two sub-blocks) (CA4_N2)	Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61.
2. The parameter settings for the cell are set up according to Table 8.2.2-1 and 8.2.2.4.1_A.3.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.2_A.3.4.3.

8.2.2.4.2_A.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.4.2_A.3.4.3.
3. The SS activates SCCs by sending the MAC-CE according to TS 36.321 [13] clauses 5.13 and 6.1.3.8. Wait for at least 2 seconds as per TS 36.133 [4] clause 8.3.3.2.
4. The SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2_A.3.3-1 and 8.2.2.4.2_A.3.3-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. The SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to ‘10’ and I_MCS=29 and N_PRB allocated to be less or equal to 20.
6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.2.4.2_A.3.5-1 as appropriate.
7. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.2.4.2_A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6 with the following exceptions:

Table 8.2.2.4.2_A.3.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.4.2_A.3.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.2.4.2_A.3.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000 00000000000011111111 11111111000000000000 0000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 8.2.2.4.2_A.3.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			RBC
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.2_A.3.4.3-4: *CQI-ReportConfig-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.2.4.2_A.3.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11100000	P-Cell, S-Cells report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.2.4.2_A.3.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.2.4.2_A.3.4.3-7: *PUSCH-ConfigDedicated-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.2.2.4.2_A.3.5 Test requirement

Table 8.2.2.4.2_A.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2.2 for the throughput test shall meet or exceed the specified value in Table 8.2.2.4.2_A.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.2_A.3.5-1: Single carrier performance for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9
3MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6

Table 8.2.2.4.2_A.3.5-2: Test requirement (FRC) based on single carrier performance for CA with 4 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.2.2.4.2_A.3.5-1 per CC	≥8
2	20MHz+20MHz+20MHz+15MHz	As specified in Table 8.2.2.4.2_A.3.5-1 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.4.2A TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 – Enhanced Performance Requirement Type C

8.2.2.4.2A.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed loop rank-two spatial multiplexing with wideband and frequency selective precoding.

8.2.2.4.2A.2 Test applicability

This test applies to all types of E-UTRA TDD release 12 and forward UE of Category ≥ 2 that support enhanced receiver Type C.

8.2.2.4.2A.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.4.2A.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.4.2A.3-2 for the specified SNR.

Table 8.2.2.4.2A.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	50
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 3-1
ACK/NACK feedback mode			Bundling
CodeBookSubsetRestriction bitmap			110000
PDSCH transmission mode			4

Note 1: $P_B = 1$.

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.

Table 8.2.2.4.2A.3-2: Enhanced Performance Requirement Type C, Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Medium	70	17.8	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.2A.

8.2.2.4.2A.4 Test description

8.2.2.4.2A.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.4.2A.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.4.2A.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.2A.4.3.

8.2.2.4.2A.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2A.3-1 and 8.2.2.4.2A.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.4.2A.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.4.2A.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.4.2A.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	110000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.2A.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.2A.4.3-3: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 Table 4.6.3-9			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
tddAckNackFeedbackMode	bundling		
}			

8.2.2.4.2A.5 Test requirement

Table 8.2.2.4.2A.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.4.2A.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.2A.5-1: Test requirement for Enhanced Performance Requirement Type C, Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Medium	70	18.7	≥2

8.2.2.4.3 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 with TM4 Interference Model – Enhanced Performance Requirement Type A

8.2.2.4.3.1 Test purpose

To verify the closed loop rank-one performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two dominant interfering cells applying transmission mode 4 interference model.

8.2.2.4.3.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward that support enhanced receiver Type A.

8.2.2.4.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.4.3.3-1 and 8.2.2.4.3.3-2 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.4.3.3-2 for the specified SINR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.2.4.3.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.73	-8.66
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM symbols			2	2	2
PDSCH transmission mode			6	N/A	N/A
Interference model			N/A	As specified in clause B.5.3	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Precoding granularity		PRB	50	6	6
PMI delay (Note 4)		ms	10 or 11	N/A	N/A
Reporting interval		ms	5	N/A	N/A
Reporting mode			PUCCH 1-1	N/A	N/A
CodeBookSubsetRestriction bitmap			001111	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Physical channel for CQI reporting			PUSCH(Note6)	N/A	N/A
cqi-pmi-ConfigurationIndex			4	N/A	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Note 6: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Table 8.2.2.4.3.3-2: Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.47 TDD	OP.1 TDD	N/A	N/A	EVA5	EVA5	EVA5	2x2 Low	70	1.1	1-8
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.3.4 Test description

8.2.2.4.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.4.3.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for cell1 are set up according to Tables 8.2.2-1, 8.2.2.4.3.5-1 and 8.2.2.4.3.5-2 as appropriate.
3. Downlink signals are initially set up for cell1 according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.3.4.3.

8.2.2.4.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.3.5-1 and 8.2.2.4.3.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #4 and #9 (Table A.2.3.1.2-1).
2. SS sets up the parameters for cell 2 and cell 3 according to Tables 8.2.2.4.3.5-1 and Tables 8.2.2.4.3.5-2.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SINR according to Tables 8.2.2.4.3.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5-15 and G.3.6 in Annex G clause G.3.

8.2.2.4.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.4.3.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.3.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	4	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	483	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.2.2.4.3.5 Test requirement

Table 8.2.2.4.3.5-1 defines the primary level settings.

Table 8.2.2.4.3.5-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.44	-7.77
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM symbols			2	2	2
PDSCH transmission mode			6	N/A	N/A
Interference model			N/A	As specified in clause B.5.3	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Precoding granularity		PRB	50	6	6
PMI delay (Note 4)		ms	10 or 11	N/A	N/A
Reporting interval		ms	5	N/A	N/A
Reporting mode			PUCCH 1-1	N/A	N/A
CodeBookSubsetRestriction bitmap			001111	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Physical channel for CQI reporting			PUSCH(Note6)	N/A	N/A
cqi-pmi-ConfigurationIndex			4	N/A	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Note 6: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.4.3.5-2 for the specified SINR including test tolerances for all throughput tests.

Table 8.2.2.4.3.5-2: Test requirement for Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.47 TDD	OP.1 TDD	N/A	N/A	EVA5	EVA5	EVA5	2x2 Low	70	2.09	1-8
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

8.2.2.4.4 TDD PDSCH Closed Loop Multi-Layer Spatial Multiplexing 4x2 for Dual Connectivity

8.2.2.4.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing for Dual Connectivity.

8.2.2.4.4.2 Test applicability

This test case applies to all types of E-UTRA TDD release 12 and forward UE of category ≥5 that support Dual Connectivity.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.4.4.3 Minimum conformance requirements

For dual connectivity the requirements are specified in Table 8.2.2.4.4.3-3, based on single carrier requirement specified in Table 8.2.2.4.4.3-2, with the addition of the parameters in Table 8.2.2.4.4.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.2.2.4.4.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for dual connectivity

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6 for 1.4MHz, 4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, and 8 for 15MHz CCs and 20MHz CCs
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111000000000000000
PDSCH transmission mode			4
ACK/NACK transmission			Separate ACK/NACK feedbacks with PUCCH format 1b on the MCG and SCG
CSI feedback			Separate PUSCH feedbacks on the MCG and SCG
Time offset between MCG CC and SCG CC		μs	0 for UE under test supporting synchronous dual connectivity; 334 for UE under test supporting both asynchronous and synchronous dual connectivity (Note 5)

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.
Note 4: The same PDSCH transmission mode is applied to each component carrier.
Note 5: Asynchronous and synchronous dual connectivity are defined in TS36.300 [18].
Note 6: If the UE supports both SCG bearer and Split bearer, the SCG bearer is configured.

Table 8.2.2.4.4.3-2: Single carrier performance for multiple dual connectivity configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.0
3MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	9.8
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.0
10 MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.5
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.6
20MHz	R.43 TDD	OP. 1 TDD	EVA5	4x2 Low	70	10.7

Table 8.2.2.4.4.3-3: Minimum performance Multi-Layer Spatial Multiplexing (FRC) for dual connectivity

Test num.	Band-width combination	Requirement	UE category
1	2x20 MHz	As specified in Table 8.2.2.4.4.3-2 per CC	≥5
Note 1: The OCNG pattern applies for each CC. Note 2: The applicability of requirements for different dual connectivity configurations and bandwidth combination sets is defined in 8.1.2.3A.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.3A.

8.2.2.4.4.4 Test description

8.2.2.4.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: Select one according to Tables 8.2.2.4.4.3-1 and 8.2.2.4.4.3-3.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.46 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.2.4.4.3-1 as appropriate.

3. Downlink signals for the MCG CC (PCell) and SCG CC (PSCell) are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. If the Split bearer is only supported, ensure the UE is in State 3A-RF-DC2 according to TS 36.508 [7] clause 5.2A.2B. Otherwise, ensure that the UE is in State 3A-RF-DC1 according to TS 36.508 [7] clause 5.2A.2A. Message contents are defined in clause 8.2.2.4.4.4.3.

8.2.2.4.4.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.4.3-1 and 8.2.2.4.4.3-2 on both MCG CC and SCG CC. The SS sends downlink MAC padding bits on the DL RMC.

2. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to ‘10’ and I_MCS=29 and N_PRB allocated to be less or equal to 20.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Table 8.2.2.4.4.5-1 as appropriate.

4. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.2.4.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 4.6 and 5.5 with the following exceptions:

Table 8.2.2.4.4.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop spatial multiplexing performance downlink power allocation (PCell and PSCell)

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.4.4.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation (PCell and PSCell)

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.4.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation (PCell and PSCell)

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2 CQI-ReportConfig-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			RBC
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.2.4.4.5 Test requirement

Table 8.2.2.4.4.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.2.2.4.4.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.4.5-1: Single carrier performance for multiple dual connectivity configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		
					Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9	10.4
3MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	9.2
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9	9.4
10 MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4	9.9
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5	10
20MHz	R.43 TDD	OP. 1 TDD	EVA5	4x2 Low	70	11.6	10.1

Table 8.2.2.4.4.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC) for dual connectivity

Test num.	Band-width combination	Requirement	UE category
1	2x20 MHz	As specified in Table 8.2.2.4.4.5-1 per CC	≥5
Note 1: The OCNG pattern applies for each CC. Note 2: The applicability of requirements for different dual connectivity configurations and bandwidth combination sets is defined in 8.1.2.3A.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to G.3A.6.

8.2.2.4.5 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 with TM4 Interference Model – Enhanced Performance Requirement Type B

8.2.2.4.5.1 Test purpose

The purpose of these tests is to verify the closed loop rank-one performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 4 interference model defined in clause B.6.3.

8.2.2.4.5.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward that support enhanced performance requirement Type B.

8.2.2.4.5.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.4.5-2, with the addition of parameters in Table 8.2.2.4.5.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.2.2.4.5.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.2.2.4.5.3-1: Test Parameters for Single-layer Spatial Multiplexing (FRC) with TM4 interference model

Parameter		Unit	Cell 1	Cell 2		Cell 3	
Uplink downlink Configuration			1	1		1	
Special subframe configuration			4	4		4	
Downlink power allocation	ρ_A	dB	-3	-3		-3	
	ρ_B	dB	-3 (Note 1)	-3		-3	
	σ	dB	0	0		0	
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1		Antenna ports 0,1	
N_{oc} at antenna port		dBm/15 kHz	-98				
Test number (Note 4)				Test 1	Test 2	Test 1	Test 2
$\hat{E}_s/N_{oc}$		dB	N/A	13.91	3.28	3.34	0.74
Cell Id				6	1	1	6
CFI indicated in PCFICH in normal subframes				3	Random from set {1,2,3}	3	Random from set {1,2,3}
CFI indicated in PCFICH in special subframes				2	Random from set {1,2}	2	Random from set {1,2}
$BW_{Channel}$		MHz	10	10		10	
Cyclic Prefix			Normal	Normal		Normal	
Number of control OFDM symbols in normal subframes			3	3		3	
Number of control OFDM symbols in special subframes			2	2		2	
PDSCH transmission mode			4	4		4	
Interference model			N/A	As specified in clause B.6.3		As specified in clause B.6.3	
Precoding			Random wideband precoding per TTI	As specified in clause B.6.3		As specified in clause B.6.3	
Time offset to cell 1		us	N/A	2		3	
Frequency offset to cell 1		Hz	N/A	200		300	
MBSFN			Not configured	Not configured		Not configured	
NeighCellsInfo-r12 (Note 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}		{dB-6, dB-3, dB0}	
	transmissionModeList-r12		N/A	{2,3,4,8,9}		{2,3,4,8,9}	

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331 [5].
Note 4: Test 1 and Test 2 are defined in Table 8.2.2.4.5.3-2.

Table 8.2.2.4.5.3-2: Minimum Performance for Enhanced Performance Requirement Type B, Single-layer Spatial Multiplexing (FRC) with TM4 interference model

Test Num	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-12 TDD	OP.1 TDD	N/A	N/A	EVA 5	EVA 5	EVA 5	2x2 Low	85	16.1	≥1
2	R.11-11 TDD	OP.1 TDD	N/A	N/A	EPA 5	EPA 5	EPA 5	2x2 Low	85	9.5	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.1D.

8.2.2.4.5.4 Test description

8.2.2.4.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.4.5.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.2.2.4.5.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.5.4.3.

8.2.2.4.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-1 in TS36.211 [8]) every TTI according to Tables 8.2.2.4.5.5-1 and 8.2.2.4.5.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.2.2.4.5.5-1 as appropriate. The CFIs indicated in PCFICH are randomly selected per TTI.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.4.5.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.

5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

6. Repeat steps from 1 to 5 for each subtest in Tables 8.2.2.4.5.5-1 and 8.2.2.4.5.5-2 as appropriate.

8.2.2.4.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.2.2.4.5.4.3-1: *PhysicalConfigDedicated-DEFAULT* message disabling CQI reporting

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
}			

8.2.2.4.5.5 Test requirement

Table 8.2.2.4.5.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.2.2.4.5.5-2 for the specified SNR including test tolerances.

Table 8.2.2.4.5.5-1: Test Parameters for Single-layer Spatial Multiplexing (FRC) with TM4 interference model

Parameter		Unit	Cell 1	Cell 2		Cell 3	
Uplink downlink Configuration			1	1		1	
Special subframe configuration			4	4		4	
Downlink power allocation	ρ_A	dB	-3	-3		-3	
	ρ_B	dB	-3 (Note 1)	-3		-3	
	σ	dB	0	0		0	
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1		Antenna ports 0,1	
N_{oc} at antenna port		dBm/15 kHz	-98				
Test number (Note 4)				Test 1	Test 2	Test 1	Test 2
$\hat{E}_s / N_{oc}$		dB	N/A	14.71	4.08	4.14	1.54
Cell Id				6	1	1	6
CFI indicated in PCFICH in normal subframes				3	Random from set {1,2,3}	3	Random from set {1,2,3}
CFI indicated in PCFICH in special subframes				2	Random from set {1,2}	2	Random from set {1,2}
$BW_{Channel}$		MHz	10	10		10	
Cyclic Prefix			Normal	Normal		Normal	
Number of control OFDM symbols in normal subframes			3	3		3	
Number of control OFDM symbols in special subframes			2	2		2	
PDSCH transmission mode			4	4		4	
Interference model			N/A	As specified in clause B.6.3		As specified in clause B.6.3	
Precoding			Random wideband precoding per TTI	As specified in clause B.6.3		As specified in clause B.6.3	
Time offset to cell 1		us	N/A	2		3	
Frequency offset to cell 1		Hz	N/A	200		300	
MBSFN			Not configured	Not configured		Not configured	
NeighCellsInfo-r12 (Note 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}		{dB-6, dB-3, dB0}	
	transmissionMode List-r12		N/A	{2,3,4,8,9}		{2,3,4,8,9}	

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331 [5].
Note 4: Test 1 and Test 2 are defined in Table 8.2.2.4.5.5-2.

Table 8.2.2.4.5.5-2: Test Requirement for Enhanced Performance Requirement Type B, Single-layer Spatial Multiplexing (FRC) with TM4 interference model

Test Num	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-12 TDD	OP.1 TDD	N/A	N/A	EVA 5	EVA 5	EVA 5	2x2 Low	85	17.95	≥1
2	R.11-11 TDD	OP.1 TDD	N/A	N/A	EPA 5	EPA 5	EPA 5	2x2 Low	85	11.04	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

8.2.2.5

8.2.2.6

8.2.2.7 Carrier aggregation with power imbalance

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD

- Test tolerances are undefined

- Power at antenna port in test 2 is still TBD

8.2.2.7_A.1 TDD Carrier aggregation with power imbalance (intra-band contiguous DL CA)

8.2.2.7_A.1.1 Test purpose

To verify the ability of an intraband adjacent carrier aggregation UE to demodulate the signal transmitted by the PCell or SCell in the presence of a stronger SCell or PCell signal on an adjacent frequency. Throughput is measured on the PCell or SCell only.

8.2.2.7_A.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support intra-band contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.2.7_A.1.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.7_A.1.3-2, with the addition of the parameters in Table 8.2.2.7_A.1.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Table 8.2.2.7_A.1.3-1: Test Parameters for CA

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	Off (Note 2)	Off (Note 2)
Symbols for unused PRBs			OCNG (Note 3)	OCNG (Note 3)
Modulation			64 QAM	64 QAM
Maximum number of HARQ transmission			1	1
Redundancy version coding sequence			{0}	{0}
PDSCH transmission mode of PCell			1	3
PDSCH transmission mode of SCell			3	1
OCNG Pattern	PCell		OP.1 TDD	OP.5 TDD
	SCell		OP.5 TDD	OP.1 TDD
Propagation Conditions	PCell		Clause B.1	Clause B.1
	SCell		Clause B.1	Clause B.1
Correlation Matrix and Antenna	PCell		1x2	2x2
	SCell		2x2	1x2

Note 1: $P_B = 0$ for 1x2 and $P_B = 1$ for 2x2 antenna configuration.
Note 2: No external noise sources are applied.
Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data.
Note 4: Void

Table 8.2.2.7_A.1.3-2: Minimum performance (FRC) for CA

Test Number	Bandwidth (MHz)		Reference channel		Power at antenna port (dBm/15KHz)		Reference value Fraction of Maximum Throughput (%)		UE Category
	PCell	SCell	PCell	SCell	$\hat{E}_{s_PCell}$ for PCell	$\hat{E}_{s_SCell}$ for Scell	PCell	SCell	
1	20	20	R.49 TDD	NA	-85	-79	85	NA	≥5
2	20	15	NA	R.49-1 TDD	-79	[-85.8]	NA	85	≥5

Note 1: The OCNG pattern for PCell is used to fill the control channel. The OCNG pattern for SCell is used to fill the control channel and PDSCH.
Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.7.

8.2.2.7_A.1.4 Test description

8.2.2.7_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.7_A.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group TBD for UE supporting only 2Rx RF bands on all CC. Annex A, Figure TBD for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 8.2.2-1and 8.2.2.7_A.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.7_A.1.4.3.

8.2.2.7_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels except control channel and PDSCH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.7_A.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.7_A.1.3-1 and 8.2.2.7_A.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition and the correlation matrix on each of the component carriers according to Tables 8.2.2.7_A.1.5-1 as appropriate.
6. Measure the average throughput on PCC in test number 1or measure the average throughput on SCC in test number 2 for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-6. Count the number of NACKs, ACKs and statDTXs on the UL during the test on PCC in test number 1 or on SCC in test number 2.

8.2.2.7_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 3, for SCC configuration there are no additional message contents.

8.2.2.7_A.1.5 Test requirement

Table 8.2.2.7_A.1.5-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.2.7_A.1.5-1 for the specified cell power levels including test tolerances for all throughput tests.

Table 8.2.2.7_A.1.5-1: Test Requirement (FRC) for CA

Test Number	Bandwidth (MHz)		Reference channel		Power at antenna port (dBm/15KHz)		Reference value Fraction of Maximum Throughput (%)		UE Category
	PCell	SCell	PCell	SCell	$\hat{E}_{s_PCell}$ for PCell	$\hat{E}_{s_SCell}$ for Scell	PCell	SCell	
1	20	20	R.49 TDD	NA	-85+TT	-79+TT	85	NA	≥5
2	20	15	NA	R.49-1 TDD	-79+TT	[-85.8] +TT	NA	85	≥5
Note 1: The OCNG pattern for PCell is used to fill the control channel. The OCNG pattern for SCell is used to fill the control channel and PDSCH. Note 2: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.8 FFS

8.2.2.9 TDD PDSCH HST-SFN performance in HST-SFN scenario

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test tolerances are undefined

- 36.521-2 spec need to be introduced

8.2.2.9.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports in the HST-SFN scenario defined in B.3A when *highSpeedEnhancedDemodulationFlag* is received.

8.2.2.9.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 14 and forward that support *demodulationEnhancements-r14*.

8.2.2.9.3 Minimum conformance requirements

The requirements are specified in Table 8.2.2.9.3-2, with the addition of the parameters in Table 8.2.2.9.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.2.2.9.3-1: Test Parameters for UE performance in HST-SFN scenario (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (NOTE 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
PDSCH transmission mode			3
NOTE 1: $P_B = 1$.			

Table 8.2.2.9.3-2: Minimum performance UE in HST-SFN scenario (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.87 TDD	OP.1 TDD	HST-SFN	2x2	70	13.2	≥1
NOTE 1: Test case applicability is defined in 8.1.2.1. NOTE 2: The requirement defined is based on the normalized channel model, i.e., the power of each tap is normalized to the instantaneous total received power from four taps.								

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.9.

8.2.2.9.4 Test description

8.2.2.9.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.9.3-2 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.2.2-1and 8.2.2.9.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.3A.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.9.4.3.

8.2.2.9.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.9.3-1 and 8.2.2.9.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.2.9.3-2as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.9.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.2.9.5 Test requirement

Table 8.2.2.9.3-2 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.2.9.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.9.5-1: Test requirement for UE in HST-SFN scenario (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.hh TDD	OP.1 TDD	HST-SFN	2x2	70	13.2+ TT	≥1
NOTE 1: Test case applicability is defined in 8.1.2.1. NOTE 2: The requirement defined is based on the normalized channel model.								

8.2.3 TDD FDD CA (Fixed Reference Channel)

The parameters specified in Table 8.2.3-1 are valid for all the TDD FDD CA tests unless otherwise stated.

Table 8.2.3-1: Common Test Parameters

Parameter		Unit	Value
Uplink downlink configuration (Note 1) for TDD CC only			1
Special subframe configuration (Note 2) for TDD CC only			4
Inter-TTI Distance			1
Maximum number of HARQ processes per component carrier	FDD PCell	Processes	8 for FDD and TDD CCs
	TDD PCell	Processes	11 for FDD CC; 7 for TDD CC
Maximum number of HARQ transmission			4
Redundancy version coding sequence			{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier		OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths
Cyclic Prefix			Normal
Cell_ID			0
Cross carrier scheduling			Not configured
ACK/NACK feedback mode			PUCCH format 3
Downlink HARQ-ACK timing	FDD PCell		As specified in Clause 7.3.3 in TS36.213 [10]
	TDD PCell		As specified in Clause 7.3.4 in TS36.213 [10]
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8].			

The applicability of the requirements are specified in Clause 8.1.2.3. The single carrier performance with different bandwidths for multiple CA configurations specified in Clause 8.2.3 cannot be applied for UE single carrier test.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.

8.2.3.1 TDD FDD CA PDSCH Single Antenna Port Performance

8.2.3.1.1.1 TDD FDD CA PDSCH Single Antenna Port Performance for FDD PCell (2DL CA)

8.2.3.1.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.3.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support E-UTRA FDD and TDD and 2DL CA with FDD as PCELL.

Note: This test also applies to UE supporting 4Rx antenna ports

8.2.3.1.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.1.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.1.1.1.3-4 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.3.1.1.1.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1
Note 1: $P_B = 0$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			
Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.3.1.1.1.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.3.1.1.1.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.3.1.1.1.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.1.1.1.3-2 and Table 8.2.3.1.1.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.1.1.1.3-2 and Table 8.2.3.1.1.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.1.1.1.3-2 and Table 8.2.3.1.1.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.1.

8.2.3.1.1.1.4 Test description

8.2.3.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.1.1.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.1.1.1.4.1-1.

Table 8.2.3.1.1.1.4.1-1: Test point selection for TM1 2DLCA

CA Capability	Bandwidth Combination		
	20+20	20+10	20+15
Inter-band (CA_A_2)	Test 1	Test 2	Test3
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA			

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.35 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 8.2.3-1and 8.2.3.1.1.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.1.1.1.4.3.

8.2.3.1.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.1.1.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.1.1.1.3-2 and 8.2.3.1.1.1.3-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.1.1.1.5-1 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.3.1.1.1.5 Test requirement

Table 8.2.3.1.1.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.3.1.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.1.1.1.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5	-2
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3	-1.8
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2	-1.7
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8	-2.3
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4

Table 8.2.3.1.1.1.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2	-1.3
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0	-1.5
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4	-1.9
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8	-2.3
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1

Table 8.2.3.1.1.1.5-3: Test requirement for multiple CA configurations with 2DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Test Requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.1.1.1.5-1 and Table 8.2.3.1.1.1.5-2 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.1.1.1.5-1 and Table 8.2.3.1.1.1.5-2 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.1.1.1.5-1 and Table 8.2.3.1.1.1.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.1.1.2 TDD FDD CA PDSCH Single Antenna Port Performance for FDD PCell (3DL CA)

8.2.3.1.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.3.1.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support E-UTRA FDD and TDD and 3DL CA with FDD as PCELL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.1.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.1.1.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.1.1.2.3-4 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.3.1.1.2.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1

Note 1: $P_B = 0$.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 3: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.3.1.1.2.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.3.1.1.2.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.3.1.1.2.3-4: Minimum performance for multiple CA configurations with 3DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.1.1.2.3-2 and Table 8.2.3.1.1.2.3-3 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.1.1.2.3-2 and Table 8.2.3.1.1.2.3-3 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.1.1.2.3-2 and Table 8.2.3.1.1.2.3-3 per CC	≥5
4	3x20	2x20	20	As defined in Table 8.2.3.1.1.2.3-2 and Table 8.2.3.1.1.2.3-3 per CC	≥5
5	20+20+15	20+15	20	As defined in Table 8.2.3.1.1.2.3-2 and Table 8.2.3.1.1.2.3-3 per CC	≥5
6	20+20+10	20+10	20	As defined in Table 8.2.3.1.1.2.3-2 and Table 8.2.3.1.1.2.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.1.

8.2.3.1.1.2.4 Test description

8.2.3.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.1.1.2.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.1.1.2.4.1-1

Table 8.2.3.1.1.2.4.1-1: Test point selection for TM1 CA

CA Capability	Bandwidth combination		
	3x20	20+20+15	20+10+10
Inter-band CA (three bands, one FDD CC) CA3_A3	Test1	Test2	Test3
Inter-band CA (three bands, two FDD	Test4	Test5	Test6

CC) CA3_A3			
Inter-band CA (two bands, one FDD CC) CA3_A2	Test1	Test2	Test3
Inter-band CA (two bands, two FDD CC) CA3_A2	Test4	Test5	Test6
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.2.3-1 and 8.2.3.1.1.2.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.1.1.1.4.3.

8.2.3.1.1.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.1.2.1.4.3.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.1.1.2.3-2 and 8.2.3.1.1.2.3-3 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.1.1.2.5-1 as appropriate.

6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.3.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.3.1.1.2.5 Test requirement

Table 8.2.3.1.1.2.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.3.1_A.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.1.1.2.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5	-2
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3	-1.8
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2	-1.7
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8	-2.3
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4

Table 8.2.3.1.1.2.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2	-1.3
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0	-1.5
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4	-1.9
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8	-2.3
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1

Table 8.2.3.1.1.2.5-3: Test requirement for multiple CA configurations with 3DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Test Requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.1.1.2.5-1 and Table 8.2.3.1.1.2.5-2 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.1.1.2.5-1 and Table 8.2.3.1.1.2.5-2 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.1.1.2.5-1 and Table 8.2.3.1.1.2.5-2 per CC	≥5
4	3x20	2x20	20	As defined in Table 8.2.3.1.1.2.5-1 and Table 8.2.3.1.1.2.5-2 per CC	≥5
5	20+20+15	20+15	20	As defined in Table 8.2.3.1.1.2.5-1 and Table 8.2.3.1.1.2.5-2 per CC	≥5
6	20+20+10	20+10	20	As defined in Table 8.2.3.1.1.2.5-1 and Table 8.2.3.1.1.2.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					
Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

8.2.3.1.1.3 TDD FDD CA PDSCH Single Antenna Port Performance for FDD PCell (4DL CA)

8.2.3.1.1.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.3.1.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 or higher that support E-UTRA FDD and TDD and 4DL CA with FDD as PCELL.

8.2.3.1.1.3.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.1.1.3.3-4 based on single carrier requirement specified in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3, with the addition of the parameters in Table 8.2.3.1.1.3.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.2.3.1.1.3.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1
Note 1: $P_B = 0$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			
Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.3.1.1.3.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.3.1.1.3.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.3.1.1.3.3-4: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
4	2x15+2x20	2x15	2x20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
5	3x20+15	2x20+15	20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
6	2x15+2x20	2x15+20	20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.1.

8.2.3.1.1.3.4 Test description

8.2.3.1.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.1.1.3.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.1.1.3.4.1-1

Table 8.2.3.1.1.3.4.1-1: Test point selection for TM1 CA

CA Applicability		Bandwidth combination						
	FDD cell	20	2x20	20+15	2x15	2x20+15	2x15+20	2x20+10
	TDD cell	3x20	2x20	2x20	2x20	20	20	20
Inter-band CA (two bands) (CA4_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (three bands) (CA4_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (four bands) (CA4_A4)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA								

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59.
2. The parameter settings for the cell are set up according to Table 8.2.3-1 and 8.2.3.1.1.3.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.1.1.1.4.3.

8.2.3.1.1.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.1.1.3.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.1.1.3.3-2 and 8.2.3.1.1.3.3-3 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.1.1.3.5-1 as appropriate.

6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.3.1.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.3.1.1.3.5 Test requirement

Table 8.2.3.1.1.3.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.3.1.1.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.1.1.3.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9

Table 8.2.3.1.1.3.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6

Table 8.2.3.1.1.3.5-3: Test requirement for multiple CA configurations with 4DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
4	2x15+2x20	2x15	2x20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
5	3x20+15	2x20+15	20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
6	2x15+2x20	2x15+20	20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.1.1.3.3-2 and Table 8.2.3.1.1.3.3-3 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					
Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

8.2.3.1.1.4 TDD FDD CA PDSCH Single Antenna Port Performance for FDD PCell (5DL CA)

8.2.3.1.1.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.3.1.1.4.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8, or categories 11 and above that support E-UTRA FDD and TDD and 5DL CA with FDD as PCELL.

8.2.3.1.1.4.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.1.1.4.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.1.1.4.3-4 for the specified SNR. For QPSK performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.3.1.1.4.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1

Note 1: $P_B = 0$.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 3: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.3.1.1.4.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.3.1.1.4.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.3.1.1.4.3-4: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.1.1.4.3-2and Table 8.2.3.1.1.4.3-3per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.1.1.4.3-2and Table 8.2.3.1.1.4.3-3per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.1.

8.2.3.1.1.4.4 Test description

8.2.3.1.1.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.1.1.4.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.1.1.4.4.1-1

Table 8.2.3.1.1.4.4.1-1: Test point selection for TM1 CA

CA Capability	Bandwidth combination	
FDD CELL	15+2×20	2×15+20
TDD CELL	2×20	2×20
Inter-band CA (two bands) (CA5_A2)	Test1	Test2
Inter-band CA (three bands) (CA5_A3)	Test1	Test2
Inter-band_CA (four bands) (CA_A4)	Test1	Test2
Inter-band_CA (five bands) (CA_A5)	Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59.
2. The parameter settings for the cell are set up according to Table 8.2.3-1 and 8.2.3.1.1.3.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex .0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.1.1.4.4.3.

8.2.3.1.1.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.1.1.4.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.1.1.4.3-2 and 8.2.3.1.1.4.3-3 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Table 8.2.3.1.1.4.5-1 and Table 8.2.3.1.1.4.5-2 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.3.1.1.4.4 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.3.1.1.4.5 Test requirement

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.3.1.1.4.5-3 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.1.1.4.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9

Table 8.2.3.1.1.4.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6

Table 8.2.3.1.1.4.5-3: Test requirement for multiple CA configurations with 5DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.1.1.4.5-1 and Table 8.2.3.1.1.4.5-2 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.1.1.4.5-1 and Table 8.2.3.1.1.4.5-2 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					
Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

Decide pass or fail for each subset according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.1.2.1 TDD FDD CA PDSCH Single Antenna Port Performance for TDD PCell (2DL CA)

8.2.3.1.2.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.3.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support E-UTRA FDD and TDD and 2DL CA with TDD as PCELL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.1.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.1.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.1.2.1.3-2 and 8.2.3.1.2.1.3-3 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.3.1.2.1.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1

Note 1: $P_B = 0$.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 3: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.3.1.2.1.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.3.1.2.1.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.3.1.2.1.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.1.2.1.3-2 and Table 8.2.3.1.2.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.1.2.1.3-2 and Table 8.2.3.1.2.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.1.2.1.3-2 and Table 8.2.3.1.2.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.1.

8.2.3.1.2.1.4 Test description

8.2.3.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: Select one according to Table 8.2.3.1.1.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.1.1.1.4.1-1

Table 8.2.3.1.1.1.4.1-1: Test point selection for TM1 2DLCA

CA Capability	Bandwidth Combination		
	20+20	20+10	20+15
Inter-band (CA_A_2)	Test 1	Test 2	Test3
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA			

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.35 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Tables 8.2.3-1, 8.2.3.1.2.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.1.2.1.4.3.

8.2.3.1.2.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.1.2.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.1.2.1.3-1 and 8.2.3.1.2.1.3-2 or 8.2.3.1.2.1.3-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.3.1.2.1.5-1 and 8.2.3.1.2.1.5-2 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.3.1.2.1.5 Test requirement

Table 8.2.3.1.2.1.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.3.1.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.1.2.1.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5	-2
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3	-1.8
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2	-1.7
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8	-2.3
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9	-2.4

Table 8.2.3.1.2.1.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2	-1.3
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0	-1.5
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4	-1.9
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8	-2.3
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1

Table 8.2.3.1.2.1.5-3: Test requirement for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.1.2.1.5-1 and Table 8.2.3.1.2.1.5-2 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.1.2.1.5-1 and Table 8.2.3.1.2.1.5-2 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.1.21.5-1 and Table 8.2.3.1.2.1.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

8.2.3.1.2.2 TDD FDD CA PDSCH Single Antenna Port Performance for TDD PCell (3DL CA)

8.2.3.1.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.3.1.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support E-UTRA FDD and TDD and 3DL CA with TDD as PCELL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.1.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.1.2.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.1.2.2.3-2 and 8.2.3.1.2.2.3-3 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.3.1.2.2.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1

Note 1: $P_B = 0$.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 3: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.3.1.2.2.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3	-2.8
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1	-2.6
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0	-2.5
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7	-3.2
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6	-3.1
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7	-3.2

Table 8.2.3.1.2.2.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6	-2.1
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8	-2.3
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2	-2.7
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6	-3.1
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4	-2.9
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4	-2.9

Table 8.2.3.1.2.2.3-4: Minimum performance for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.1.2.2.3-2 and Table 8.2.3.1.2.2.3-3 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.1.2.2.3-2 and Table 8.2.3.1.2.2.3-3 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.1.2.2.3-2 and Table 8.2.3.1.2.2.3-3 per CC	≥5
4	3x20	2x20	20	As defined in Table 8.2.3.1.2.2.3-2 and Table 8.2.3.1.2.2.3-3 per CC	≥5
5	20+20+15	20+15	20	As defined in Table 8.2.3.1.2.2.3-2 and Table 8.2.3.1.2.2.3-3 per CC	≥5
6	20+20+10	20+10	20	As defined in Table 8.2.3.1.2.2.3-2 and Table 8.2.3.1.2.2.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.1.

8.2.3.1.2.2.4 Test description

8.2.3.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.1.2.2.4.1-1

CA Capability to be tested: Select one according to Table 8.2.3.1.2.2.4.1-1

Table 8.2.3.1.2.2.4.1-1: Test point selection for TM1 CA

CA Capability	Bandwidth combination		
	3x20	20+20+15	20+20+10
Inter-band CA (three bands, two TDD CC) CA3_A3	Test1	Test2	Test3
Inter-band CA (three bands, one TDD CC) CA3_A3	Test4	Test5	Test6
Inter-band CA (two bands, two TDD CC) CA3_A2	Test1	Test2	Test3
Inter-band CA (two bands, one TDD CC) CA3_A2	Test4	Test5	Test6
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.2.3-1 and 8.2.3.1.2.2.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.1.2.2.4.3.

8.2.3.1.2.2.4.2 Test procedure

1. Configure SCCs according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.1.2.2.4.3.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.1.2.2.5-1 and 8.2.3.1.2.2.5-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.1.2.2.5-1 and 8.2.3.1.2.2.5-2 as appropriate.

6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.3.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.3.1.2.2.5 Test requirement

Table 8.2.3.1.2.2.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.3.1.2.2.5-1 and 8.2.3.1.2.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.1.2.2.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9

Table 8.2.3.1.2.2.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6

Table 8.2.3.1.2.2.5-3: Test requirement for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test Requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.1.2.2.5-1 and Table 8.2.3.1.2.2.5-2 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.1.2.2.5-1 and Table 8.2.3.1.2.2.5-1 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.1.2.2.5-1 and Table 8.2.3.1.2.2.5-1 per CC	≥5
4	3x20	2x20	20	As defined in Table 8.2.3.1.2.2.5-1 and Table 8.2.3.1.2.2.5-1 per CC	≥5
5	20+20+15	20+15	20	As defined in Table 8.2.3.1.2.2.5-1 and Table 8.2.3.1.2.2.5-1 per CC	≥5
6	20+20+10	20+10	20	As defined in Table 8.2.3.1.2.2.5-1 and Table 8.2.3.1.2.2.5-1 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

8.2.3.1.2.3 TDD FDD CA PDSCH Single Antenna Port Performance for TDD PCell (4DL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- The test case needs to be added to Annex G

8.2.3.1.2.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.3.1.2.3.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 and above that support E-UTRA FDD and TDD and 4DL CA with TDD as PCELL.

8.2.3.1.2.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.1.2.3.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.1.2.3.3-2 and 8.2.3.1.2.3.3-3 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.3.1.2.3.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1
Note 1: $P_B = 0$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			
Note 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.3.1.2.3.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.3.1.2.3.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.3.1.2.3.3-4: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		

1	4x20	20	3x20	As defined in Table 8.2.3.1.2.3.3-2and Table 8.2.3.1.2.3.3-3per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.1.2.3.3-2and Table 8.2.3.1.2.3.3-3per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.1.2.3.3-2and Table 8.2.3.1.2.3.3-3per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.1.2.3.3-2and Table 8.2.3.1.2.3.3-3per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.1.2.3.3-2and Table 8.2.3.1.2.3.3-3per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.1.2.3.3-2and Table 8.2.3.1.2.3.3-3per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.1.2.3.3-2and Table 8.2.3.1.2.3.3-3per CC	≥8
8	2x15+2x20	2x15+20	20	As defined in Table 8.2.3.1.2.3.3-2and Table 8.2.3.1.2.3.3-3per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.1.

8.2.3.1.2.3.4 Test description

8.2.3.1.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.1.2.3.4.1-1

CA Capability to be tested: Select one according to Table 8.2.3.1.2.3.4.1-1

Table 8.2.3.1.2.3.4.1-1: Test point selection for TM1 CA

CA Applicability		**Bandwidth combination**						
	FDD cell	20	2x20	20+15	2x15	2x20+15	2x15+20	2x20+10
	TDD cell	3x20	2x20	2x20	2x20	20	20	20
Inter-band CA (two bands) (CA4_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (three bands) (CA4_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (four bands) (CA4_A4)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA.								

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59.

2. The parameter settings for the cell are set up according to Table 8.2.3-1 and 8.2.3.1.2.3.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.1.2.3.4.3.

8.2.3.1.2.3.4.2 Test procedure

1. Configure SCCs according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.1.2.3.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.1.2.3.5-1 and 8.2.3.1.2.3.5-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.1.2.3.5-1 and 8.2.3.1.2.3.5-2 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.3.1.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.3.1.2.3.5 Test requirement

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.3.1.2.3.5-1 and 8.2.3.1.2.3.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.1.2.3.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9

Table 8.2.3.1.2.3.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)

1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6

Table 8.2.3.1.2.3.5-3: Test requirement for multiple CA configurations with 4DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.1.2.3.5-1and Table 8.2.3.1.2.3.5-2per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.1.2.3.5-1and Table 8.2.3.1.2.3.5-2per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.1.2.3.5-1and Table 8.2.3.1.2.3.5-2per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.1.2.3.5-1and Table 8.2.3.1.2.3.5-2per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.1.2.3.5-1and Table 8.2.3.1.2.3.5-2per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.1.2.3.5-1and Table 8.2.3.1.2.3.5-2per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.1.2.3.5-1and Table 8.2.3.1.2.3.5-2per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

8.2.3.1.2.4 TDD FDD CA PDSCH Single Antenna Port Performance for TDD PCell (5DL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- The test case needs to be added to Annex G

8.2.3.1.2.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.3.1.2.4.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 or 11 and above that support E-UTRA FDD and TDD and 5DL CA with TDD as PCELL.

8.2.3.1.2.4.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.1.2.4.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.1.2.4.3-2 and 8.2.3.1.2.4.3-3 for the specified SNR. For QPSK performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.3.1.2.4.3-1: Test Parameters for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
PDSCH transmission mode			1

Note 1: $P_B = 0$.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 3: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.3.1.2.4.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.3
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.1
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.6
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.7

Table 8.2.3.1.2.4.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.6
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.4

Table 8.2.3.1.2.4.3-4: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.1.2.4.3-2and Table 8.2.3.1.2.4.3-3per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.1.2.4.3-2and Table 8.2.3.1.2.4.3-3per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B. Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.1.

8.2.3.1.2.4.4 Test description

8.2.3.1.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.1.2.4.4.1-1

CA Capability to be tested: Select one according to Table 8.2.3.1.2.4.4.1-1

Table 8.2.3.1.2.4.4.1-1: Test point selection for TM1 CA

CA Applicability		Bandwidth combination	
	FDD Cell	15+2×20	2×15+20
	TDD Cell	2×20	2×20
Inter-band CA (two bands) (CA5_A2)		Test1	Test2
Inter-band CA (three bands) (CA5_A3)		Test1	Test2
Inter-band_CA (four bands) (CA5_A4)		Test1	Test2
Inter-band_CA (five bands) (CA5_A5)		Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.59.

2. The parameter settings for the cell are set up according to Table 8.2.3-1 and 8.2.3.1.2.4.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.1.2.4.4.3.

8.2.3.1.2.4.4.2 Test procedure

1. Configure SCCs according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.1.2.4.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.1.2.4.5-1 and 8.2.3.1.2.4.5-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.1.2.4.5-1 and 8.2.3.1.2.4.5-2 as appropriate.
6. Measure the average throughput per component carrier for duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on each of the component carriers.

8.2.3.1.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCCs configuration there are no additional message contents.

8.2.3.1.2.4.5 Test requirement

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 and A.3.4.1 for the throughput test shall meet or exceed the specified value in Table 8.2.3.1.2.4.5-1 and 8.2.3.1.2.4.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.1.2.4.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.5
3 MHz	R.42-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.3
5MHz	R.42-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2
10MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9
15MHz	R.42-3 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.8
20MHz	R.42 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.9

Table 8.2.3.1.2.4.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.2
3 MHz	R.42-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0
5MHz	R.42-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4
10MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.8
15MHz	R.42-3 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6
20MHz	R.42 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.6

Table 8.2.3.1.2.4.5-3: Test requirement for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.1.2.4.5-1 and Table 8.2.3.1.2.4.5-2 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.1.2.4.5-1 and Table 8.2.3.1.2.4.5-2 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					
Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

8.2.3.2 TDD FDD CA PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.3.2.1 TDD FDD CA PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols) for FDD PCell

8.2.3.2.1.1 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for FDD PCell (2DL CA)

8.2.3.2.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.3.2.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of category ≥5 that support E-UTRA FDD and TDD and 2DL CA with FDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.2.1.1.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 2DL CCs, the requirements are specified in Table 8.2.3.2.1.1.3-4 based on single carrier requirement specified in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3, with the addition of the parameters in Table 8.2.3.2.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of large delay CDD with 2 transmitter antennas.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.2.1.1.3-1: Test Parameters for Large Delay CDD (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 0$.			
Note 2: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.3.2.1.1.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.6
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.8
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9

Table 8.2.3.2.1.1.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.2
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.6
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.9
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.0

Table 8.2.3.2.1.1.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		

1	2x20	20	20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.1.

8.2.3.2.1.1.4 Test description

8.2.3.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.2.1.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.2.1.1.4.1-1.

Table 8.2.3.2.1.1.4.1-1: Test point selection for TM3 TDD FDD 2DL CA FDD PCell

CA Capability	**Bandwidth Combination**		
	20+20	20+10	20+15
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test3
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.			

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for Pcell are set up according to Tables 8.2.3-1, 8.2.3.2.1.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.2.1.1.4.3.

8.2.3.2.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.2.1.1.4.3
3. The SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4. The SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.1.1.3-1 and 8.2.3.2.1.1.3-2 or 8.2.3.2.1.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.2.1.1.5-1 and 8.2.3.2.1.1.5-2.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions:

Table 8.2.3.2.1.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.3.2.1.1.4.3-2: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.3.2.1.1.5 Test requirement

Tables 8.2.3.2.1.1.5-1 and 8.2.3.2.1.1.5-2 define the primary level settings.

For TDD FDD CA with FDD PCell and 2DL CCs, the requirements are specified in Table 8.2.3.2.1.1.5-3 based on single carrier requirement specified in Tables 8.2.3.2.1.1.5-1 and 8.2.3.2.1.1.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.2.1.1.5-1 or 8.2.3.2.1.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.2.1.1.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5	13
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7	12.2
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3

Table 8.2.3.2.1.1.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1	12.6
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5	12
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8	12.3
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9	12.4

Table 8.2.3.2.1.1.5-3: Test requirement for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.2.1.1.5-2 and Table 8.2.3.2.1.1.5-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.2.1.1.5-2 and Table 8.2.3.2.1.1.5-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.2.1.1.5-2 and Table 8.2.3.2.1.1.5-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.2.1.2 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for FDD PCell (3DL CA)

8.2.3.2.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.3.2.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of category ≥5 that support E-UTRA FDD and TDD and 3DL CA with FDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.2.1.2.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 3DL CCs, the requirements are specified in Table 8.2.3.2.1.2.3-1 based on single carrier requirement specified in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3, with the addition of the parameters in Table 8.2.3.2.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of large delay CDD with 2 transmitter antennas.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.2.1.2.3-1: Minimum performance for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.1.

8.2.3.2.1.2.4 Test description

8.2.3.2.1.2.4.1 Initial conditions

Same as in clause 8.2.3.2.1.1.4.1 with the following exceptions:

- Instead of Table 8.2.3.2.1.1.4.1-1 → use Table 8.2.3.2.1.2.4.1-1

- Instead of Figure group A.36 as appropriate → Figure A.60 for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC

- Instead of clause 8.2.3.2.1.1.4.3 → use clause 8.2.3.2.1.2.4.3

Table 8.2.3.2.1.2.4.1-1: Test point selection for TM3 TDD FDD 3DL CA FDD PCell

CA Capability	Bandwidth Combination		
	20+20+20	20+20+15	20+20+10

Inter-band CA (two bands) (CA3_A2)	Test 1	Test 2	Test 3
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.			

8.2.3.2.1.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.2.1.2.4.3
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.1.1.3-1 and 8.2.3.2.1.1.3-2 or 8.2.3.2.1.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.2.1.2.5-1 and 8.2.3.2.1.2.5-2.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.1.2.4.3 Message contents

Same as in clause 8.2.3.2.1.1.4.3.

8.2.3.2.1.2.5 Test requirement

Tables 8.2.3.2.1.2.5-1 and 8.2.3.2.1.2.5-2 define the primary level settings.

For TDD FDD CA with FDD PCell and 3DL CCs, the requirements are specified in Table 8.2.3.2.1.2.5-3 based on single carrier requirement specified in Tables 8.2.3.2.1.2.5-1 and 8.2.3.2.1.2.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.2.1.2.5-1 or 8.2.3.2.1.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.2.1.2.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5	13.0
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7	12.2
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3

Table 8.2.3.2.1.2.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1	12.6
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5	12.0
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8	12.3
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9	12.4

Table 8.2.3.2.1.2.5-3: Minimum performance for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test Requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.2.1.2.5-1 and Table 8.2.3.2.1.2.5-2 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.2.1.2.5-1 and Table 8.2.3.2.1.2.5-2 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.2.1.2.5-1 and Table 8.2.3.2.1.2.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.2.1A TDD FDD CA PDSCH Soft buffer management test for FDD PCell (2DL CA)

8.2.3.2.1A.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports with different channel models and MCS using large delay CDD.

8.2.3.2.1A.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of Category 3 or 4 that support E-UTRA FDD and TDD and 2DL CA with FDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.2.1A.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.2.1A.3-1: and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.2.1A.3-2 for the specified SNR. For performance the bandwidths specified in article 5.4.2A are verified.

Table 8.2.3.2.1A.3-1: Test Parameters for CA

Parameter		Unit	Value	
			FDD Carrier	TDD Carrier
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
PDSCH transmission mode			3	3
Note 1: $P_B = 1$.				
Note 2: The same PDSCH transmission mode is applied to each component carrier.				

Table 8.2.3.2.1A.3-2: Minimum performance (FRC) for CA

Test num.	Band-width		Reference channel	OCNG pattern	Propa-gation condi-tion	Correl ation matrix and anten na config .	Reference value		UE cate-gory
							Fraction of maximum throughput (%)	SNR (dB)	
1	PCell	20MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.2	3
	SCell	20MHz	R.30 TDD	OP.1 TDD (Note 1)			70	13.2	
2	PCell	20MHz	R.35-1 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.3	4
	SCell	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)			70	16.3	
3	PCell	10MHz	R.35-3 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.0	3
	SCell	20MHz	R.30-2 TDD	OP.1 TDD (Note 1)			70	13.2	
4	PCell	10MHz	R.35-3 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.0	4
	SCell	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)			70	16.3	
5	PCell	15MHz	R.35-2 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.0	3
	SCell	20MHz	R.30-2 TDD	OP.1 TDD (Note 1)			70	13.2	
6	PCell	15MHz	R.35-2 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.0	4
	SCell	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)			70	16.3	

Note 1: The OCNG pattern applies for each CC.
Note 2: The applicability and test rules of requirements for different CA configurations and bandwidth combination sets are defined in Table 8.1.2.3B-1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.1A

8.2.3.2.1A.4 Test description

8.2.3.2.1A.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.2.1A.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.2.1A.4.1-1.

Table 8.2.3.2.1A.4.1-1: Test point selection soft buffer management tests for TDD/FDD CA for FDD Pcell

CA Capability	Bandwidth combination		
	20+20	10+20	15+20

Inter-band CA2_A2	Test1 or 2	Test3 or 4	Test5 or 6
Only one test point is tested. Note 1: Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: One of the two tests per table position is selected, depending on UE category.			

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.2.3-1 and 8.2.3.2.1A.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.2.1A.4.3.

8.2.3.2.1A.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.2.1A.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.1A.3-1 and 8.2.3.2.1A.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.3.2.1A.5-1 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.1A.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions

Table 8.2.3.2.1A.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.3.2.1A.4.3-2: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.3.2.1A.5 Test Requirements

Table 8.2.3.2.1A.5-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for the throughput test shall meet or exceed the specified value in Table 8.2.3.2.1A.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.2.1A.5-1: Test Requirement (FRC) for CA

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value			UE cate gory
						Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band	

1	PCell	20MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.2	11.7	3
	SCell	20MHz	R.30 TDD	OP.1 TDD (Note 1)			70	13.2	11.7	
2	PCell	20MHz	R.35-1 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.3	14.8	4
	SCell	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)			70	16.3	14.8	
3	PCell	10MHz	R.35-3 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.0	14.5	3
	SCell	20MHz	R.30-2 TDD	OP.1 TDD (Note 1)			70	13.2	11.7	
4	PCell	10MHz	R.35-3 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.0	14.5	4
	SCell	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)			70	16.3	14.8	
5	PCell	15MHz	R.35-2 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.0	14.5	3
	SCell	20MHz	R.30-2 TDD	OP.1 TDD (Note 1)			70	13.2	11.7	
6	PCell	15MHz	R.35-2 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	16.0	14.5	4
	SCell	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)			70	16.3	14.8	

Note 1: The OCNG pattern applies for each CC.
Note 2: The applicability and test rules of requirements for different CA configurations and bandwidth combination sets are defined in 8.1.2.3B.

8.2.3.2.1.3 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for FDD PCell (4DL CA)

8.2.3.2.1.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.3.2.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 or higher that support E-UTRA FDD and TDD and 4DL CA with FDD as PCELL.

8.2.3.2.1.3.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.2.1.3.3-1 based on single carrier requirement specified in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3, with the addition of the parameters in Table 8.2.3.2.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of large delay CDD with 2 transmitter antennas.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.2.1.3.3-1: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥8
8	2x15+2x20	2x15+20	20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.1.

8.2.3.2.1.3.4 Test description

8.2.3.2.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.2.1.3.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.2.1.3.4.1-1.

Table 8.2.3.2.1.3.4.1-1: Test point selection for TM3 TDD FDD 4DL CA FDD PCell

CA Applicability		Bandwidth combination						
	FDD cell	20	2x20	20+15	2x15	2x20+15	2x15+20	2x20+10
	TDD cell	3x20	2x20	2x20	2x20	20	20	20
Inter-band CA (two bands) (CA4_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (three bands) (CA4_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (four bands) (CA4_A4)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.								

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate.

2. The parameter settings for Pcell are set up according to Tables 8.2.3-1, 8.2.3.2.1.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.2.1.3.4.3.

8.2.3.2.1.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.2.1.3.4.3

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.1.1.3-1 and 8.2.3.2.1.1.3-2 or 8.2.3.2.1.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.2.1.3.5-1 and 8.2.3.2.1.3.5-2.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.1.3.4.3 Message contents

Same as in clause 8.2.3.2.1.1.4.3.

8.2.3.2.1.3.5 Test requirement

Tables 8.2.3.2.1.3.5-1 and 8.2.3.2.1.3.5-2 define the primary level settings. For TDD FDD CA with FDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.2.1.3.5-3 based on single carrier requirement specified in Tables 8.2.3.2.1.3.5-1 and 8.2.3.2.1.3.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.2.1.2.5-1 or 8.2.3.2.1.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.2.1.3.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8

Table 8.2.3.2.1.3.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9

Table 8.2.3.2.1.3.5-3: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	CA Bandwidth combination (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.2.1.3.5-1and Table 8.2.3.2.1.3.5-2 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.2.1.3.5-1and Table 8.2.3.2.1.3.5-2 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.2.1.3.5-1and Table 8.2.3.2.1.3.5-2 per CC	≥8
4	2x15+2x20	2x15	2x20	As defined in Table 8.2.3.2.1.3.5-1and Table 8.2.3.2.1.3.5-2 per CC	≥8
5	3x20+15	2x20+15	20	As defined in Table 8.2.3.2.1.3.5-1and Table 8.2.3.2.1.3.5-2 per CC	≥8
6	2x15+2x20	2x15+20	20	As defined in Table 8.2.3.2.1.3.5-1and Table 8.2.3.2.1.3.5-2 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.2.1.3.5-1and Table 8.2.3.2.1.3.5-2 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					
Note 2: 30usec timing difference between PCell and any SCell is applied in inter-band CA case, where PCell can be assigned on any CC.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.2.1.4 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for FDD PCell (5DL CA)

8.2.3.2.1.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.3.2.1.4.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8, or categories 11 and onwards that support E-UTRA FDD and TDD and 5DL CA with FDD as PCELL.

8.2.3.2.1.4.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 5DL CCs, the requirements are specified in Table 8.2.3.2.1.4.3-1 based on single carrier requirement specified in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3, with the addition of the parameters in Table 8.2.3.2.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of large delay CDD with 2 transmitter antennas.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.2.1.4.3-1: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.2.1.1.3-2 and Table 8.2.3.2.1.1.3-3 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.1.

8.2.3.2.1.4.4 Test description

8.2.3.2.1.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.2.1.4.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.2.1.4.4.1-1.

Table 8.2.3.2.1.4.4.1-1: Test point selection for TM3 TDD FDD 5DL CA FDD PCell

CA Capability	Bandwidth combination	
FDD CELL	15+2×20	2×15+20
TDD CELL	2×20	2×20
Inter-band CA (two bands) (CA5_A2)	Test1	Test2
Inter-band CA (three bands) (CA5_A3)	Test1	Test2
Inter-band_CA (four bands) (CA_A4)	Test1	Test2
Inter-band_CA (five bands) (CA_A5)	Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate.
2. The parameter settings for Pcell are set up according to Tables 8.2.3-1, 8.2.3.2.1.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.2.1.4.4.3.

8.2.3.2.1.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.2.1.4.4.3
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.1.1.3-1 and 8.2.3.2.1.1.3-2 or 8.2.3.2.1.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.3.2.1.4.5-1 and 8.2.3.2.1.4.5-2.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.1.4.4.3 Message contents

Same as in clause 8.2.3.2.1.1.4.3.

8.2.3.2.1.4.5 Test requirement

Tables 8.2.3.2.1.4.5-1 and 8.2.3.2.1.4.5-2 define the primary level settings.

For TDD FDD CA with FDD PCell and 5DL CCs, the requirements are specified in Table 8.2.3.2.1.4.5-3 based on single carrier requirement specified in Tables 8.2.3.2.1.4.5-1 and 8.2.3.2.1.4.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.2.1.4.5-1 or 8.2.3.2.1.4.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.2.1.4.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8

Table 8.2.3.2.1.4.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9

Table 8.2.3.2.1.4.5-3: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.2.1.4.5-1 and Table 8.2.3.2.1.4.5-2 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.2.1.4.5-1 and Table 8.2.3.2.1.4.5-2 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.2.2 TDD FDD CA PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols) for TDD PCell

8.2.3.2.2.1 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (2DL CA)

8.2.3.2.2.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports with different channel models and MCS using large delay CDD.

8.2.3.2.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories of ≥5 that support E-UTRA FDD and TDD and 2DL CA with TDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.2.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.2.2.1.3-1: and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.2.2.1.3-2 and 8.2.3.2.2.1.3-3 for the specified SNR. For performance the bandwidths specified in article 5.4.2A are verified.

For TDD FDD CA with TDD PCell and 2 DL CCs, the requirements are specified in Table 8.2.3.2.2.1.3-4, based on single carrier requirement specified in Table 8.2.3.2.2.1.3-2 and 8.2.3.2.2.1.3-3.

Table 8.2.3.2.2.1.3-1: Test Parameters for Large Delay CDD (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 0$.			
Note 2: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.3.2.2.1.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.6
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.8
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9

Table 8.2.3.2.2.1.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.2
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.6
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.9
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.0

Table 8.2.3.2.2.1.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.2

8.2.3.2.2.1.4 Test description

8.2.3.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.2.2.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.2.2.1.4.1-1.

Table 8.2.3.2.2.1.4.1-1: Test point selection for TM3 TDD FDD 2DL CA TDD PCell

CA Capability	Bandwidth Combination		
	20+20	20+10	20+15
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test3
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.			

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Tables 8.2.3-1 and 8.2.3.2.2.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.2.2.1.4.3.

8.2.3.2.2.1.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in Table 8.2.3.2.2.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.2.1.3-1, 8.2.3.2.2.1.5-1 and 8.2.3.2.2.1.5-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.3.2.2.1.5-1 and Table 8.2.3.2.2.1.5-2 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions.

Table 8.2.3.2.2.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.2.2.1.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.3.2.2.1.5 Test Requirements

Tables 8.2.3.2.2.1.5-1 and 8.2.3.2.2.1.5-2 define the primary level settings.

For TDD FDD CA with TDD PCell and 2DL CCs, the requirements are specified in Table 8.2.3.2.2.1.5-3 based on single carrier requirement specified in Tables 8.2.3.2.2.1.5-1 and 8.2.3.2.2.1.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.2.2.1.5-1 or 8.2.3.2.2.1.5-2 for the specified SNR including test tolerances for all throughput tests

Table 8.2.3.2.2.1.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5	13
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7	12.2
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3

Table 8.2.3.2.2.1.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1	12.6
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5	12
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8	12.3
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9	12.4

Table 8.2.3.2.2.1.5-3: Test requirement for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.2.2.1.5-1 and Table 8.2.3.2.2.1.5-2 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.2.2.1.5-1 and Table 8.2.3.2.2.1.5-2 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.2.2.1.5-1 and Table 8.2.3.2.2.1.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.2.2.2 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (3DL CA)

8.2.3.2.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports with different channel models and MCS using large delay CDD.

8.2.3.2.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories ≥5 that support E-UTRA FDD and TDD and 3DL CA with TDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.2.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.2.2.1.3-1: and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.2.2.1.3-2 and 8.2.3.2.2.1.3-3 for the specified SNR. For performance the bandwidths specified in article 5.4.2A are verified

For TDD FDD CA with TDD Pcell and 3 DL CCs, the requirements are specified in Table 8.2.3.2.2.2.3-4, based on single carrier requirement specified in Table 8.2.3.2.2.1.3-2 and 8.2.3.2.2.1.3-3.

Table 8.2.3.2.2.2.3-4: Minimum performance for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.2.2.2.3-2 and Table 8.2.3.2.2.2.3-3 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.2.2.2.3-2 and Table 8.2.3.2.2.2.3-3 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.2.2.2.3-2 and Table 8.2.3.2.2.2.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.2

8.2.3.2.2.2.4 Test description

8.2.3.2.2.2.4.1 Initial conditions

Same as in clause 8.2.3.2.2.1.4.1 with the following exceptions:

- Instead of Table 8.2.3.2.2.1.4.1-1 → use Table 8.2.3.2.2.2.4.1-1
- Instead of Figure group 36 as appropriate → use Figure A.60
- Instead of clause 8.2.3.2.2.1.4.3 → use clause 8.2.3.2.2.2.4.3

Table 8.2.3.2.2.2.4.1-1: Test point selection for TM3 TDD FDD 3DL CA TDD PCell

CA Capability	Bandwidth Combination		
	20+20+20	20+20+15	20+20+10
Inter-band CA (two bands) (CA3_A2)	Test 1	Test 2	Test 3
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.			

8.2.3.2.2.2.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in Table 8.2.3.2.2.2.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.2.1.3-1, 8.2.3.2.2.2.5-1 and 8.2.3.2.2.2.5-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.3.2.2.2.5-1 and Table 8.2.3.2.2.2.5-2 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions.

Table 8.2.3.2.2.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.2.2.1.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD or FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.3.2.2.2.5 Test Requirements

Tables 8.2.3.2.2.2.5-1 and 8.2.3.2.2.2.5-2 define the primary level settings.

For TDD FDD CA with TDD PCell and 3DL CCs, the requirements are specified in Table 8.2.3.2.2.2.5-3 based on single carrier requirement specified in Tables 8.2.3.2.2.2.5-1 and 8.2.3.2.2.2.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.2.2.2.5-1 or 8.2.3.2.2.2.5-2 for the specified SNR including test tolerances for all throughput tests

Table 8.2.3.2.2.2.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5	13
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2	11.7
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7	12.2
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8	12.3

Table 8.2.3.2.2.2.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1	12.6
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5	12
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7	12.2
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8	12.3
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9	12.4

Table 8.2.3.2.2.2.5-3: Test requirement for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.2.2.2.5-1 and Table 8.2.3.2.2.2.5-2 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.2.2.2.5-1 and Table 8.2.3.2.2.2.5-2 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.2.2.2.5-1 and Table 8.2.3.2.2.2.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.2.2.3 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (4DL CA)

8.2.3.2.2.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports with different channel models and MCS using large delay CDD.

8.2.3.2.2.3.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 and above that support E-UTRA FDD and TDD and 4DL CA with TDD as PCELL.

8.2.3.2.2.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.2.2.1.3-1: and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.2.2.1.3-2 and 8.2.3.2.2.1.3-3 for the specified SNR. For performance the bandwidths specified in article 5.4.2A are verified

For TDD FDD CA with TDD Pcell and 4DL CCs, the requirements are specified in Table 8.2.3.2.2.3.3-1, based on single carrier requirement specified in Table 8.2.3.2.2.1.3-2 and 8.2.3.2.2.1.3-3.

Table 8.2.3.2.2.3.3-1: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥8
8	2x15+2x20	2x15+20	20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.2

8.2.3.2.2.3.4 Test description

8.2.3.2.2.3.4.1 Initial conditions

Same as in clause 8.2.3.2.2.1.4.1 with the following exceptions:

- Instead of Table 8.2.3.2.2.1.4.1-1 → use Table 8.2.3.2.2.3.4.1-1
- Instead of Figure group 36 as appropriate → use Figure A.60
- Instead of clause 8.2.3.2.2.1.4.3 → use clause 8.2.3.2.2.3.4.3

Table 8.2.3.2.2.3.4.1-1: Test point selection for TM3 CA

CA Applicability		Bandwidth combination							
	FDD cell	20	2x20	20+15	2x15	2x20+15	2x15+20	2x20+10	2x15+20
	TDD cell	3x20	2x20	2x20	2x20	20	20	20	20
Inter-band CA (two bands) (CA4_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8
Inter-band CA (three bands) (CA4_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8
Inter-band CA (four bands) (CA4_A4)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.									

8.2.3.2.2.3.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in Table 8.2.3.2.2.3.4.3.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.2.1.3-1, 8.2.3.2.2.3.5-1 and 8.2.3.2.2.3.5-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.3.2.2.2.5-1 and Table 8.2.3.2.2.2.5-2 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions.

Table 8.2.3.2.2.3.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.3.2.2.3.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD or FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.3.2.2.3.5 Test Requirements

Tables 8.2.3.2.2.3.5-1 and 8.2.3.2.2.3.5-2 define the primary level settings.

For TDD FDD CA with TDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.2.2.3.5-3 based on single carrier requirement specified in Tables 8.2.3.2.2.3.5-1 and 8.2.3.2.2.3.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.2.2.3.5-1 or 8.2.3.2.2.3.5-2 for the specified SNR including test tolerances for all throughput tests

Table 8.2.3.2.2.3.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8

Table 8.2.3.2.2.3.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9

Table 8.2.3.2.2.3.5-3: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.2.2.3.5-1 and Table 8.2.3.2.2.3.5-2 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.2.2.3.5-1 and Table 8.2.3.2.2.3.5-2 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.2.2.3.5-1 and Table 8.2.3.2.2.3.5-2 per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.2.2.3.5-1 and Table 8.2.3.2.2.3.5-2 per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.2.2.3.5-1 and Table 8.2.3.2.2.3.5-2 per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.2.2.3.5-1 and Table 8.2.3.2.2.3.5-2 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.2.2.3.5-1 and Table 8.2.3.2.2.3.5-2 per CC	≥8
8	2x15+2x20	2x15+20	20	As defined in Table 8.2.3.2.2.3.5-1 and Table 8.2.3.2.2.3.5-2 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.2.2.4 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (5DL CA)

8.2.3.2.2.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports with different channel models and MCS using large delay CDD.

8.2.3.2.2.4.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 or 11 and above that support E-UTRA FDD and TDD and 5DL CA with TDD as PCELL.

8.2.3.2.2.4.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.2.2.1.3-1: and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.2.2.1.3-2 and 8.2.3.2.2.1.3-3 for the specified SNR. For performance the bandwidths specified in article 5.4.2A are verified

For TDD FDD CA with TDD Pcell and 5DL CCs, the requirements are specified in Table 8.2.3.2.2.4.3-1, based on single carrier requirement specified in Table 8.2.3.2.2.1.3-2 and 8.2.3.2.2.1.3-3.

Table 8.2.3.2.2.4.3-1: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.2.2.1.3-2 and Table 8.2.3.2.2.1.3-3 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.2

8.2.3.2.2.4.4 Test description

8.2.3.2.2.4.4.1 Initial conditions

Same as in clause 8.2.3.2.2.1.4.1 with the following exceptions:

- Instead of Table 8.2.3.2.2.1.4.1-1 → use Table 8.2.3.2.2.4.4.1-1
- Instead of Figure group 36 as appropriate → use Figure A.60
- Instead of clause 8.2.3.2.2.1.4.3 → use clause 8.2.3.2.2.4.4.3

Table 8.2.3.2.2.4.4.1-1: Test point selection for TM3 CA

CA Applicability		Bandwidth combination	
	FDD Cell	15+2×20	2×15+20

	TDD Cell	2×20	2×20
Inter-band CA (two bands) (CA5_A2)		Test1	Test2
Inter-band CA (three bands) (CA5_A3)		Test1	Test2
Inter-band_CA (four bands) (CA5_A4)		Test1	Test2
Inter-band_CA (five bands) (CA5_A5)		Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

8.2.3.2.2.4.4.2 Test Procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in Table 8.2.3.2.2.4.4.3.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.3.2.2.1.3-1, 8.2.3.2.2.4.5-1 and 8.2.3.2.2.4.5-2 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.3.2.2.4.5-1 and Table 8.2.3.2.2.4.5-2 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions.

Table 8.2.3.2.2.4.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.3.2.2.4.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional TDD or FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.3.2.2.4.5 Test Requirements

Tables 8.2.3.2.2.4.5-1 and 8.2.3.2.2.4.5-2 define the primary level settings.

For TDD FDD CA with TDD PCell and 5DL CCs, the requirements are specified in Table 8.2.3.2.2.4.5-3 based on single carrier requirement specified in Tables 8.2.3.2.2.4.5-1 and 8.2.3.2.2.4.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.2.2.4.5-1 or 8.2.3.2.2.4.5-2 for the specified SNR including test tolerances for all throughput tests

Table 8.2.3.2.2.4.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	14.5
3 MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.2
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.7
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8

Table 8.2.3.2.2.4.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.1
3 MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.5
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.7
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.8
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9

Table 8.2.3.2.2.4.5-3: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.2.2.4.5-1 and Table 8.2.3.2.2.4.5-2 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.2.2.4.5-1 and Table 8.2.3.2.2.4.5-2 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.2.2A TDD FDD CA PDSCH Soft buffer management test for TDD PCell (2DL CA)

8.2.3.2.2A.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports with different channel models and MCS using large delay CDD.

8.2.3.2.2A.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of Category 3 or 4 that support E-UTRA FDD and TDD and 2DL CA with TDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.2.2A.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2, with the addition of the relevant parameters in Tables 8.2.3-1, 8.2.3.2.2A.3-1: and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.3.2.2A.3-2 for the specified SNR. For performance the bandwidths specified in article 5.4.2A are verified.

Table 8.2.3.2.2A.3-1: Test Parameters for CA

Parameter		Unit	Value	
			FDD Carrier	TDD Carrier
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
PDSCH transmission mode			3	3
Note 1: $P_B = 1$.				
Note 2: The same PDSCH transmission mode is applied to each component carrier.				

Table 8.2.3.2.2A.3-2: Minimum performance (FRC) for CA

Test num.	Band-width		Reference channel	OCNG pattern	Propa-gation condi-tion	Correl ation matrix and anten na config .	Reference value		UE cate-gory
							Fraction of maximum throughput (%)	SNR (dB)	
1	**PCell**	20MHz	R.30-2 TDD	OP.1 TDD (Note 1))	EVA70	2x2 Low	70	13.2	3
	SCell	20MHz	R.30 FDD	OP.1 FDD (Note 1			70	13.2	
2	**PCell**	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	16.2	4
	SCell	20MHz	R.35-1 FDD	OP.1 FDD (Note 1)			70	16.2	
3	**PCell**	20MHz	R.30-2 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.2	3
	SCell	10MHz	R.35-3 FDD	OP.1 FDD (Note 1)			70	16.0	
4	**PCell**	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	16.2	4
	SCell	10MHz	R.35-3 FDD	OP.1 FDD (Note 1)			70	15.8	
5	**PCell**	20MHz	R.30-2 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.2	3
	SCell	15MHz	R.35-2 FDD	OP.1 FDD (Note 1)			70	15.8	
6	**PCell**	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	16.2	4
	SCell	15MHz	R.35-2 FDD	OP.1 FDD (Note 1)			70	15.8	
Note 1: The OCNG pattern applies for each CC. Note 2: The applicability and test rules of requirements for different CA configurations and bandwidth combination sets are defined in Table 8.1.2.3B-1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.2.2A.

8.2.3.2.2A.4 Test description

8.2.3.2.2A.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.2.2A.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.2.2A.4.1-1.

Table 8.2.3.2.2A.4.1-1: Test point selection soft buffer management tests for TDD/FDD CA for TDD Pcell

CA Capability	Bandwidth combination		
	20+20	20+10	20+15

Inter-band CA2_A2	Test1 or 2	Test3 or 4	Test5 or 6
Only one test point is tested. Note 1: Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: One of the two tests per table position is selected, depending on UE category.			

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.2.3-1 and 8.2.3.2.2A.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.2.2A.4.3.

8.2.3.2.2A.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.3.2.2A.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.2.3.2.2A.3-1 and 8.2.3.2.2A.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.3.2.2A.5-1 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.2.2A.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions

Table 8.2.3.2.2A.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.3.2.2A.4.3-2: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10	11	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.3.2.2A.5 Test Requirements

Table 8.2.3.2.2A.5-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A3.3.2 and A3.4.2 for the throughput test shall meet or exceed the specified value in Table 8.2.3.2.2A.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.2.2A.5-1: Test Requirement (FRC) for CA

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value			UE cate-gory
						Fraction of maximum throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band	

1	**PCell**	20MHz	R.30-2 TDD	OP.1 TDD (Note 1))	EVA70	2x2 Low	70	13.2	11.7	3
	SCell	20MHz	R.30 FDD	OP.1 FDD (Note 1			70	13.2	11.7	
2	**PCell**	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	16.2	13.7	4
	SCell	20MHz	R.35-1 FDD	OP.1 FDD (Note 1)			70	16.2	13.7	
3	**PCell**	20MHz	R.30-2 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.2	11.7	3
	SCell	10MHz	R.35-3 FDD	OP.1 FDD (Note 1)			70	16.0	14.5	
4	**PCell**	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	16.2	14.7	4
	SCell	10MHz	R.35-3 FDD	OP.1 FDD (Note 1)			70	15.8	14.3	
5	**PCell**	20MHz	R.30-2 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.2	11.7	3
	SCell	15MHz	R.35-2 FDD	OP.1 FDD (Note 1)			70	15.8	14.3	
6	**PCell**	20MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	16.2	14.7	4
	SCell	15MHz	R.35-2 FDD	OP.1 FDD (Note 1)			70	15.8	14.3	

Note 1: The OCNG pattern applies for each CC.
Note 2: The applicability and test rules of requirements for different CA configurations and bandwidth combination sets are defined in Table 8.1.2.3B-1.

8.2.3.3 TDD FDD CA PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.3.3.1 TDD FDD CA PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols) for FDD PCell

8.2.3.3.1.1 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (2DL CA)

8.2.3.3.1.1.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.2.3.3.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support E-UTRA FDD and TDD and 2DL CA with FDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.3.1.1.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 2DL CCs, the requirements are specified in Table 8.2.3.3.1.1.3-4 based on single carrier requirement specified in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3, with the addition of the parameters in Table 8.2.3.3.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.3.1.1.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	Wideband precoding for 1.4MHz, 4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)	FDD CC	ms	8
	TDD CC	ms	10 or 11
Reporting interval	FDD CC	ms	1
	TDD CC	ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111100000000000000000
CSI request field (Note 3)			‘10’
PDSCH transmission mode			4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.
Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.3.3.1.1.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.3

Table 8.2.3.3.1.1.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.0
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	9.8
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.0
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.5
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.6
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7

Table 8.2.3.3.1.1.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.3.1.

8.2.3.3.1.1.4 Test description

8.2.3.3.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.3.1.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.3.1.1.4.1-1.

Table 8.2.3.3.1.1.4.1-1: Test point selection for TM4 TDD FDD 2DL CA FDD PCell

CA Capability	Bandwidth Combination		
	20+20	20+10	20+15
Inter-band (CA_A2)	Test 1	Test 2	Test 3
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.46 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for Pcell are set up according to Tables 8.2.3-1, 8.2.3.3.1.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.3.1.1.4.3.

8.2.3.3.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-2, *CQI-ReportConfig--r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-6.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.3.3.1.1.3-1 and 8.2.3.3.1.1.3-2 or 8.2.3.3.1.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.

5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to ‘10’ and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.3.3.1.1.5-1 or 8.2.3.3.1.1.5-2 as appropriate.

7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.3.3.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions:

Table 8.2.3.3.1.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.3.3.1.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.3.3.1.1.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000 00000000000011111111 11111111000000000000 0000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 8.2.3.3.1.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.3.3.1.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			RBC
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.3.3.1.1.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.3.3.1.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.3.3.1.1.4.3-7: *PUSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.2.3.3.1.1.5 Test requirement

Tables 8.2.3.3.1.1.5-1 and 8.2.3.3.1.1.5-2 define the primary level settings.

For TDD FDD CA with FDD PCell and 2DL CCs, the requirements are specified in Table 8.2.3.3.1.1.5-3 based on single carrier requirement specified in Table 8.2.3.3.1.1.5-1 and Table 8.2.3.3.1.1.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.3.1.1.5-1 or 8.2.3.3.1.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.3.1.1.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3	9.8
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2	9.7

Table 8.2.3.3.1.1.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9	10.4
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	9.2
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9	9.4
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4	9.9
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5	10.0
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	10.1

Table 8.2.3.3.1.1.5-3: Test requirement for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.3.1.1.5-1 and Table 8.2.3.3.1.1.5-2 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.3.1.1.5-1 and Table 8.2.3.3.1.1.5-2 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.3.1.1.5-1 and Table 8.2.3.3.1.1.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.3.1.2 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (3DL CA)

8.2.3.3.1.2.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.2.3.3.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support E-UTRA FDD and TDD and 3DL CA with FDD as PCell.

8.2.3.3.1.2.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 3DL CCs, the requirements are specified in Table 8.2.3.3.1.2.3-1 based on single carrier requirement specified in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3, with the addition of the parameters in Table 8.2.3.3.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.3.1.2.3-1: Minimum performance for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.3.1.

8.2.3.3.1.2.4 Test description

8.2.3.3.1.2.4.1 Initial conditions

Same as in clause 8.2.3.3.1.1.4.1 with the following exceptions:

- Instead of Table 8.2.3.3.1.1.4.1-1 → use Table 8.2.3.3.1.2.4.1-1

- Instead of Figure group 46 as appropriate → use Figure A.61
- Instead of clause 8.2.3.3.1.1.4.3 → use clause 8.2.3.3.1.2.4.3

- **Table 8.2.3.3.1.2.4.1-1: Test point selection for TM4 TDD FDD 3DL CA FDD PCell**

CA Capability	Bandwidth Combination		
	20+20+20	20+20+15	20+20+10
Inter-band CA (two bands) (CA3_A2)	Test 1	Test 2	Test 3
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.			

8.2.3.3.1.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-2, *CQI-ReportConfig-r10--DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-6.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.3.3.1.1.3-1 and 8.2.3.3.1.1.3-2 or 8.2.3.3.1.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.
5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.
6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.3.3.1.2.5-1 or 8.2.3.3.1.2.5-2 as appropriate.
7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.3.3.1.2.4.3 Message contents

Same as in clause 8.2.3.3.1.1.4.3 with the following exceptions:

- Instead of Table 8.2.3.3.1.1.4.3-5 → use Table 8.2.3.3.1.2.4.3-1
- use Table 8.2.3.3.1.2.4.3-2

Table 8.2.3.3.1.2.4.3-1: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11100000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.3.3.1.2.4.3-2: *PUSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.2.3.3.1.2.5 Test requirement

Tables 8.2.3.3.1.2.5-1 and 8.2.3.3.1.2.5-2 define the primary level settings.

For TDD FDD CA with FDD PCell and 3DL CCs, the requirements are specified in Table 8.2.3.3.1.2.5-3 based on single carrier requirement specified in Tables 8.2.3.3.1.2.5-1 and 8.2.3.3.1.2.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.3.1.2.5-1 or 8.2.3.3.1.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.3.1.2.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2

Table 8.2.3.3.1.2.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6

Table 8.2.3.3.1.2.5-3: Minimum performance for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test Requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.3.1.2.5-1 and Table 8.2.3.3.1.2.5-2 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.3.1.2.5-1 and Table 8.2.3.3.1.2.5-2 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.3.1.2.5-1 and Table 8.2.3.3.1.2.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.3.1.3 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (4DL CA)

8.2.3.3.1.3.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.2.3.3.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 or higher that support E-UTRA FDD and TDD and 4DL CA with FDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.3.1.3.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.3.1.3.3-1 based on single carrier requirement specified in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3, with the addition of the parameters in Table 8.2.3.3.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.3.1.3.3-1: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.3.1.

8.2.3.3.1.3.4 Test description

8.2.3.3.1.3.4.1 Initial conditions

Same as in clause 8.2.3.3.1.1.4.1 with the following exceptions:

- Instead of Table 8.2.3.3.1.1.4.1-1 → use Table 8.2.3.3.1.3.4.1-1
- Instead of Figure group 46 as appropriate → use Figure A.61
- Instead of clause 8.2.3.3.1.1.4.3 → use clause 8.2.3.3.1.3.4.3

Table 8.2.3.3.1.3.4.1-1: Test point selection for TM4 TDD FDD 4DL CA FDD PCell

CA Applicability		Bandwidth combination						
	FDD cell	20	2x20	20+15	2x15	2x20+15	2x15+20	2x20+10
	TDD cell	3x20	2x20	2x20	2x20	20	20	20
Inter-band CA (two bands) (CA4_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (three bands) (CA4_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (four bands) (CA4_A4)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA								

8.2.3.3.1.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-2, *CQI-ReportConfig-r10--DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.3.3.1.3.4.3-1, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-6.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.3.3.1.1.3-1, 8.2.3.3.1.1.3-2 and 8.2.3.3.1.3.3-1. The SS sends downlink MAC padding bits on the DL RMC.

5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.3.3.1.3.5-1 or 8.2.3.3.1.3.5-2 as appropriate.

7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.3.3.1.3.4.3 Message contents

Same as in clause 8.2.3.3.1.1.4.3 with the following exceptions:

- Instead of Table 8.2.3.3.1.1.4.3-5 → use Table 8.2.3.3.1.3.4.3-1

Table 8.2.3.3.1.3.4.3-1: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11110000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.3.3.1.3.5 Test requirement

For TDD FDD CA with FDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.3.1.3.5-3 based on single carrier requirement specified in Tables 8.2.3.3.1.3.5-1 and 8.2.3.3.1.3.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.3.1.3.5-1 or 8.2.3.3.1.3.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.3.1.3.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3	9.8
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2	9.7

Table 8.2.3.3.1.3.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9	10.4
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	9.2
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9	9.4
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4	9.9
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5	10.0
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	10.1

Table 8.2.3.3.1.3.5-3: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.3.1.3.5-1 and Table 8.2.3.3.1.3.5-2 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.3.1.3.5-1 and Table 8.2.3.3.1.3.5-2 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.3.1.3.5-1 and Table 8.2.3.3.1.3.5-2 per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.3.1.3.5-1 and Table 8.2.3.3.1.3.5-2 per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.3.1.3.5-1 and Table 8.2.3.3.1.3.5-2 per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.3.1.3.5-1 and Table 8.2.3.3.1.3.5-2 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.3.1.3.5-1 and Table 8.2.3.3.1.3.5-2 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.3.1.4 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (5DL CA)

8.2.3.3.1.4.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.2.3.3.1.4.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8, or categories 11 and above that support E-UTRA FDD and TDD and 5DL CA with FDD as PCELL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.3.1.4.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.3.1.4.3-1 based on single carrier requirement specified in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3, with the addition of the parameters in Table 8.2.3.3.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.3.1.4.3-1: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.3.1.1.3-2 and Table 8.2.3.3.1.1.3-3 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.3.1.

8.2.3.3.1.4.4 Test description

8.2.3.3.1.4.4.1 Initial conditions

Same as in clause 8.2.3.3.1.1.4.1 with the following exceptions:

- Instead of Table 8.2.3.3.1.1.4.1-1 → use Table 8.2.3.3.1.4.4.1-1
- Instead of Figure group 46 as appropriate → use Figure A.61
- Instead of clause 8.2.3.3.1.1.4.3 → use clause 8.2.3.3.1.4.4.3

Table 8.2.3.3.1.4.4.1-1: Test point selection for TM4 CA TDD FDD 5DL CA FDD PCell

CA Capability	**Bandwidth combination**	
FDD CELL	15+2×20	2×15+20
TDD CELL	2×20	2×20
Inter-band CA (two bands) (CA5_A2)	Test1	Test2
Inter-band CA (three bands) (CA5_A3)	Test1	Test2
Inter-band_CA (four bands) (CA_A4)	Test1	Test2
Inter-band_CA (five bands) (CA_A5)	Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

8.2.3.3.1.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-2, *CQI-ReportConfig-r10--DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.3.3.1.4.4.3-1, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.3.3.1.1.4.3-6.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.3.3.1.1.3-1, 8.2.3.3.1.1.3-2 and 8.2.3.3.1.4.3-1. The SS sends downlink MAC padding bits on the DL RMC.
5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.
6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.3.3.1.4.5-1 or 8.2.3.3.1.4.5-2 as appropriate.
7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.3.3.1.4.4.3 Message contents

Same as in clause 8.2.3.3.1.1.4.3 with the following exceptions:

- Instead of Table 8.2.3.3.1.1.4.3-5 → use Table 8.2.3.3.1.4.4.3-1

Table 8.2.3.3.1.4.4.3-1: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11111000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.3.3.1.4.5 Test requirement

For TDD FDD CA with FDD PCell and 5DL CCs, the requirements are specified in Table 8.2.3.3.1.4.5-3 based on single carrier requirement specified in Tables 8.2.3.3.1.4.5-1 and 8.2.3.3.1.4.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.3.1.4.5-1 or 8.2.3.3.1.4.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.3.1.4.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3	9.8
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2	9.7

Table 8.2.3.3.1.4.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9	10.4
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	9.2
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9	9.4
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4	9.9
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5	10.0
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	10.1

Table 8.2.3.3.1.4.5-3: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.3.1.4.5-1 and Table 8.2.3.3.1.4.5-2 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.3.1.4.5-1 and Table 8.2.3.3.1.4.5-2 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.3.2 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell

8.2.3.3.2.1 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (2DL CA)

8.2.3.3.2.1.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.2.3.3.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support E-UTRA FDD and TDD and 2DL CA with TDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.3.2.1.3 Minimum conformance requirements

For TDD FDD CA with TDD PCell and 2DL CCs, the requirements are specified in Table 8.2.3.3.2.1.3-4 based on single carrier requirement specified in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3, with the addition of the parameters in Table 8.2.3.3.2.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.3.2.1.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	Wideband pre-coding for 1.4MHz, 4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)	FDD CC	ms	8
	TDD CC	ms	10 or 11
Reporting interval	FDD CC	ms	1
	TDD CC	ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111100000000000000000
CSI request field (Note 3)			'10'
PDSCH transmission mode			TM4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.
Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.3.3.2.1.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.3

Table 8.2.3.3.2.1.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
					Fraction of Maximum Throughput (%)	SNR (dB)
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.0
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	9.8
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.0
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.5
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.6
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7

Table 8.2.3.3.2.1.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.3.3.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.3.2.

8.2.3.3.2.1.4 Test description

8.2.3.3.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.3.2.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.3.2.1.4.1-1.

Table 8.2.3.3.2.1.4.1-1: Test point selection for TM4 TDD FDD 2DL CA TDD PCell

CA Capability	Bandwidth Combination		
	20+20	20+10	20+15
Inter-band (CA_A2)	Test 1	Test 2	Test 3
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group 46 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for Pcell are set up according to Tables 8.2.3-1, 8.2.3.3.2.1.3-1as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.3.2.1.4.3.

8.2.3.3.2.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-2, *CQI-ReportConfig-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-6.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.3.3.2.1.3-1 and 8.2.3.3.2.1.3-2 or 8.2.3.3.2.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.

5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to ‘10’ and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.3.3.2.1.5-1 or 8.2.3.3.2.1.5-2 as appropriate.

7. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.3.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions:

Table 8.2.3.3.2.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.3.3.2.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000000011111111111111110000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.3.3.2.1.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000000000000000000011111111111111110000000000000000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			

Table 8.2.3.3.2.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.3.3.2.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			RBC
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.3.3.2.1.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.3.3.2.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.3.3.2.1.4.3-7: *PUSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.2.3.3.2.1.5 Test requirement

Tables 8.2.3.3.2.1.3-1 define the primary level settings.

For TDD FDD CA with TDD PCell and 2DL CCs, the requirements are specified in Table 8.2.3.3.2.1.5-3 based on single carrier requirement specified in Table 8.2.3.3.2.1.5-1 and Table 8.2.3.3.2.1.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.3.2.1.5-1 or 8.2.3.3.2.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.3.2.1.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3	[9.8]
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	[8.9]
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	[8.9]
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	[9.5]
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	[9.5]
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2	[9.7]

Table 8.2.3.3.2.1.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9	[10.4]
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	[9.2]
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9	[9.4]
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4	[9.9]
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5	[10]
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	[10.1]

Table 8.2.3.3.2.1.5-3: Test requirement for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.2.3.3.2.1.5-1 and Table 8.2.3.3.2.1.5-2 per CC	≥5
2	20+10	10	20	As defined in Table 8.2.3.3.2.1.5-1 and Table 8.2.3.3.2.1.5-2 per CC	≥5
3	20+15	15	20	As defined in Table 8.2.3.3.2.1.5-1 and Table 8.2.3.3.2.1.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.3.2.2 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (3DL CA)

8.2.3.3.2.2.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.2.3.3.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support E-UTRA FDD and TDD and 3DL CA with TDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.3.2.2.3 Minimum conformance requirements

For TDD FDD CA with TDD PCell and 3DL CCs, the requirements are specified in Table 8.2.3.3.2.2.3-1 based on single carrier requirement specified in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3, with the addition of the parameters in Table 8.2.3.3.2.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.3.2.2.3-1: Minimum performance for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.3.2.

8.2.3.3.2.2.4 Test description

8.2.3.3.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.3.2.2.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.3.2.2.4.1-1

Table 8.2.3.3.2.2.4.1-1: Test point selection for TM4 TDD FDD 3DL CA TDD PCell

CA Capability	Bandwidth Combination		
	3x20	20+20+15	20+20+10
Inter-band CA (two bands) (CA3_A2)	Test1	Test2	Test3
Inter-band CA (three	Test1	Test2	Test3

bands) (CA3_A3)			
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for Pcell are set up according to Tables 8.2.3-1, 8.2.3.3.2.1.3-1as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.3.2.2.4.3.

8.2.3.3.2.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-2, *CQI-ReportConfig-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-6.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.3.3.2.1.3-1 and 8.2.3.3.2.1.3-2 or 8.2.3.3.2.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.

5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to ‘10’ and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.3.3.2.1.5-1 or 8.2.3.3.2.1.5-2 as appropriate.

7. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.3.2.2.4.3 Message contents

Same Message contents as in clause 8.2.3.3.2.1.4.3 with the following exceptions:

- Instead of Table 8.2.3.3.2.1.4.3-5 → use Table 8.2.3.3.2.2.4.3-1

Table 8.2.3.3.2.2.4.3-1: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11100000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.3.3.2.2.5 Test requirement

Tables 8.2.3.3.2.1.3-1 define the primary level settings.

For TDD FDD CA with TDD PCell and 3DL CCs, the requirements are specified in Table 8.2.3.3.2.2.5-1 based on single carrier requirement specified in Table 8.2.3.3.2.1.5-1 and Table 8.2.3.3.2.1.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.3.2.1.5-1 or 8.2.3.3.2.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.3.2.2.5-1: Test requirement for multiple CA configurations with 3DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Test Requirement	UE Category
	Total	FDD CC	TDD CC		
1	3x20	20	2x20	As defined in Table 8.2.3.3.2.1.5-1 and Table 8.2.3.3.2.1.5-2 per CC	≥5
2	20+20+15	15	2x20	As defined in Table 8.2.3.3.2.1.5-1 and Table 8.2.3.3.2.1.5-2 per CC	≥5
3	20+20+10	10	2x20	As defined in Table 8.2.3.3.2.1.5-1 and Table 8.2.3.3.2.1.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.3.2.3 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (4DL CA)

8.2.3.3.2.3.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.2.3.3.2.3.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 and above that support E-UTRA FDD and TDD and 4DL CA with TDD as PCELL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.3.2.3.3 Minimum conformance requirements

For TDD FDD CA with TDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.3.2.3.3-1 based on single carrier requirement specified in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3, with the addition of the parameters in Table 8.2.3.3.2.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.3.2.3.3-1: Minimum performance for multiple CA configurations with 4DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.3.2.

8.2.3.3.2.3.4 Test description

8.2.3.3.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.3.2.3.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.3.2.3.4.1-1

Table 8.2.3.3.2.3.4.1-1: Test point selection for TM4 TDD FDD 4DL CA TDD PCell

CA Applicability		Bandwidth combination						
	FDD cell	20	2x20	20+15	2x15	2x20+15	2x15+20	2x20+10
	TDD cell	3x20	2x20	2x20	2x20	20	20	20

Inter-band CA (two bands) (CA4_A2)	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (three bands) (CA4_A3)	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Inter-band CA (four bands) (CA4_A4)	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.							

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for Pcell are set up according to Tables 8.2.3-1, 8.2.3.3.2.1.3-1as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.3.2.3.4.3.

8.2.3.3.2.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-2, *CQI-ReportConfig-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.3.3.2.3.4.3-1, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-6.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.3.3.2.1.3-1, 8.2.3.3.2.1.3-2 and 8.2.3.3.2.3.3-1. The SS sends downlink MAC padding bits on the DL RMC.

5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.3.3.2.3.5-1 or 8.2.3.3.2.3.5-2 as appropriate.

7. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.3.2.3.4.3 Message contents

Same Message contents as in clause 8.2.3.3.2.1.4.3 with the following exceptions:

- Instead of Table 8.2.3.3.2.1.4.3-5 → use Table 8.2.3.3.2.3.4.3-1

Table 8.2.3.3.2.3.4.3-1: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11110000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.3.3.2.3.5 Test requirement

For TDD FDD CA with TDD PCell and 4DL CCs, the requirements are specified in Table 8.2.3.3.2.3.5-3 based on single carrier requirement specified in Table 8.2.3.3.2.3.5-1 and Table 8.2.3.3.2.3.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.3.2.3.5-1 or 8.2.3.3.2.3.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.3.2.3.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3	9.8
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2	9.7

Table 8.2.3.3.2.3.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9	10.4
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	9.2
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9	9.4
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4	9.9
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5	10
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	10.1

Table 8.2.3.3.2.3.5-3: Test requirement for multiple CA configurations with 4DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	4x20	20	3x20	As defined in Table 8.2.3.3.2.3.5-1 and Table 8.2.3.3.2.3.5-2 per CC	≥8
2	4x20	2×20	2×20	As defined in Table 8.2.3.3.2.3.5-1 and Table 8.2.3.3.2.3.5-2 per CC	≥8
3	3x20+15	20+15	2×20	As defined in Table 8.2.3.3.2.3.5-1 and Table 8.2.3.3.2.3.5-2 per CC	≥8
4	2×15+2x20	2×15	2x20	As defined in Table 8.2.3.3.2.3.5-1 and Table 8.2.3.3.2.3.5-2 per CC	≥8
5	3x20+15	2×20+15	20	As defined in Table 8.2.3.3.2.3.5-1 and Table 8.2.3.3.2.3.5-2 per CC	≥8
6	2×15+2x20	2x15+20	20	As defined in Table 8.2.3.3.2.3.5-1 and Table 8.2.3.3.2.3.5-2 per CC	≥8
7	3x20+10	2x20+10	20	As defined in Table 8.2.3.3.2.3.5-1 and Table 8.2.3.3.2.3.5-2 per CC	≥8
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.3.3.2.4 TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (5DL CA)

8.2.3.3.2.4.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.2.3.3.2.4.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 8 or 11 and above that support E-UTRA FDD and TDD and 5DL CA with TDD as PCELL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.2.3.3.2.4.3 Minimum conformance requirements

For TDD FDD CA with TDD PCell and 5DL CCs, the requirements are specified in Table 8.2.3.3.2.4.3-1 based on single carrier requirement specified in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3, with the addition of the parameters in Table 8.2.3.3.2.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.3.3.2.4.3-1: Minimum performance for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.3.2.1.3-2 and Table 8.2.3.3.2.1.3-3 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

The normative reference for this requirement is TS 36.101 [2] clause 8.2.3.3.2.

8.2.3.3.2.4.4 Test description

8.2.3.3.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.2.3.3.2.4.4.1-1.

CA Capability to be tested: Select one according to Table 8.2.3.3.2.4.4.1-1

Table 8.2.3.3.2.4.4.1-1: Test point selection for TM4 TDD FDD 5DL CA TDD PCell

CA Applicability		Bandwidth combination	
	FDD Cell	15+2×20	2×15+20
	TDD Cell	2×20	2×20
Inter-band CA (two bands) (CA5_A2)		Test1	Test2
Inter-band CA (three bands) (CA5_A3)		Test1	Test2
Inter-band_CA (four bands) (CA5_A4)		Test1	Test2
Inter-band_CA (five bands) (CA5_A5)		Test1	Test2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.61 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.87 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for Pcell are set up according to Tables 8.2.3-1, 8.2.3.3.2.1.3-1as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.3.3.2.4.4.3.

8.2.3.3.2.4.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-2, *CQI-ReportConfig-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.3.3.2.4.4.3-1, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 8.2.3.3.2.1.4.3-6.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.3.3.2.1.3-1, 8.2.3.3.2.1.3-2 and 8.2.3.3.2.4.3-1. The SS sends downlink MAC padding bits on the DL RMC.

5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.3.3.2.4.5-1 or 8.2.3.3.2.4.5-2 as appropriate.

7. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.2.3.3.2.4.4.3 Message contents

Same Message contents as in clause 8.2.3.3.2.1.4.3 with the following exceptions:

- Instead of Table 8.2.3.3.2.1.4.3-5 → use Table 8.2.3.3.2.4.4.3-1

Table 8.2.3.3.2.4.4.3-1: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11111000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.3.3.2.4.5 Test requirement

For TDD FDD CA with TDD PCell and 5DL CCs, the requirements are specified in Table 8.2.3.3.2.4.5-3 based on single carrier requirement specified in Table 8.2.3.3.2.4.5-1 and Table 8.2.3.3.2.4.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.3.3.2.4.5-1 or 8.2.3.3.2.4.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.3.3.2.4.5-1: Single carrier test requirement with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3	9.8
3 MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4	8.9
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.0	9.5
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2	9.7

Table 8.2.3.3.2.4.5-2: Single carrier test requirement with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		
					Fraction of Maximum Throughput (%)	SNR (dB) for CC on 2Rx supported RF band	SNR (dB) for CC on 4Rx supported RF band
1.4 MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9	10.4
3 MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	9.2
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9	9.4
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4	9.9
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5	10
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	10.1

Table 8.2.3.3.2.4.5-3: Test requirement for multiple CA configurations with 5DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	15+4×20	15+2×20	2×20	As defined in Table 8.2.3.3.2.4.5-1 and Table 8.2.3.3.2.4.5-2 per CC	8, ≥11
2	2×15+3×20	2×15+20	2×20	As defined in Table 8.2.3.3.2.4.5-1 and Table 8.2.3.3.2.4.5-2 per CC	8, ≥11
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3B.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.4 LAA

8.2.4.1 LAA PDSCH CA Closed-Loop Spatial Multiplexing Performance

8.2.4.1.1 LAA PDSCH CA Closed Loop Spatial Multiplexing Performance with 4 Tx Antenna port and with FDD as Pcell (FDD single carrier)

8.2.4.1.1.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with frequency selective precoding for CA with LAA SCell(s).

8.2.4.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD Release 13 and forward UEs of category ≥5 that support LAA with E-UTRA FDD as PCell.

8.2.4.1.1.3 Minimum conformance requirements

The parameters specified in Table 8.2.4.1.1.3-1 are valid for FDD CC and LAA SCell(s) unless otherwise stated. And the additional parameters specified in Table 8.2.4.1.1.3-2 are valid for LAA SCell(s).

Table 8.2.4.1.1.3-1: Common Test Parameters

Parameter	Unit	Value
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	8
Maximum number of HARQ transmission (Note 1)		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM
Cyclic Prefix		Normal
Cell_ID		0
Cross carrier scheduling		Not configured
Note 1: For retransmission in partial subframes, the TB size should be kept the same as the initial transmission regardless of the initial transmission is performed in full subframes or partial subframes.		

Table 8.2.4.1.1.3-2: Additional Test Parameters for LAA SCell(s)

Parameter	Unit	Value
DMTC Periodicity	ms	80
dmtc-PeriodOffset-r12 ms80-r12		0
Discovery signal occasion duration	subframe	1
Power allocation of discovery signal		Same as power allocation of CRS within a transmission burst in the test

For CA with LAA SCell(s), the requirements are specified in Table 8.2.4.1.1.3-4, with the addition of the parameters in Table 8.2.4.1.1.3-1, Table 8.2.4.1.1.3-2, Table 8.2.4.1.1.3-3 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.4.1.1.3-3: Test Parameters for Dual-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000 00111111111111111100000000000000
CSI request field (Note 3)			'10'
PDSCH transmission mode			TM4
DL Burst transmission pattern for LAA SCell			As specified in B.8
The number of subframes set (S_1) in a burst			{1,3,5,8}
Occupied OFDM symbols set in the last subframe			{6,9,12,14}
Random variable *p* defined in B.8			0.5
timing error relative of LAA SCell to PCell		μs	0
Frequency offset of th *i*-th LAA SCell relative to PCell		Hz	200

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.
Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.4.1.1.3-4: Single carrier performance for PCell for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
3MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	9.5
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.1
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.3

Table 8.2.4.1.1.3-5: Single carrier performance for LAA SCell(s) for multiple CA configurations

Band-width	Sub-test (Note 2)	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of nominal maximum throughput (%) (Note 1)	SNR (dB)
20MHz	1	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	18.7
	2	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	18.6
	3	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	18.9
	4	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19

Note 1: Fraction of nominal maximum throughput is calculated based on random transmission occasions of PDSCH.

Note 2: An UE is required to fulfil only one test of Sub-test 1-4 depending on UE capabilities of endingDwPTS and secondSlotStartingPosition. For an UE not supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 1; For an UE not supporting endingDwPTS but supporting secondSlotStartingPosition, it is required to fulfil Sub-test 2; For an UE supporting endingDwPTS but not supporting secondSlotStartingPosition, it is required to fulfil Sub-test 3; and For an UE supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 4.

Table 8.2.4.1.1.3-6: Minimum performance (FRC) based on single carrier performance for CA with LAA SCell(s)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement (Note 2)	UE Category
	Total	PCell	LAA SCell		
1	2x20	20	20	As defined in Table 8.2.4.1.1.3-4 and Table 8.2.4.1.1.3-5	≥5

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3C.

Note 2: Apply a per-CC requirement defined in 8.2.4.1.1.3-4 for PCell and apply a per-CC requirement defined in 8.2.4.1.1.3-5 for LAA SCell.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.4.1.1

8.2.4.1.1.4 Test description

8.2.4.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: 2x20MHz, according to Table 8.2.4.1.1.3-6.

CA Capability to be tested: According to Table 8.2.4.1.1.3-6

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.46 as appropriate.
2. The parameter settings for Pcell are set up according to Table 8.2.4.1.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.4.1.1.4.3.

8.2.4.1.1.4.2 Test procedure

1. Configure the LAA SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels. The parameter settings for the LAA SCC are specified in 8.2.4.1.1.3-1 and 8.2.4.1.1.3-2. Additionally, the SS shall configure the PCC and the SCC according to 8.2.4.1.1.3-3.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.4.1.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.2.4.1.1.3-4 for PCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.4.1.1.3-2 and 8.2.4.1.1.3-5 for LAA SCC. The SS sends downlink MAC padding bits on the DL RMC. SS transmits PDCCH DCI format 1C for CC_RNTI every sub-frame to indicate number of OFDM symbols in the DwPTS of ending partial subframe if required depending on UE capability according to TS 36.213 clause 13A as described in Table 8.2.4.1.1.3-5.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.4.1.1.5-1 and 8.2.4.1.1.5-2 for the PCell and the LAA SCell, respectively.

7. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and LAA SCC. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval, for each component carrier and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.4.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.4.1.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.4.1.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000000011111111111111110000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.4.1.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			RBC
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.4.1.1.4.3-4: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	Configure report for PCell and SCell (index = {0,1})	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.4.1.1.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000000000000000000011111111111111110000000000000000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
Laa-ScellConfiguration-r13 SEQUENCE {			
subframeStartPosition	‘s0’ or ‘s07’	Depending on UE capability, as described in Table 8.4.3.1.1.3-3	
Laa-SCellSubframeConfig	‘00000000’		
}			
}			

Table 8.2.4.1.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.4.1.1.4.3-7: PUCCH-ConfigDedicated-v1020-DEFAULT

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-9A			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {			
pucch-Format-r10 CHOICE {			
format3-r10 SEQUENCE {			
n3PUCCH-AN-List-r10 SEQUENCE {	4		
	101		
	102		
	103		
	104		
}			
twoAntennaPortActivatedPUCCH-Format3-r10	Not present		
}			
}			
}			

Table 8.2.4.1.1.4.3-8: RadioResourceConfigCommon-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigCommon-DEFAULT ::= SEQUENCE {			
tdd-Config	Not present		
}			

Table 8.2.4.1.1.4.3-9: MeasDS-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.6			
Information Element	**Value/remark**	**Comment**	**Condition**
MeasDS-Config-DEFAULT ::= CHOICE {			
release	NULL		
setup SEQUENCE {			
dmtc-PeriodOffset-r12 CHOICE {			
ms80-r12	0		
}			
ds-OccasionDuration-r12 CHOICE {			
durationTDD-r12	2		
}			
}			
}			

Table 8.2.4.1.1.4.3-10: *Void*

8.2.4.1.1.5 Test requirement

Table 8.2.4.1.1.5-3 defines the test requirements based on the single carrier performance requirements for the FDD PCell defined in Table 8.2.4.1.1.5-1 and on the single carrier performance requirements for the LAA SCell defined in Table 8.2.4.1.1.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for the FDD PCell and A.8 for the LAA SCell, for the selected throughput test, shall meet or exceed the specified value in Tables 8.2.4.1.1.5-1 and 8.2.4.1.1.5-2, respectively, for the specified SNR including test tolerances and uncertainties.

Table 8.2.4.1.1.5-1: Single carrier performance for PCell for multiple CA configurations

Band-width	**Reference channel**	**OCNG pattern**	**Propa-gation condi-tion**	**Correlation matrix and antenna config.**	**Reference value**	
					Fraction of maximum throughput (%)	**SNR (dB)**
1.4MHz	R.14-4 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.3
3MHz	R.14-5 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
5MHz	R.14-6 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.4
10MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11
15MHz	R.14-7 FDD	OP.1 FDD	EVA5	4x2 Low	70	11
20MHz	R.14-3 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.2

Table 8.2.4.1.1.5-2: Single carrier performance for LAA SCell(s) for multiple CA configurations

Band-width	Sub-test (Note 2)	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of nominal maximum throughput (%) (Note 1)	SNR (dB)
20MHz	1	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19.6
	2	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19.5
	3	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19.8
	4	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19.9

Note 1: Fraction of nominal maximum throughput is calculated based on random transmission occasions of PDSCH.

Note 2: An UE is required to fulfil only one test of Sub-test 1-4 depending on UE capabilities of endingDwPTS and secondSlotStartingPosition. For an UE not supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 1; For an UE not supporting endingDwPTS but supporting secondSlotStartingPosition, it is required to fulfil Sub-test 2; For an UE supporting endingDwPTS but not supporting secondSlotStartingPosition, it is required to fulfil Sub-test 3; and For an UE supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 4.

Table 8.2.4.1.1.5-3: Minimum performance (FRC) based on single carrier performance for CA with LAA SCell(s)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement (Note 2)	UE Category
	Total	PCell	LAA SCell		
1	2x20	20	20	As defined in Table 8.2.4.1.1.5-1 and Table 8.2.4.1.1.5-2	≥5

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3C.

Note 2: Apply a per-CC requirement defined in 8.2.4.1.1.5-1 for PCell and apply a per-CC requirement defined in 8.2.4.1.1.5-2 for LAA SCell.

8.2.4.1.2 LAA PDSCH CA Closed Loop Spatial Multiplexing Performance with 4 Tx Antenna port and with TDD as Pcell (TDD single carrier)

8.2.4.1.2.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with frequency selective precoding for CA with LAA SCell(s).

8.2.4.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD Release 13 and forward UEs of category ≥5 that support LAA with E-UTRA TDD as PCell.

8.2.4.1.2.3 Minimum conformance requirements

The parameters specified in Table 8.2.4.1.2.3-1 are valid for TDD CC and LAA SCell(s) unless otherwise stated. And the additional parameters specified in Table 8.2.4.1.2.3-2 are valid for LAA SCell(s).

Table 8.2.4.1.2.3-1: Common Test Parameters (TDD)

Parameter	Unit	Value
Uplink downlink configuration (Note 1)		1
Special subframe configuration (Note 2)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	7
Maximum number of HARQ transmission (Note 3)		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM
Cross carrier scheduling		Not configured
Note 1: as specified in Table 4.2-2 in TS 36.211 [4]. Note 2: as specified in Table 4.2-1 in TS 36.211 [4]. Note 3: For retransmission in partial subframes, the TB size should be kept the same as the initial transmission regardless of the initial transmission is performed in full subframes or partial subframes.		

Table 8.2.4.1.2.3-2: Additional Test Parameters for LAA SCell(s)

Parameter	Unit	Value
DMTC Periodicity	ms	80
dmtc-PeriodOffset-r12 ms80-r12		0
Discovery signal occasion duration	subframe	1
Power allocation of discovery signal		Same as power allocation of CRS within a transmission burst in the test

For CA with LAA SCell(s), the requirements are specified in Table 8.2.4.1.2.3-4, with the addition of the parameters in Table 8.2.4.1.2.3-1, Table 8.2.4.1.2.3-2, Table 8.2.4.1.2.3-3 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.2.4.1.2.3-3: Test Parameters for Dual-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000011111111111111111000000000000000
CSI request field (Note 4)			'10'
PDSCH transmission mode			TM4
DL Burst transmission pattern for LAA SCell			As specified in B.8
The number of subframes set (S_1) in a burst			{1,3,5,8}
Occupied OFDM symbols set in the last subframe			{6,9,12,14}
Random variable *p* defined in B.8			0.5
timing error relative of LAA SCell to PCell		μs	0
Frequency offset of th *i*-th LAA SCell relative to PCell		Hz	200

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.
Note 4: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.
Note 5: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3.
Note 6: The same PDSCH transmission mode is applied to each component carrier.

Table 8.2.4.1.2.3-4: Single carrier performance for PCell for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.0
3MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	9.8
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.0
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.5
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.6
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7

Table 8.2.4.1.2.3-5: Single carrier performance for LAA SCell for multiple CA configurations

Bandwidth	Sub-test (Note 2)	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of maximum throughput (%) (Note 1)	SNR (dB)
20MHz	1	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	18.7
	2	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	18.6
	3	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	18.9
	4	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19

Note 1: Fraction of nominal maximum throughput is calculated based on random transmission occasions of PDSCH.

Note 2: An UE is required to fulfil only one test of Sub-test 1-4 depending on UE capabilities of endingDwPTS and secondSlotStartingPosition. For an UE not supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 1; For an UE not supporting endingDwPTS but supporting secondSlotStartingPosition, it is required to fulfil Sub-test 2; For an UE supporting endingDwPTS but not supporting secondSlotStartingPosition, it is required to fulfil Sub-test 3; and For an UE supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 4.

Table 8.2.4.1.2.3-6: Minimum performance (FRC) based on single carrier performance for CA with LAA SCell(s)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement (Note 2)	UE Category
	Total	PCell	LAA SCell		
1	2x20	20	20	As defined in Table 8.2.4.1.2.3-4 and Table 8.2.4.1.2.3-5	≥5

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3C.

Note 2: Apply a per-CC requirement defined in 8.2.4.1.2.3-4 for PCell and apply a per-CC requirement defined in 8.2.4.1.2.3-5 for LAA SCell.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.4.1.2

8.2.4.1.2.4 Test description

8.2.4.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: 2x20MHz, according to Table 8.2.4.1.2.3-6.

CA Capability to be tested: According to Table 8.2.4.1.2.3-6

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.46 as appropriate.
2. The parameter settings for Pcell are set up according to Table 8.2.4.1.2.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.4.1.2.4.3.

8.2.4.1.1.4.2 Test procedure

1. Configure the LAA SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels. The parameter settings for the LAA SCC are specified in 8.2.4.1.2.3-1 and 8.2.4.1.2.3-2. Additionally, the SS shall configure the PCC and the SCC according to 8.2.4.1.2.3-3.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.4.1.2.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.2.4.1.2.3-4 for PCC. The SS sends downlink MAC padding bits on the DL RMC.

5. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.4.1.2.3-2 and 8.2.4.1.2.3-5 for LAA SCC. The SS sends downlink MAC padding bits on the DL RMC. SS transmits PDCCH DCI format 1C for CC_RNTI every sub-frame to indicate number of OFDM symbols in the DwPTS of ending partial subframe if required depending on UE capability according to TS 36.213 clause 13A as described in Table 8.2.4.1.2.3-5.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.4.1.2.5-1 and 8.2.4.1.2.5-2 for the PCell and the LAA SCell, respectively.

7. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on both PCC and LAA SCC. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval, for each component carrier and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.4.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.4.1.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.4.1.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000000011111111111111111000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.2.4.1.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			RBC
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.4.1.2.4.3-4: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	Configure report for PCell and SCell (index = {0,1})	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.2.4.1.2.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000000000000000000011111111111111110000000000000000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
Laa-ScellConfiguration-r13 SEQUENCE {			
subframeStartPosition	‘s0’ or ‘s07’	Depending on UE capability, as described in Table 8.4.3.1.1.3-3	
Laa-SCellSubframeConfig	‘00000000’		
}			
}			

Table 8.2.4.1.2.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.2.4.1.2.4.3-7: PUCCH-ConfigDedicated-v1020-DEFAULT

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-9A			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {			
pucch-Format-r10 CHOICE {			
format3-r10 SEQUENCE {			
n3PUCCH-AN-List-r10 SEQUENCE {	4		
	101		
	102		
	103		
	104		
}			
twoAntennaPortActivatedPUCCH-Format3-r10	Not present		
}			
}			
}			

Table 8.2.4.1.2.4.3-8: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa1		
specialSubframePatterns	Ssp4		
}			

Table 8.2.4.1.2.4.3-9: MeasDS-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.6			
Information Element	**Value/remark**	**Comment**	**Condition**
MeasDS-Config-DEFAULT ::= CHOICE {			
release	NULL		
setup SEQUENCE {			
dmtc-PeriodOffset-r12 CHOICE {			
ms80-r12	0		
}			
ds-OccasionDuration-r12 CHOICE {			
durationTDD-r12	2		
}			
}			
}			

Table 8.2.4.1.2.4.3-10: *Void*

8.2.4.1.2.5 Test requirement

Table 8.2.4.1.2.5-3 defines the test requirements based on the single carrier performance requirements for the TDD PCell defined in Table 8.2.4.1.2.5-1 and on the single carrier performance requirements for the LAA SCell defined in Table 8.2.4.1.2.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for the TDD PCell and A.8 for the LAA SCell, for the selected throughput test, shall meet or exceed the specified value in Tables 8.2.4.1.2.5-1 and 8.2.4.1.2.5-2, respectively, for the specified SNR including test tolerances and uncertainties.

Table 8.2.4.1.2.5-1: Single carrier performance for PCell for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.43-1 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.9
3MHz	R.43-2 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7
5MHz	R.43-3 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.9
10MHz	R.43-4 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.4
15MHz	R.43-5 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.5
20MHz	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6

Table 8.2.4.1.2.5-2: Single carrier performance for LAA SCell for multiple CA configurations

Bandwidth	Sub-test (Note 2)	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of maximum throughput (%) (Note 1)	SNR (dB)
20MHz	1	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19.6
	2	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19.5
	3	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19.8
	4	R.1 FS3	OP.1 FS3	EVA5	4x2 Low	70	19.9

Note 1: Fraction of nominal maximum throughput is calculated based on random transmission occasions of PDSCH.

Note 2: An UE is required to fulfil only one test of Sub-test 1-4 depending on UE capabilities of endingDwPTS and secondSlotStartingPosition. For an UE not supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 1; For an UE not supporting endingDwPTS but supporting secondSlotStartingPosition, it is required to fulfil Sub-test 2; For an UE supporting endingDwPTS but not supporting secondSlotStartingPosition, it is required to fulfil Sub-test 3; and For an UE supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 4.

Table 8.2.4.1.2.5-3: Minimum performance (FRC) based on single carrier performance for CA with LAA SCell(s)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement (Note 2)	UE Category
	Total	PCell	LAA SCell		
1	2x20	20	20	As defined in Table 8.2.4.1.2.5-1 and Table 8.2.4.1.2.5-2	≥5

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3C.

Note 2: Apply a per-CC requirement defined in 8.2.4.1.2.5-1 for PCell and apply a per-CC requirement defined in 8.2.4.1.2.5-2 for LAA SCell.

8.3 Demodulation of PDSCH (User-Specific Reference Symbols)

8.3.1 FDD

The parameters specified in Table 8.3.1-1 are valid for FDD unless otherwise stated.

Table 8.3.1-1: Common Test Parameters for User-specific Reference Symbols

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM
Number of OFDM symbols for PDCCH	OFDM symbols	2
Precoder update granularity		Frequency domain: 1 PRG for Transmission mode 9 and 10 Time domain: 1 ms
Note 1: Void Note 2: Void		

8.3.1.1 FDD PDSCH Single-layer Spatial Multiplexing Performance (UE-Specific Reference Symbols)

8.3.1.1.1_D FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO

8.3.1.1.1_D.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port and multiple CSI reference symbols configurations with non-zero and zero transmission power.

8.3.1.1.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support eDL-MIMO. Applicability requires support for FGI bit 103.

8.3.1.1.1_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.1.1_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.1.1_D.3-2 for the specified SNR.

Table 8.3.1.1.1_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

parameter		Unit	Test 1	Test 2	Test 3
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3	-3

Beamforming model		Annex B.4.1	Annex B.4.1	Annex B.4.1
Cell-specific reference signals		Antenna ports 0,1		
CSI reference signals		Antenna ports 15,…,18	Antenna ports 15,…,18	Antenna ports 15, …, 18
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}	Subframes	5 / 2	5 / 2	5 / 2
CSI reference signal configuration		0	3	0
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	3 / 0001000000000000	3 / 0001000000000000	3 / 0001000000000000
N_{oc} at antenna port	dBm/15kHz	-98	-98	-98
Symbols for unused PRBs		OCNG (Note 4)	OCNG (Note 4)	OCNG (Note 4)
Number of allocated resource blocks (Note 2)	PRB	50	50	50
Simultaneous transmission		No	Yes (Note 3, 5)	No
PDSCH transmission mode		9	9	9

Note 1: $P_B = 1$.
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.
Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.
Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.

Table 8.3.1.1.1_D.3-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	UE DL Category
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	10 MHz QPSK 1/3	R.43 FDD	OP.1 FDD	EVA5	2x2 Low	70	-1	≥1	≥6
3	10MHz 256QAM	R. 66 FDD	OP.1 FDD	EPA5	2x2 Low	70	24.3	11-12	≥11

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1.

8.3.1.1.1_D.4 Test description

8.3.1.1.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.1.1_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.1_D.4.3.

8.3.1.1.1_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.1_D.3-1, 8.3.1.1.1_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.1.1_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15-18 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.1.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.1.1_D.4.3-1: *Void*

Table 8.3.1.1.1_D.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.3.1.1.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
}			
release	NULL		
}			

Table 8.3.1.1.1_D.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	3	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.1.1.1_D.5 Test requirement

Table 8.3.1.1.1_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.1.1.1_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.1.1_D.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.43 FDD	OP.1 FDD	EVA5	2x2 Low	70	-0.1	1-8

8.3.1.1.1_H FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO for 256QAM in DL

8.3.1.1.1_H.1 Test purpose

Same test purpose as defined in clause 8.3.1.1.1_D.1.

8.3.1.1.1_H.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 that support 256QAM in DL. Applicability requires support for FGI bit 103.

8.3.1.1.1_H.3 Minimum conformance requirements

Same minimum conformance requirements as defined in clause 8.3.1.1.1_D.3.

8.3.1.1.1_H.4 Test description

Same test description as defined in clause 8.3.1.1.1_D.4 with the following exceptions:

- Instead of Table 8.3.1.1.1_D.5-1 → use Table 8.3.1.1.1_H.5-1.

8.3.1.1.1_H.5 Test requirement

Same test requirement as defined in clause 8.3.1.1.1_D.5 with the following exceptions:

- Instead of Table 8.3.1.1.1_D.5-1 → use Table 8.3.1.1.1_H.5-1.

Table 8.3.1.1.1_H.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	UE DL Category
						Fraction of Maximum Throughput (%)	SNR (dB)		
3	10MHz 256QAM	R. 66 FDD	OP.1 FDD	EPA5	2x2 Low	70	25.2	11-12	≥11

8.3.1.1.2_D FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with a simultaneous transmission for eDL-MIMO

8.3.1.1.2_D.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 with a

simultaneous transmission on the other antenna port and multiple CSI reference symbols configurations with non-zero and zero transmission power.

8.3.1.1.2_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 103.

8.3.1.1.2_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.1.2_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.1.2_D.3-2 for the specified SNR.

Table 8.3.1.1.2_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	
CSI reference signals			Antenna ports 15,…,18	Antenna ports 15,…,18
Beamforming model			Annex B.4.1	Annex B.4.1
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$		Subframes	5 / 2	5 / 2
CSI reference signal configuration			0	3
Zero-power CSI-RS configuration $I_{\text{CSI-RS}}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0001000000000000	3 / 0001000000000000
N_{oc} at antenna port		dBm/15kHz	-98	-98
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)
Number of allocated resource blocks (Note 2)		PRB	50	50
Simultaneous transmission			No	Yes (Note 3, 5)
PDSCH transmission mode			9	9

Note 1: $P_B = 1$.

Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.

Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.

Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.

Table 8.3.1.1.2_D.3-2: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz 64QAM 1/2	R.50 FDD	OP.1 FDD	EPA5	2x2 Low	70	21.9	2-8
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1.

8.3.1.1.2_D.4 Test description

8.3.1.1.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.1.2_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.2_D.4.3.

8.3.1.1.2_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.2_D.3-1, 8.3.1.1.2_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.1.2_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) and another simultaneous transmission of DRS/PDSCH not for the test UE are sent on antenna port 8 (or 7). The DRS/PDSCH transmissions use two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15-18 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.1.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.1.2_D.4.3-1: Void

Table 8.3.1.1.2_D.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.3.1.1.2_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.1.1.2_D.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	3	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	0001000000000000	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.1.1.2_D.5 Test requirement

Table 8.3.1.1.2_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.1.1.2_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.1.2_D.5-1: Test requirement for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz 64QAM 1/2	R.50 FDD	OP.1 FDD	EPA5	2x2 Low	70	22.8	2-8
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

8.3.1.1.3 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type A

8.3.1.1.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4.

8.3.1.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that support enhanced receiver Type A. Applicability requires support for FGI bit 103.

8.3.1.1.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.1.3.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.1.3.3-2 for the specified SNR.

Table 8.3.1.1.3.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		Ms	8	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			0000000000000000 0000000000000000 0000000000000000 1111111111111111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A
Physical channel for CQI reporting			PUSCH(Note8)	N/A
cqi-pmi-ConfigurationIndex			5	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4:	The precoder in clause B.4.3 follows UE recommended PMI.
Note 5:	If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 6:	These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.
Note 8:	To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Table 8.3.1.1.3.3-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.48 FDD	OP.1 FDD	N/A	EVA5	EVA5	4x2 Low	70	-1.1	1-8
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1A.

8.3.1.1.3.4 Test description

8.3.1.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.49.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.1.3.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.3.4.3.

8.3.1.1.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.3.5-1, 8.3.1.1.3.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink

scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #4 and #9 (Table A.2.2.1.1-1).

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.1.3.5-2 as appropriate.
BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using four Tx antennas with beam-forming model as specified in Annex B.4.3 and precoder update granularity specified in Table 8.3.1.1.3.5-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.3.

3. Set the Cell2 –aggressor cell- as defined in Tables 8.3.1.1.3.5-1, 8.3.1.1.3.5-2 and according to Annex B.5.4.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.1.3.4.3-1: *Void*

Table 8.3.1.1.3.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000000000000000000 000000000000000000 000000000000111111 1111111111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.1.1.3.4.3-3: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 8.3.1.1.3.4.3-4: *CQI-ReportPeriodic-r10*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2AC CQI-ReportPeriodic-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	5	FDD	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	483	FDD	
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			

Table 8.3.1.1.3.4.3-5: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT using condition CQI_PERIODIC		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 8.3.1.1.3.4.3-6: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
pmi-RI-Report-r9	setup		
}			

8.3.1.1.3.5 Test requirement

Table 8.3.1.1.3.5-1 defines the primary level settings.

Table 8.3.1.1.3.5-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.45
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		Ms	8	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			0000000000000000 0000000000000000 0000000000000000 1111111111111111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A
Physical channel for CQI reporting			PUSCH(Note8)	N/A
cqi-pmi-ConfigurationIndex			5	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4:	The precoder in clause B.4.3 follows UE recommended PMI.
Note 5:	If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 6:	These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.
Note 8:	To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.1.1.3.5-2 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.1.3.5-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.48 FDD	OP.1 FDD	N/A	EVA5	EVA5	4x2 Low	70	-0.12	1-8
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

8.3.1.1.4 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model – Enhanced Performance Requirement Type B

8.3.1.1.4.1 Test purpose

The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7, 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 9 interference model defined in clause B.6.4.

8.3.1.1.4.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward that support enhanced performance requirement Type B. Applicability requires support for FGI bit 103.

8.3.1.1.4.3 Minimum conformance requirements

The requirements are specified in Table 8.3.1.1.4.3-2, with the addition of the parameters in Table 8.3.1.1.4.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.3.1.1.4.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.3.1.1.4.3-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PDSCH transmission mode			9	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Precoding			Random wideband precoding per TTI	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			Antenna ports 15, 16, 17, 18	Antenna ports 15, 16	Antenna ports 15, 16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	10 / 1	10 / 1	10 / 1
CSI reference signal configuration			5	6	7
Zero-power CSI-RS configuration I_{CSI-RS} /*ZeroPowerCSI-RS* bitmap		Subframes / bitmap	6 / 1000000000000000	6 / 0100000000000000	6 / 0010000000000000
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of [5].

Table 8.3.1.1.4.3-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration			Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.69 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	4x2 Low	2x2 Low	2x2 Low	85	18.5	≥1

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1C.

8.3.1.1.4.4 Test description

8.3.1.1.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.3.1.1.4.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.88.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.3.1.1.4.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.4.4.3.

8.3.1.1.4.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.4.5-1 and 8.3.1.1.4.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.3.1.1.4.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.3.1.1.4.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 or 8 using four Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity as specified in Table 8.3.1.1.4.5-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.
5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.3.1.1.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.3.1.1.4.4.3-1: PDSCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.1.4.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.1.1.4.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	5	Parameter: CSI reference signal configuration	
subframeConfig-r10	6	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}} - 5$ when CSI-RS SubframeConfig is from 5-14; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	1000000000000000	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	6	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.1.1.4.5 Test requirement

Table 8.3.1.1.4.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.3.1.1.4.5-2 for the specified SNR including test tolerances.

Table 8.3.1.1.4.5-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	14.71	4.14
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PDSCH transmission mode			9	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Precoding			Random wideband precoding per TTI	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			Antenna ports 15, 16, 17, 18	Antenna ports 15, 16	Antenna ports 15, 16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	10 / 1	10 / 1	10 / 1
CSI reference signal configuration			5	6	7
Zero-power CSI-RS configuration I_{CSI-RS} /*ZeroPowerCSI-RS* bitmap		Subframes / bitmap	6 / 1000000000000000	6 / 0100000000000000	6 / 0010000000000000
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause TS 36.331 6.3.2 of [5].

Table 8.3.1.1.4.5-2: Test Requirement for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration			Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.69 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	4x2 Low	2x2 Low	2x2 Low	85	20.35	≥1

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.

8.3.1.1.5 FDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with CRS Interference Model - Enhanced Performance Requirement Type B

8.3.1.1.5.1 Test purpose

The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by the CRS of the interfering cell, applying the CRS interference model defined in clause B.6.5

8.3.1.1.5.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward UE of Category 2 or higher that support enhanced performance requirement Type B.

8.3.1.1.5.3 Minimum conformance requirements

The requirements are specified in Table 8.3.1.1.5.3-2, with the addition of the parameters in Table 8.3.1.1.5.3-1 and the downlink physical channel setup according to Annex C.3.2. In 8.3.1.1.5.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.3.1.1.5.3-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with CRS interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (NOTE 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PDSCH transmission mode			8	N/A	N/A
Interference model			N/A	As specified in clause B.6.5	As specified in clause B.6.5
Precoding			Random wideband precoding per TTI	N/A	N/A
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (NOTE 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of [5].

Table 8.3.1.1.5.3-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with CRS interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.71 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	14.3	≥2
NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1D.

8.3.1.1.5.4 Test description

8.3.1.1.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.3.1.1.4.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.3.1.1.5.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.5.4.3.

8.3.1.1.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.6.5-1 and 8.3.1.1.6.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.3.1.1.6.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.3.1.1.6.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 or 8 using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity as specified in Table 8.3.1.1.6.5-1.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.

5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.3.1.1.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.3.1.1.5.4.3-1: PDSCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.1.5.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm8-v920		
codebookSubsetRestriction-r10	Not present		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

8.3.1.1.5.5 Test requirement

Table 8.3.1.1.5.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.3.1.1.5.5-2 for the specified SNR including test tolerances.

Table 8.3.1.1.5.5-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with CRS interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (NOTE 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.71	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PDSCH transmission mode			8	N/A	N/A
Interference model			N/A	As specified in clause B.6.5	As specified in clause B.6.5
Precoding			Random wideband precoding per TTI	N/A	N/A
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (NOTE 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of [5].

Table 8.3.1.1.5.5-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with CRS interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.71 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	15.2	≥2

NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

8.3.1.1.6 FDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM3 interference model - Enhanced Performance Requirement Type B

8.3.1.1.6.1 Test purpose

The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving

cell is interfered by PDSCH of two interfering cells applying transmission mode 3 interference model defined in clause B.6.2. In Table 8.3.1.1.6.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells.

8.3.1.1.6.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward that support enhanced performance requirement Type B.

8.3.1.1.6.3 Minimum conformance requirements

The requirements are specified in Table 8.3.1.1.6.3-2, with the addition of the parameters in Table 8.3.1.1.6.3-1 and the downlink physical channel setup according to Annex C.3.2. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.3.1.1.6.3-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with TM3 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	0	-3	-3
	ρ_B	dB	0 (Note 1)	-3	-3
	σ	dB	-3	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	3.28	0.74
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	Random from {1,2,3}	Random from {1,2,3}
PDSCH transmission mode			8	3	3
Interference model			N/A	As specified in clause B.6.2	As specified in clause B.6.2
Precoding			Random wideband precoding per TTI	As specified in clause B.6.2	As specified in clause B.6.2
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 8.3.1.1.6.3-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM3 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.70 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	11.5	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1E.

8.3.1.1.6.4 Test description

8.3.1.1.6.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.3.1.1.6.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.3.1.1.6.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.6.4.3.

8.3.1.1.6.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.6.5-1 and 8.3.1.1.6.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.3.1.1.6.5-1 as appropriate. The CFIs indicated in PCFICH are randomly selected per TTI.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.3.1.1.6.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 or 8 using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity as specified in Table 8.3.1.1.6.5-1.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.

5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.3.1.1.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.3.1.1.6.4.3-1: PDSCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.1.6.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm8-v920		
codebookSubsetRestriction-r10	Not present		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

8.3.1.1.6.5 Test requirement

Table 8.3.1.1.6.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.3.1.1.6.5-2 for the specified SNR including test tolerances.

Table 8.3.1.1.6.5-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with TM3 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	0	-3	-3
	ρ_B	dB	0 (Note 1)	-3	-3
	σ	dB	-3	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	4.08	1.54
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	Random from {1,2,3}	Random from {1,2,3}
PDSCH transmission mode			8	3	3
Interference model			N/A	As specified in clause B.6.2	As specified in clause B.6.2
Precoding			Random wideband precoding per TTI	As specified in clause B.6.2	As specified in clause B.6.2
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of [5].

Table 8.3.1.1.6.5-2: Test Requirement for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM3 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.70 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	13.04	≥1

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

8.3.1.1.7 FDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM10 serving cell configuration and TM9 interference model - Enhanced Performance Requirement Type B

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Information in Annex F is TBD

- Test Tolerances are undefined

8.3.1.1.7.1 Test purpose

The purpose of this test is to verify closed loop rank one performance of the UE, on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission configured with TM10 in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 9 interference model defined in clause B.6.4.

8.3.1.1.7.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward that support enhanced performance requirement Type B and PDSCH Transmission mode 10.

8.3.1.1.7.3 Minimum conformance requirements

The requirements are specified in Table 8.3.1.1.7.3-2, with the addition of the parameters in Table 8.3.1.1.7.3-1 and the downlink physical channel setup according to Annex C.3.2.

The NAICS network assistance is provided when the serving cell TM10 is configured with QCL-type A and PCID based DM-RS scrambling. The neighbouring cells have transmission mode TM9 and NeighCellsInfo-r12 for interfering cells indicates presence of TM9. In Table 8.3.1.1.7.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.3.1.1.7.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM10 serving cell configuration and TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PDSCH transmission mode			10	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Precoding			Random wideband precoding per TTI	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			Antenna ports 15, 16, 17, 18	Antenna ports 15, 16	Antenna ports 15, 16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	10 / 1	10 / 1	10 / 1
CSI reference signal configuration			5	6	7
Zero-power CSI-RS configuration I_{CSI-RS} /*ZeroPowerCSI-RS* bitmap		Subframes / bitmap	6 / 1000000000000000	6 / 0100000000000000	6 / 0010000000000000
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 8.3.1.1.7.3-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM10 serving cell configuration and TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration			Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.69 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	4x2 Low	2x2 Low	2x2 Low	85	18.2	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.													
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.													

The normative reference for these requirements is TS 36.101 [2] clause 8.3.1.1F.

8.3.1.1.7.4 Test description

8.3.1.1.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.3.1.1.7.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.88.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.3.1.1.7.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.7.4.3.

8.3.1.1.7.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.7.5-1 and 8.3.1.1.7.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.3.1.1.7.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.3.1.1.7.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 or 8 using four Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity as specified in Table 8.3.1.1.7.5-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.

5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.3.1.1.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.3.1.1.7.4.3-1: PDSCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.1.7.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.1.1.7.4.3-3: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	5	Parameter: CSI reference signal configuration	
subframeConfig-r10	6	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ -5 when CSI-RS SubframeConfig is from 5-14; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	1000000000000000	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	6	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.1.1.7.5 Test requirement

Table 8.3.1.1.7.5-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.3.1.1.7.5-2 for the specified SNR including test tolerances.

Table 8.3.1.1.7.5-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM10 serving cell configuration and TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91+TT	3.34+TT
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PDSCH transmission mode			10	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Precoding			Random wideband precoding per TTI	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			Antenna ports 15, 16, 17, 18	Antenna ports 15, 16	Antenna ports 15, 16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	10 / 1	10 / 1	10 / 1
CSI reference signal configuration			5	6	7
Zero-power CSI-RS configuration I_{CSI-RS} /*ZeroPowerCSI-RS* bitmap		Subframes / bitmap	6 / 1000000000000000	6 / 0100000000000000	6 / 0010000000000000
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 8.3.1.1.7.5-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM10 serving cell configuration and TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration			Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.69 FDD	OP.1 FDD	N/A	N/A	EPA5	EPA5	EPA5	4x2 Low	2x2 Low	2x2 Low	85	18.2 + TT	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.													
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.													

8.3.1.2 FDD PDSCH Dual-layer Spatial Multiplexing Performance (UE-Specific Reference Symbols)

8.3.1.2.1_D FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO

8.3.1.2.1_D.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.1.2.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 that support eDL-MIMO. Applicability requires support for FGI bit 103.

8.3.1.2.1_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.2.1_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.2.1_D.3-2 for the specified SNR.

Table 8.3.1.2.1_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0 and 1
CSI reference signals			Antenna ports 15,16
Beamforming model			Annex B.4.2
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2
CSI reference signal configuration			8
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Number of allocated resource blocks (Note 2)		PRB	50
Simultaneous transmission			No
PDSCH transmission mode			9
Note 1: $P_B = 1$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.1.2.1_D.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	EPA5	2x2 Low	70	13.3	2-8

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.2.

8.3.1.2.1_D.4 Test description

8.3.1.2.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.2.1_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.2.1_D.4.3.

8.3.1.2.1_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.2.1_D.3-1, 8.3.1.2.1_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.2.1_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.2.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.2.1_D.4.3-1: Void

Table 8.3.1.2.1_D.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.3.1.2.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.1.2.1_D.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.1.2.1_D.5 Test requirement

Table 8.3.1.2.1_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.3.1.2.1_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.2.1_D.5-1: Test requirement for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	EPA5	2x2 Low	70	14.2	2-8

8.3.1.2.1_D_1 FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO (Release 11 and forward)

8.3.1.2.1_D_1.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power, and to verify that the UE correctly estimate SNR.

8.3.1.2.1_D_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward. Applicability requires support for FGI bit 103.

8.3.1.2.1_D_1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.2.1_D_1.3-1 where Cell 1 is the serving cell and Cell 2 is the interfering cell. The downlink physical channel setup is set according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.2.1_D_1.3-2 for the specified SNR.

Table 8.3.1.2.1_D_1.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

Parameter		Unit	Test 1	
			Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
	PDSCH_RA	dB	4	NA
	PDSCH_RB	dB	4	NA

Cell-specific reference signals		Antenna ports 0 and 1	Antenna ports 0 and 1
Cell ID		0	126
CSI reference signals		Antenna ports 15,16	NA
Beamforming model		Annex B.4.2	NA
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}	Subframes	5 / 2	NA
CSI reference signal configuration		8	NA
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	3 / 0010000000000000	NA
N_{oc} at antenna port	dBm/15kHz	-98	-98
$\hat{E}_s / N_{oc}$		Reference Value in Table 8.3.1.2-2	7.25dB
Symbols for unused PRBs		OCNG (Note 2)	NA
Number of allocated resource blocks (Note 2)	PRB	50	NA
Simultaneous transmission		No	NA
PDSCH transmission mode		9	Blanked
Note 1: $P_B = 1$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.1.2.1_D_1.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern		Propagation Condition		Correlation Matrix and Antenna Configuration	Reference value		UE Category
			Cell1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	N/A	ETU5	ETU5	2x2 Low	70	14.2	≥2
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.2.

8.3.1.2.1_D_1.4 Test description

8.3.1.2.1_D_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.2.1_D_1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.2.1_D_1.4.3.

8.3.1.2.1_D_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.2.1_D_1.3-1, 8.3.1.2.1_D_1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.2.1_D_1.5-2 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Set Cell 2 as defined in Tables 8.3.1.2.1_D_1.5-1 and 8.3.1.2.1_D_1.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.2.1_D_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.2.1_D_1.4.3-1: Void

Table 8.3.1.2.1_D_1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.3.1.2.1_D_1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.1.2.1_D_1.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.1.2.1_D_1.5 Test requirement

Table 8.3.1.2.1_D_1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.3.1.2.1_D_1.5-1 and 8.3.1.2.1_D_1.5-2 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.2.1_D_1.5-1: Test Requirement for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Test 1	
			Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	4	0
	ρ_B	dB	4 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0 and 1	Antenna ports 0 and 1
Cell ID			0	126
CSI reference signals			Antenna ports 15,16	NA
Beamforming model			Annex B.4.2	NA
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2	NA
CSI reference signal configuration			8	NA
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0010000000000000	NA
N_{oc} at antenna port		dBm/15kHz	-98	-98
$\widehat{E}_s / N_{oc}$			Reference Value in Table 8.3.1.2.1_D_1.5-2	6.9dB
Symbols for unused PRBs			OCNG (Note 2)	NA
Number of allocated resource blocks (Note 2)		PRB	50	NA
Simultaneous transmission			No	NA
PDSCH transmission mode			9	Blanked

Note 1: $P_B = 1$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.1.2.1_D_1.5-2: Test requirement for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern		Propagation Condition		Correlation Matrix and Antenna Configuration	Reference value		UE Category
			Cell1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	N/A	ETU5	ETU5	2x2 Low	70	15.0	≥2

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.
Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.

8.3.1.2.2 FDD PDSCH Dual-layer Spatial Multiplexing – Enhanced Performance Requirement Type C

8.3.1.2.2.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.1.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD release 12 and forward UE of Category 2 or higher that support enhanced receiver Type C. Applicability requires support for FGI bit 103.

8.3.1.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.2.2.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.2.2.3-2 for the specified SNR.

Table 8.3.1.2.2.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0 and 1
CSI reference signals			Antenna ports 15,16
Beamforming model			Annex B.4.2
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2
CSI reference signal configuration			8
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Number of allocated resource blocks (Note 2)		PRB	50
Simultaneous transmission			No
PDSCH transmission mode			9
Note 1: $P_B = 1$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.1.2.2.3-2: Enhanced Performance Requirement Type C for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	EPA5	2x2 Medium	70	17.4	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.2A.

8.3.1.2.2.4 Test description

8.3.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.2.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.2.2.4.3.

8.3.1.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.2.2.3-1, 8.3.1.2.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.2.2.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.2.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.2.2.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.1.2.2.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.1.2.2.5 Test requirement

Table 8.3.1.2.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.3.1.2.2.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.2.2.5-1: Test requirement for Enhanced Performance Requirement Type C for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	EPA5	2x2 Medium	70	18.3	≥2

8.3.1.3 FDD PDSCH Performance with DCI format 2D and non Quasi Co-located Antenna Ports

8.3.1.3.1_F FDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and single NZP CSI-RS resource for CoMP

8.3.1.3.1_F.1 Test purpose

To verify the UE capability of supporting non quasi-collocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission points share the same Cell ID. In particular the test verifies that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the timing difference between two transmission points, channel parameters estimation and rate matching behaviour according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling.

8.3.1.3.1_F.2 Test applicability

This test applies to E-UTRA FDD category ≥2 UE release 11 and forward, supporting Maximum CSI processes of One on a component carrier within a band with PDSCH transmission mode 10.

8.3.1.3.1_F.3 Minimum conformance requirements

The requirements are specified in Table 8.3.1.3.1_F.3-3, with the addition of the parameters in Table 8.3.1.3.1_F.3-1 and Table 8.3.1.3.1_F.3-2. In table 8.3.1.3.1_F.3-1 transmission point 1 (TP1) is the serving cell and transmission point 2 (TP2) transmits PDSCH. The downlink physical channel setup for TP1 is according to Table C.3.4-1 and for TP2 according to Table C.3.4-2.

Table 8.3.1.3.1_F.3-1: Test Parameters for quasi co-location type B: same Cell ID

Parameter		Unit	TP 1	TP 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	(Note 2)
CSI-RS 0 antenna ports			NA	Port {15,16}
qcl-CSI-RS-ConfigNZPId-r11, CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	NA	5/2
qcl-CSI-RS-ConfigNZPId-r11, CSI-RS 0 configuration			NA	8
csi-RS-ConfigZPId-r11, Zero-power CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframe	NA	5/2
csi-RS-ConfigZPId-r11, Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPower CSI-RS* bitmap			NA	2/ 0000010000000000
N_{oc} at antenna port		dBm/15kHz	-98	-98
SNR		dB	Reference point in Table 8.3.1.3.1_F.3-2	Reference point in Table 8.3.1.3.1_F.3-2
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	0
Number of control OFDM symbols			2	2
PDSCH transmission mode			Blanked	10
Number of allocated PRB		PRB	NA	50
*qcl-Operation, '*PDSCH RE Mapping and Quasi-Co-Location Indicator'			Type B, '00'	
Time offset between TPs		μs	NA	Reference point in Table 8.3.1.3.1_F.3-2
Frequency error between TPs		Hz	NA	0
Beamforming model			NA	Port 7 as specified in clause B.4.1
Symbols for unused PRBs			NA	OCNG (Note 3)

Note 1: $P_B = 1$

Note 2: REs for antenna ports 0 and 1 CRSs have zero transmission power.

Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.1.3.1_F.3-2: Configurations of PQI and DL transmission hypothesis for each PQI set

PQI set index	Parameters in each PQI set		DL transmission hypothesis for each PQI Set	
	NZP CSI-RS Index (For quasi co-location)	ZP CSI-RS configuration	TP 1	TP 2
PQI set 0	CSI-RS 0	ZP CSI-RS 0	Blanked	PDSCH

Table 8.3.1.3.1_F.3-3: Minimum performance for quasi co-location type B: same Cell ID

Test Number	Reference Channel	OGCN pattern		Time offset between TPs (μs)	Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		TP1	TP2		TP1	TP2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.52 FDD	NA	OP.1 FDD	2	EPA5	EPA5	2x2 Low	70	12.1	≥2
2	R.52 FDD	NA	OP.1 FDD	-0.5	EPA5	EPA5	2x2 Low	70	12.6	≥2
Note 1: The propagation conditions for TP1 and TP2 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for TP1 and TP2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of TP2.										

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.3.1.

8.3.1.3.1_F.4 Test description

8.3.1.3.1_F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the TP 1 and TP 2 are set up according to table 8.3.1-1, table 8.3.1.3.1_F.3-1 and 8.3.1.3.1_F.3-2 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.3.1_F.4.3.

8.3.1.3.1_F.4.2 Test procedure

1. SS transmits PDCCH on TP 1. PQI set and PDSCH transmission hypothesis in PDCCH format 2D are configured according to Table 8.3.1.3.1_F.3-2.

2. SS transmits PDSCH on TP 1 and TP 2 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to Table 8.3.1.3.1_F.3-3. The SS sends downlink MAC padding bits on the DL RMC.

3. Set the parameters of the reference channel, timing offset (TP 2 timing - TP 1 timing), the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.3.1_F.3-3 Test 1 as appropriate.

4. Wait for at least 1 second before measuring throughput.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

6. Repeat steps 1 to 5 for Test 2 in Table 8.3.1.3.1_F.3-3.

8.3.1.3.1_F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.3.1_F.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	PDSCH-ConfigDedicated-DEFAULT		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigNZPToAddModList-r11	CSI-RS-ConfigNZP-r11-DEFAULT		
csi-RS-ConfigZPToAddModList-r11	CSI-RS-ConfigZP-r11-DEFAULT		
pdsch-ConfigDedicated-v1130	PDSCH-ConfigDedicated-v1130-DEFAULT		
}			

Table 8.3.1.3.1_F.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path:36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		2TX
}			

Table 8.3.1.3.1_F.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.1.3.1_F.4.3-4: CSI-RS-ConfigNZP-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {			
csi-RS-ConfigNZPId-r11	1		
antennaPortsCount-r11	an2		
resourceConfig-r11	8		
subframeConfig-r11	2		
scramblingIdentity-r11	0		
qcl-CRS-Info-r11 SEQUENCE {			
qcl-ScramblingIdentity-r11	0		
crs-PortsCount-r11	n2		
mbsfn-SubframeConfigList-r11	Not present		
}			
}			

Table 8.3.1.3.1_F.4.3-5: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	0000010000000000		
subframeConfig-r11	2		
}			

Table 8.3.1.3.1_F.4.3-6: PDSCH-ConfigDedicated-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {			
dmrs-ConfigPDSCH-r11	DMRS-Config-r11-DEFAULT		
qcl-Operation	typeB		
re-MappingQCLConfigToAddModList-r11 SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF SEQUENCE {	1 entry		
pdsch-RE-MappingQCL-ConfigId-r11[1]	1		
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11	Not present		
pdsch-Start-r11	2		
}			
}			
}			

8.3.1.3.1_F.5 Test requirement

Table 8.3.1.3.1_F.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.1.3.1_F.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.3.1_F.5-1: Test requirements for quasi co-location type B: same Cell ID

Test Number	Reference Channel	OGCN pattern		Time offset between TPs (Note 4)	Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		TP1	TP2		TP1	TP2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.52 FDD	NA	OP.1 FDD	57Ts	EPA5	EPA5	2x2 Low	70	13.0	≥2
2	R.52 FDD	NA	OP.1 FDD	-11Ts	EPA5	EPA5	2x2 Low	70	13.5	≥2
Note 1: The propagation conditions for TP1 and TP2 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for TP1 and TP2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of TP2. Note 4: Timing offset in units of Ts: T_S = 1/(15000 x 2048) seconds, the basic timing unit defined in TS 36.211 [8].										

8.3.1.3.2_F FDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and multiple NZP CSI-RS resources for CoMP

8.3.1.3.2_F.1 Test purpose

To verify the UE capability of supporting non quasi-collocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission points share the same Cell ID by verifying that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the timing difference between two transmission points, channel parameters estimation and rate matching behaviour according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling.

8.3.1.3.2_F.2 Test applicability

This test applies to all types of E-UTRA FDD category ≥2 UE release 11 and forward, supporting Maximum CSI processes of Three or Four on a component carrier within a band with PDSCH transmission mode 10.

8.3.1.3.2_F.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.3.2_F.3-1 and 8.3.1.3.2_F.3-2.

In table 8.3.1.3.2_F.2-1, transmission point 1 (TP 1) is the serving cell transmitting PDCCH, synchronization signals and PBCH, and transmission point 2 (TP 2) has same Cell ID as TP 1. Multiple NZP CSI-RS resources and ZP CSI-RS resources are configured. In each sub-frame, DL PDSCH transmission is dynamically switched between 2 TPs with multiple PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator and downlink transmission hypothesis are defined in Table 8.3.1.3.2_F.3-2. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.3.2_F.3-3 for the specified SNR.

Table 8.3.1.3.2_F.3-1: Test Parameters for timing offset compensation with DPS transmission

Parameter		Unit	TP 1	TP 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Beamforming model			As specified in clause B.4.1	As specified in clause B.4.1
Cell-specific reference signals			Antenna ports 0,1	(Note 2)
CSI reference signals 0			Antenna ports {15,16}	N/A
CSI-RS 0 periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 2	N/A
CSI reference signal 0 configuration			0	N/A
CSI reference signals 1			N/A	Antenna ports {15,16}
CSI-RS 1 periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	N/A	5 / 2
CSI reference signal 1 configuration			N/A	8
Zero-power CSI-RS 0 configuration $I_{CSI\text{-}RS}$ / *ZeroPower CSI-RS* bitmap		Subframes/bitmap	2/ 0010000000000000	N/A
Zero-power CSI-RS1 configuration $I_{CSI\text{-}RS}$ / *ZeroPower CSI-RS* bitmaps		Subframes/bitmap	2/ 0010000000000000	2/ 0000010000000000
$\widehat{E}_s / N_{oc}$		dB	Reference Value in Table 8.3.1.3.2_F.2-3	Reference Value in Table 8.3.1.3.2_F.2-3
N_{oc} at antenna port		dBm/15kHz	-98	-98
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	0
Number of control OFDM symbols			2	2
Timing offset between TPs			N/A	Reference Value in Table 8.3.1.3.2_F.3-3
Frequency offset between TPs		Hz	N/A	0
Number of allocated resource blocks		PRB	50	50
PDSCH transmission mode			10	10
Probability of occurrence of PDSCH transmission(Note 3)		%	30	70
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)

Note 1: $P_B = 1$.

Note 2: REs for antenna ports 0 and 1 CRSs have zero transmission power.

Note 3: PDSCH transmission from TPs shall be randomly determined independently for each subframe. Probabilities of occurrence of PDSCH transmission from TPs are specified.

Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.1.3.2_F.3-2: Configurations of PQI and DL transmission hypothesis for each PQI set

PQI set index	Parameters in each PQI set		DL transmission hypothesis for each PQI Set	
	NZP CSI-RS Index (For quasi co-location)	ZP CSI-RS configuration	TP 1	TP 2
PQI set 0	CSI-RS 0	ZP CSI-RS 0	PDSCH	Blanked
PQI set 1	CSI-RS 1	ZP CSI-RS 1	Blanked	PDSCH

Table 8.3.1.3.2_F.3-3: Minimum Requirements for timing offset compensation with DPS transmission

Test Number	Timing offset(us)	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
			TP 1	TP 2	TP 1	TP 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	2	R.53 FDD	OP.1 FDD	OP.1 FDD	EPA 5	EPA 5	2x2 Low	70	12.2	≥2
2	-0.5	R.53 FDD	OP.1 FDD	OP.1 FDD	EPA 5	EPA 5	2x2 Low	70	12.5	≥2
Note 1: The propagation conditions for TP 1 and TP 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of both TP 1 and TP 2 as defined in clause 8.1.1.										

The normative reference for these requirements is TS 36.101 [2] clause 8.3.1.3.2.

8.3.1.3.2_F.4 Test description

8.3.1.3.2_F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.3.3_C.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the TP 1 and TP 2 are set up according to table 8.3.1-1, 8.3.1.3.2_F.3-1 and 8.3.1.3.2_F.3-2 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.3.2_F.4.3.

8.3.1.3.2_F.4.2 Test procedure

1. SS transmits PDCCH on TP 1. PQI set and PDSCH transmission hypothesis in PDCCH format 2D are configured according to Table 8.3.1.3.2_F.3-2.
2. SS transmits PDSCH on TP 1 and TP 2 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to Tables 8.3.1.3.2_F.3-1 and 8.3.1.3.2_F.3-2. The SS sends downlink MAC padding bits on the DL RMC. PDSCH transmission from TPs shall be randomly determined independently for each subframe. Probabilities of occurrence of PDSCH transmission from TPs are specified according to Table 8.3.1.3.2_F.3-1. The probability of occurrence of PQI set in each TP is equal.
3. Set the parameters of the reference channel, timing offset (TP 2 timing - TP 1 timing), the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.3.2_F.3-3 Test 1 as appropriate.
4. Wait for at least 1 second before measuring throughput.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

6. Repeat steps 1 to 5 for Test 2 in Table 8.3.1.3.2_F.5-1.

8.3.1.3.2_F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.3.2_F.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	PDSCH-ConfigDedicated-DEFAULT		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigNZPToAddModList-r11	CSI-RS-ConfigNZP-r11-DEFAULT		
csi-RS-ConfigZPToAddModList-r11	CSI-RS-ConfigZP-r11-DEFAULT		
pdsch-ConfigDedicated-v1130	PDSCH-ConfigDedicated-v1130-DEFAULT		
}			

Table 8.3.1.3.2_F.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path:36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		2TX
}			

Table 8.3.1.3.2_F.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.1.3.2_F.4.3-4: CSI-RS-ConfigNZP-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {			
csi-RS-ConfigNZPId-r11	For NZP CSI-RS configuration (CSI reference signals 0) = 1 NZP CSI-RS configuration (CSI reference signals 1) = 2		
antennaPortsCount-r11	an2		
resourceConfig-r11	For NZP CSI-RS configuration (CSI reference signals 0) = 0 NZP CSI-RS configuration (CSI reference signals 1) = 8		
subframeConfig-r11	2		
scramblingIdentity-r11	0		
qcl-CRS-Info-r11 SEQUENCE {			
qcl-ScramblingIdentity-r11	0		
crs-PortsCount-r11	n2		
mbsfn-SubframeConfigList-r11	Not present		
}			
}			

Table 8.3.1.3.2_F.4.3-5: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	For Zero-power CSI-RS 0 = 0010000000000000 For Zero-power CSI-RS 1 configuration = 0000010000000000	Parameter: *ZeroPowerCSI-RS*	
subframeConfig-r11	2		
}			

Table 8.3.1.3.2_F.4.3-6: PDSCH-ConfigDedicated-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {			
dmrs-ConfigPDSCH-r11	DMRS-Config-r11-DEFAULT		
qcl-Operation	typeB		
re-MappingQCLConfigToAddModList-r11 SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF SEQUENCE {	2 entries	See Table 8.3.1.3.2_F.3-2	
pdsch-RE-MappingQCL-ConfigId-r11[1]	1	Entry 1	
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11	Not present		
pdsch-Start-r11	2		
}			
csi-RS-ConfigZPId-r11[1]	1		
qcl-CSI-RS-ConfigNZPId-r11[1]	1		
pdsch-RE-MappingQCL-ConfigId-r11[1]	4	Entry 2	
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11	Not present		
pdsch-Start-r11	2		
}			
csi-RS-ConfigZPId-r11[1]	2		
qcl-CSI-RS-ConfigNZPId-r11[1]	2		
}			
}			

8.3.1.3.2_F.5 Test requirements

Table 8.3.1.3.2_F.2-1 and 8.3.1.3.2_F.2-2 defines the primary level setting.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Table 8.3.1.3.2_F.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.1.3.2_F.5-1: Test Requirements for timing offset compensation with DPS transmission

Test Number	Timing offset (Note 4)	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
			TP 1	TP 2	TP 1	TP 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	57Ts	R.53 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	70	13.1	≥2
2	11Ts	R.53 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	70	13.4	≥2

Note 1: The propagation conditions for TP 1and TP 2 are statistically independent.
Note 2: Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2.
Note 3: SNR corresponds to $\widehat{E}_s / N_{oc}$ of both TP 1 and TP 2 as defined in clause 8.1.1.
Note 4: Timing offset in units of Ts: T_S = 1/(15000 x 2048) seconds, the basic timing unit defined in TS 36.211 [8].

8.3.1.3.3_F FDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Different Cell ID, Colliding CRS and single NZP CSI-RS resource for CoMP

8.3.1.3.3_F.1 Test purpose

To verify the UE capability of supporting non quasi-collocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission points have different Cell ID and colliding CRS by verifying that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the frequency difference between two transmission points, channel parameters estimation and rate matching behaviour according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling.

8.3.1.3.3_F.2 Test applicability

This test applies to all types of E-UTRA FDD category ≥2 UE release 11 and forward, supporting Maximum CSI processes of One, Three or Four on a component carrier within a band with PDSCH transmission mode 10.

8.3.1.3.3_F.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1 and 8.3.1.3.3_F.3-1.

In table 8.3.1.3.3_F.3-1, transmission point 1 (TP 1) is the serving cell transmitting PDCCH, synchronization signals and PBCH, and transmission point 2 (TP 2) transmit PDSCH with different Cell ID. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.3.3_F.3-2 for the specified SNR.

Table 8.3.1.3.3_F.3-1: Test Parameters for quasi co-location type B with different Cell ID and Colliding CRS

parameter		Unit	TP 1	TP 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3

Beamforming model		N/A	As specified in clause B.4.2
Cell-specific reference signals		Antenna ports 0,1	Antenna ports 0,1
CSI reference signals 0		N/A	Antenna ports {15,16}
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}	Subframes	N/A	5 / 2
CSI reference signal 0 configuration		N/A	0
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPower CSI-RS* bitmap	Subframes /bitmap	N/A	2/ 0010000000000000
$\hat{E}_s / N_{oc}$	dB	Reference point in Table 8.3.1.3.3_F.3-2 + 4dB	Reference Value in Table 8.3.1.3.3_F.3-2
N_{oc} at antenna port	dBm/15kHz	-98	-98
$BW_{Channel}$	MHz	10	10
Cyclic Prefix		Normal	Normal
Cell Id		0	126
Number of control OFDM symbols		1	2
Timing offset between TPs	us	N/A	0
Frequency offset between TPs	Hz	N/A	200
*qcl-Operation, '*PDSCH RE Mapping and Quasi-Co-Location Indicator'		Type B, '00'	
PDSCH transmission mode		Blank	10
Number of allocated resource block		N/A	50
Symbols for unused PRBs		N/A	OCNG (Note 2)
Note 1: $P_B = 1$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.1.3.3_F.3-2: Performance Requirements for quasi co-location type B with different Cell ID and Colliding CRS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		TP 1	TP 2	TP 1	TP 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.54 FDD	N/A	OP.1 FDD	EPA5	ETU5	2x2 Low	70	14.4	≥2
Note 1: The propagation conditions for TP 1 and TP 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of TP 2 as defined in clause 8.1.1.									

The normative reference for these requirements is TS 36.101 [2] clause 8.3.1.3.3.

8.3.1.3.3_F.4 Test description

8.3.1.3.3_F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.3.3_C.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the TP 1 are set up according to tables 8.3.1-1 and 8.3.1.3.3_F.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.3.3_F.4.3.

8.3.1.3.3_F.4.2 Test procedure

1. SS transmits PDCCH DCI format 2D on TP 1 according to Tables 8.3.1.3.3_F.3-1, 8.3.1.3.3_F.3-2 and Annex C3.4.
2. SS transmits PDSCH on TP 2 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to Tables 8.3.1.3.3_F.3-1, 8.3.1.3.3_F.3-2 and Annex C3.4. The SS sends downlink MAC padding bits on the DL RMC.
3. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.3.3_F.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.3.3_F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.3.3_F.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	PDSCH-ConfigDedicated-DEFAULT		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigNZPToAddModList-r11	CSI-RS-ConfigNZP-r11-DEFAULT		
csi-RS-ConfigZPToAddModList-r11	CSI-RS-ConfigZP-r11-DEFAULT		
pdsch-ConfigDedicated-v1130	PDSCH-ConfigDedicated-v1130-DEFAULT		
}			

Table 8.3.1.3.3_F.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path:36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		2TX
}			

Table 8.3.1.3.3_F.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.1.3.3_F.4.3-4: CSI-RS-ConfigNZP-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {			
csi-RS-ConfigNZPId-r11	1		
antennaPortsCount-r11	an2		
resourceConfig-r11	0		
subframeConfig-r11	2		
scramblingIdentity-r11	126		
qcl-CRS-Info-r11 SEQUENCE {			
qcl-ScramblingIdentity-r11	0		
crs-PortsCount-r11	n2		
mbsfn-SubframeConfigList-r11	Not present		
}			
}			

Table 8.3.1.3.3_F.4.3-5: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	0010000000000000		
subframeConfig-r11	2		
}			

Table 8.3.1.3.3_F.4.3-6: PDSCH-ConfigDedicated-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {			
dmrs-ConfigPDSCH-r11	DMRS-Config-r11-DEFAULT		
qcl-Operation	typeB		
re-MappingQCLConfigToAddModList-r11 SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF SEQUENCE {	1 entry		
pdsch-RE-MappingQCL-ConfigId-r11[1]	1		
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11	Not present		
pdsch-Start-r11	2		
}			
}			
}			

8.3.1.3.3_F.5 Test requirements

Table 8.3.1.3.3_F.3-1defines the primary level setting.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Table 8.3.1.3.3_F.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.1.3.3_F.5-1: Test Requirements for quasi co-location type B with different Cell ID and Colliding CRS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		TP 1	TP 2	TP 1	TP 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.54 FDD	N/A	OP.1 FDD	EPA5	ETU5	2x2 Low	70	15.3	≥2
Note 1: The propagation conditions for TP 1 and TP 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. Note 3: SNR corresponds to $\widehat{E}_s / N_{oc}$ of TP 2 as defined in clause 8.1.1.									

8.3.2 TDD

The parameters specified in Table 8.3.2-1 are valid for TDD unless otherwise stated.

Table 8.3.2-1: Common Test Parameters for User-specific Reference Symbols

Parameter	Unit	Value
Uplink downlink configuration (Note 1)		1
Special subframe configuration (Note 2)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes. All these HARQ processes are used.	Processes	7
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM
Number of OFDM symbols for PDCCH	OFDM symbols	2
Precoder update granularity		Frequency domain: 1 PRB for Transmission mode 7 & 8, 1 PRG for Transmission mode 9 and 10 Time domain: 1 ms
ACK/NACK feedback mode		Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8].		

For all test cases, the SNR is defined as:

$$SNR = \frac{\hat{E}_s^{(1)} + \hat{E}_s^{(2)}}{N_{oc}^{(1)} + N_{oc}^{(2)}},$$

where the superscript indicates the receiver antenna connector. The SNR requirement applies for the UE categories given for each test.

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1 TDD PDSCH Single-layer Spatial Multiplexing Performance (UE-Specific Reference Symbols)

8.3.2.1.1 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 8 and forward)

8.3.2.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna port 5 using user-specific reference signals with full RB or single RB allocation.

8.3.2.1.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.3.2.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.1, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.1.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.1.1.3-2 for the specified SNR.

Table 8.3.2.1.1.3-1: Test Parameters for Testing DRS

parameter		Unit	Test 1	Test 2	Test 3	Test 4
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)
	σ	dB	0	0	0	0
Cell-specific reference signals		Antenna port 0				
Beamforming model		Annex B.4.1				
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)
PDSCH transmission mode			7	7	7	7
Note 1: $P_B = 0$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.						

Table 8.3.2.1.1.3-2: Minimum performance DRS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.25 TDD	OP.1 TDD	EPA5	2x2 Low	70	-0.8	≥1
2	10 MHz 16QAM 1/2	R.26 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.0	≥2
3	10 MHz 64QAM 3/4	R.27 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.0	≥2
4	10 MHz 16QAM 1/2	R.28 TDD	OP.1 TDD	EPA5	2x2 Low	30	1.7	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1.1.4 Test description

8.3.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.1.4.3.

8.3.2.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.1.3-1, 8.3.2.1.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.1.5-1 as appropriate.

   BCH/CRS/PDCCH/PCFICH are sent on antenna port 0 using one Tx antenna, while DRS/Dedicated data for the test UE are sent on antenna port 5 using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.1.1.5-1 as appropriate.

8.3.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.3.2.1.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH DRS performance downlink power allocation test point 1 requirement for Test number 1 - 4

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm7		
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

8.3.2.1.1.5 Test requirement

Table 8.3.2.1.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.1 for each throughput test shall meet or exceed the specified value in Table 8.3.2.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.1.1.5-1: Test requirement DRS

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.25 TDD	OP.1 TDD	EPA5	2x2 Low	70	0.1	≥1
2	10 MHz 16QAM 1/2	R.26 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.9	≥2
3	10 MHz 64QAM 3/4	R.27 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.9	≥2
4	10 MHz 16QAM 1/2	R.28 TDD	OP.1 TDD	EPA5	2x2 Low	30	2.6	≥1

8.3.2.1.1_1 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 9 and forward)

8.3.2.1.1_1.1 Test purpose

Same test purpose as in clause 8.3.2.1.1.1.

8.3.2.1.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward of UE category 1.

8.3.2.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.3.2.1.1.3 with the following exceptions:

- Instead of Table 8.3.2.1.1.3-1 -> use Table 8.3.2.1.1_1.3-1.
- Instead of Table 8.3.2.1.1.3-2 -> use Table 8.3.2.1.1_1.3-2.

Table 8.3.2.1.1_1.3-1: Test Parameters for Testing DRS (Antenna port 5)

Parameter		Unit	Test 1 (Note 4)	Test 2	Test 3	Test 4 (Note 4)
Downlink power allocation	ρ_A	dB	N/A	0	0	NA
	ρ_B	dB		0 (Note 1)	0 (Note 1)	
	σ	dB		0	0	
Cell-specific reference signals		Antenna port 0				
Beamforming model		Annex B.4.1				
N_{oc} at antenna port		dBm/15kHz	N/A	-98	-98	NA
Symbols for unused PRBs			N/A	OCNG (Note 2)	OCNG (Note 2)	N/A
PDSCH transmission mode			N/A	7	7	N/A

Note 1: $P_B = 0$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 3: The modulation symbols of the signal under test are mapped onto antenna port 5.

Note 4: This tests are covered in subclause 8.3.2.1.1

Table 8.3.2.1.1_1.3-2: Minimum performance DRS (FRC) (Antenna port 5)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1 (Note 1)	N/A							
2	5MHz 16QAM 1/2	R.26-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.0	1
3	10 MHz 64QAM 3/4	R.27-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.0	1
4 (Note 1)	N/A							
Note 1: These tests are covered in subclause 8.3.2.1.1								

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1.1_1.4 Test description

Same test description as in clause 8.3.2.1.1.4 with the following exceptions:

- Instead of Table 8.3.2.1.1.3-1 -> use Table 8.3.2.1.1_1.3-1.
- Instead of Table 8.3.2.1.1.3-2 -> use Table 8.3.2.1.1_1.3-2.
- Initial conditions - Bandwidths to be tested: Depending on the bandwidth specified per test number in Table 8.3.2.1.1_1.3-2, as defined in TS 36.508 [7] clause 4.3.1.2.
- Instead of Table 8.3.2.1.1.5-1 -> use Table 8.3.2.1.1_1.5-1.

8.3.2.1.1_1.5 Test requirement

Same test requirement as in clause 8.3.2.1.1.5 with the following exceptions:

- Instead of Table 8.3.2.1.1.3-1 -> use Table 8.3.2.1.1_1.3-1.
- Instead of Table 8.3.2.1.1.5-1 -> use Table 8.3.2.1.1_1.5-1.

Table 8.3.2.1.1_1.5-1: Test requirement DRS (FRC) (Antenna port 5)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1 (Note 1)	N/A							
2	5MHz 16QAM 1/2	R.26-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.9	1
3	10 MHz 64QAM 3/4	R.27-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.9	1
4 (Note 1)	N/A							
Note 1: These tests are covered in subclause 8.3.2.1.1								

8.3.2.1.2 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without a simultaneous transmission

8.3.2.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna port 7 or 8 without a simultaneous transmission on the other antenna port using DM-RS with full RB allocation.

8.3.2.1.2.2 Test applicability

This test applies to Release 9 UEs that support enhanced Dual Layer TDD (TM8) and all types of E-UTRATDD UE release 10 and forward.

8.3.2.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.2.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.1.2.3-2 for the specified SNR.

Table 8.3.2.1.2.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer)

parameter		Unit	Test 1	Test 2	Test 3	Test 4 (Note 3)	Test 5 (Note 3)
Downlink power allocation	ρ_A	dB	0	0	0	N/A	N/A
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	N/A	N/A
	σ	dB	-3	-3	-3		
Cell-specific reference signals			Antenna port 0 and antenna port 1				
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	N/A	N/A
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)	OCNG (Note 4)	N/A	N/A
Simultaneous transmission			No	No	No	N/A	N/A

Note 1: $P_B = 1$
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.
Note 3: Test 4 and Test 5 are covered in subclause 8.3.2.1.3.
Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.2.1.2.3-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	-1.0	≥1
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	7.7	≥2
	5MHz 16QAM 1/2	R.32-1 TDD	OP.1 TDD	EPA5	2x2 Medium	70	7.7	1
3	10 MHz 64QAM 3/4	R.33 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.7	≥2
	10 MHz 64QAM 3/4	R.33-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.7	1

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1.2.4 Test description

8.3.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: Depending on the bandwidth specified per test number in Table 8.3.2.1.2.3-2, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.2.4.3.

8.3.2.1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.2.3-1, 8.3.2.1.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.2.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/Dedicated data for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.1.2.5-1 as appropriate.

8.3.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.3.2.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm8-v920		
}			
}			
Extension ::= SEQUENCE {			
antennaInfo-v920 ::= SEQUENCE{			
codebookSubsetRestriction-v920 CHOICE {			
n2TxAntenna-tm8-r9	111111		
}			
}			
}			
}			

8.3.2.1.2.5 Test requirement

Table 8.3.2.1.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.1.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.1.2.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	-0.1	≥1
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	8.6	≥2
	5 MHz 16QAM 1/2	R.32-1 TDD	OP.1 TDD	EPA5	2x2 Medium	70	8.6	1
3	10 MHz 64QAM 3/4	R.33 TDD	OP.1 TDD	EPA5	2x2 Low	70	18.6	≥2
	10 MHz 64QAM 3/4	R.33-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	18.6	1

8.3.2.1.2_D TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO

8.3.2.1.2_D.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a

simultaneous transmission on the other antenna port and multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.2.1.2_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 104.

8.3.2.1.2_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.5, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.2_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.1.2_D.3-2 for the specified SNR.

Table 8.3.2.1.2_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

Parameter		Unit	Test 1	Test 2	Test 3
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1		
CSI reference signals			Antenna ports 15,…,22	Antenna ports 15,…,18	Antenna ports 15,…,18
Beamforming model			Annex B.4.1	Annex B.4.1	Annex B.4.1
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$		Subframes	5 / 4	5 / 4	5 / 4
CSI reference signal configuration			1	3	3
Zero-power CSI-RS configuration $I_{\text{CSI-RS}}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4 / 0010000100000000	4 / 0010000000000000	4/ 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)	OCNG (Note 4)
Number of allocated resource blocks (Note 2)		PRB	50	50	100
Simultaneous transmission			No	Yes (Note 3, 5)	No
PDSCH transmission mode			9	9	9

Note 1: $P_B = 1$.
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.
Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.
Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.

Table 8.3.2.1.2_D.3-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	UE DL Cate-gory
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	10 MHz QPSK 1/3	R.50 TDD	OP.1 TDD	EVA5	2x2 Low	70	-0.6	≥1	≥6
3	20MHz 256QAM	R. 66 TDD	OP.1 TDD	EPA5	2x2 Low	70	24.3	11-12	≥11

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1A.

8.3.2.1.2_D.4 Test description

8.3.2.1.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.2_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.2_D.4.3.

8.3.2.1.2_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.2_D.3-1, 8.3.2.1.2_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.2_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1. CSI-RS are sent on antenna ports 15-22 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.1.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.1.2_D.4.3-1: *Void*

Table 8.3.2.1.2_D.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.3.2.1.2_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.2.1.2_D.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an8	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	1	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-6 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2, 7	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.2.1.2_D.5 Test requirement

Table 8.3.2.1.2_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.5 for the throughput test shall meet or exceed the specified value in Table 8.3.2.1.2_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.1.2_D.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.50 TDD	OP.1 TDD	EVA5	2x2 Low	70	0.3	1-8

8.3.2.1.2_H TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO for 256QAM in DL

8.3.2.1.2_H.1 Test purpose

Same test purpose as defined in clause 8.3.2.1.2_D.1.

8.3.2.1.2_H.2 Test applicability

This test applies to all types of E-UTRA TDD UEs release 12 and forward that support 256QAM in DL. Applicability requires support for FGI bit 104.

8.3.2.1.2_H.3 Minimum conformance requirements

Same minimum conformance requirements as defined in clause 8.3.2.1.2_D.3.

8.3.2.1.2_H.4 Test description

8.3.2.1.2_H.4.1 Initial conditions

Same test procedure as defined in clause 8.3.2.1.2_D.4.1 with the following exceptions:

- Instead of Table 8.3.2.1.2_D.4.3-4 → use Table 8.3.2.1.2_H.4.3-1.

8.3.2.1.2_H.4.2 Test procedure

Same test procedure as defined in clause 8.3.2.1.2_D.4.2 with the following exceptions:

- Instead of Table 8.3.2.1.2_D.5-1 → use Table 8.3.2.1.2_H.5-1.
- CSI-RS are sent on antenna ports 15-22 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1 → CSI-RS are sent on antenna ports 15-18 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1 in test step 2.

8.3.2.1.2_H.4.3 Message contents

Same message contents as defined in clause 8.3.2.1.2_D.4.3 with the following exceptions:

Table 8.3.2.1.2_H.4.3-1: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
}			
}			
resourceConfig-r10	3	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.2.1.2_H.5 Test requirement

Same test requirement as defined in clause 8.3.2.1.2_D.5 with the following exceptions:

- Instead of Table 8.3.2.1.2_D.5-1 → use Table 8.3.2.1.2_H.5-1.

Table 8.3.2.1.2_H.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	UE DL Category
						Fraction of Maximum Throughput (%)	SNR (dB)		
3	20MHz 256QAM	R. 66 TDD	OP.1 TDD	EPA5	2x2 Low	70	25.2	11-12	≥11

8.3.2.1.3 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission

8.3.2.1.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna port 7 or 8 with a simultaneous transmission on the other antenna port using DM-RS with full RB allocation.

8.3.2.1.3.2 Test applicability

This test applies to Release9 UEs that support enhanced Dual Layer TDD (TM8) and all types of E-UTRA TDD UE release 10 and forward.

8.3.2.1.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.3.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.1.3.3-2 for the specified SNR.

Table 8.3.2.1.3.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer)

parameter		Unit	Test 1 (Note 6)	Test 2 (Note 6)	Test 3 (Note 6)	Test 4	Test 5
Downlink power allocation	ρ_A	dB	N/A	N/A	N/A	0	0
	ρ_B	dB	N/A	N/A	N/A	0 (Note 1)	0 (Note 1)
	σ	dB	N/A	N/A	N/A	-3	-3
Cell-specific reference signals			Antenna port 0 and antenna port 1				
Beamforming model			Annex B.4.1				
N_{oc} at antenna port		dBm/15kHz	N/A	N/A	N/A	-98	-98
Symbols for unused PRBs			N/A	N/A	N/A	OCNG (Note 4)	OCNG (Note 4)
Simultaneous transmission			N/A	N/A	N/A	Yes (Note 3, 5)	Yes (Note 3, 5)
PDSCH transmission mode			N/A	N/A	N/A	8	8

Note 1: $P_B = 1$
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.
Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.
Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.
Note 6: Test 1, Test 2 and Test 3 are covered in subclause 8.3.2.1.2.

Table 8.3.2.1.3.3-2: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
4	10 MHz 16QAM 1/2	R.32 TDD (Note 1)	OP.1 TDD	EPA5	2x2 Medium	70	21.9	≥2
5	10 MHz 64QAM 1/2	R.34 TDD (Note 1)	OP.1 TDD	EPA5	2x2 Low	70	22.0	≥2
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1.3.4 Test description

8.3.2.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.3.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.3.4.3.

8.3.2.1.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.3.3-1, 8.3.2.1.3.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.3.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/Dedicated data for the test UE are sent on antenna port 7 (or 8) and another simultaneous transmission of DRS/Dedicated data not for the test UE is sent on antenna port 8 (or 7). The DRS/Dedicated data transmissions use two Tx antennas with different beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.1.3.5-1 as appropriate.

8.3.2.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.3.2.1.3.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm8-v920		
}			
}			
Extension ::= SEQUENCE {			
antennaInfo-v920 ::= SEQUENCE{			
codebookSubsetRestriction-v920 CHOICE {			
n2TxAntenna-tm8-r9	111111		
}			
}			
}			
}			

8.3.2.1.3.5 Test requirement

Table 8.3.2.1.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.1.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.1.3.5-1: Test requirement for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
4	10 MHz 16QAM 1/2	R.32 TDD (Note 1)	OP.1 TDD	EPA5	2x2 Medium	70	22.8	≥2
5	10 MHz 64QAM 1/2	R.34 TDD (Note 1)	OP.1 TDD	EPA5	2x2 Low	70	22.9	≥2
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

8.3.2.1.3_D TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with a simultaneous transmission for eDL-MIMO

8.3.2.1.3_D.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 with a simultaneous transmission on the other antenna port and multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.2.1.3_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 104.

8.3.2.1.3_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.5, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.3_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.1.3_D.3-2 for the specified SNR.

Table 8.3.2.1.3_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	
CSI reference signals			Antenna ports 15,…,22	Antenna ports 15,…,18
Beamforming model			Annex B.4.1	Annex B.4.1
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 4	5 / 4
CSI reference signal configuration			1	3
Zero-power CSI-RS configuration $I_{CSI\text{-}RS}$ / ZeroPowerCSI-RS bitmap		Subframes / bitmap	4 / 0010000100000000	4 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98	-98
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)
Number of allocated resource blocks (Note 2)		PRB	50	50
Simultaneous transmission			No	Yes
PDSCH transmission mode			9	9

Note 1: $P_B = 1$.

Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.

Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.

Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.

Table 8.3.2.1.3_D.3-2: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz 64QAM 1/2	R.44 TDD	OP.1 TDD	EPA5	2x2 Low	70	22.1	2-8
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1A.

8.3.2.1.3_D.4 Test description

8.3.2.1.3_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.3_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.3_D.4.3.

8.3.2.1.3_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.3_D.3-1, 8.3.2.1.3_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.3_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 (or 8) and another simultaneous transmission of DRS/PDSCH not for the test UE are sent on antenna port 8 (or 7). The DRS/PDSCH transmissions use two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1. CSI-RS are sent on antenna ports 15-18 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.1.3_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.1.3_D.4.3-1: Void

Table 8.3.2.1.3_D.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.3.2.1.3_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.2.1.3_D.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	3	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.2.1.3_D.5 Test requirement

Table 8.3.2.1.3_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.4 for the throughput test shall meet or exceed the specified value in Table 8.3.2.1.3_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.1.3_D.5-1: Test requirement for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz 64QAM 1/2	R.44 TDD	OP.1 TDD	EPA5	2x2 Low	70	23	2-8
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

8.3.2.1.4 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type A

8.3.2.1.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4.

8.3.2.1.4.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward that support enhanced receiver Type A. Applicability requires support for FGI bit 103.

8.3.2.1.4.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.4.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.1.4.3-2 for the specified SNR.

Table 8.3.2.1.4.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			0000000000000000 0000000000000000 0000000000000000 1111111111111111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A
Physical channel for CQI reporting			PUSCH(Note8)	N/A
cqi-pmi-ConfigurationIndex			4	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4:	The precoder in clause B.4.3 follows UE recommended PMI.
Note 5:	If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 6:	These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.
Note 8:	To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Table 8.3.2.1.4.3-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.48 TDD	OP.1 TDD	N/A	EVA5	EVA5	4x2 Low	70	-1.0	1-8
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1B.

8.3.2.1.4.4 Test description

8.3.2.1.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.49.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.4.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.4.4.3.

8.3.2.1.4.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.4.5-1, 8.3.2.1.4.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink

scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #4 and #9 (Table A.2.3.1.1-1).

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.4.5-2 as appropriate.
BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using four Tx antennas with beam-forming model as specified in Annex B.4.3 and precoder update granularity specified in Table 8.3.2.1.4.5-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4. 3.

3. Set the Cell2 –aggressor cell- as defined in Tables 8.3.2.1.4.5-1, 8.3.2.1.4.5-2 and according to Annex B.5.4.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.1.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.1.4.4.3-1: *Void*

Table 8.3.2.1.4.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000000000000000000 000000000000000000 000000000000111111 1111111111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.2.1.4.4.3-3: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 8.3.2.1.4.4.3-4: *CQI-ReportPeriodic-r10*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2AC CQI-ReportPeriodic-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	4	TDD	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	484	TDD	
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			

Table 8.3.2.1.4.4.3-5: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT using condition CQI_PERIODIC		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 8.3.2.1.4.4.3-6: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
pmi-RI-Report-r9	setup		
}			

8.3.2.1.4.5 Test requirement

Table 8.3.2.1.4.5-1 defines the primary level settings.

Table 8.3.2.1.4.5-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.45
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			0000000000000000 0000000000000000 0000000000000000 1111111111111111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A
Physical channel for CQI reporting			PUSCH(Note8)	N/A
cqi-pmi-ConfigurationIndex			4	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4:	The precoder in clause B.4.3 follows UE recommended PMI.
Note 5:	If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 6:	These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.
Note 8:	To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.4 for the throughput test shall meet or exceed the specified value in Table 8.3.2.1.4.5-2 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.1.4.5-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.48 TDD	OP.1 TDD	N/A	EVA5	EVA5	4x2 Low	70	-0.02	1-8
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

8.3.2.1.5 TDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type B

8.3.2.1.5.1 Test purpose

The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 9 interference model defined in clause B.6.4.

8.3.2.1.5.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward that support enhanced performance requirement Type B. Applicability requires support for FGI bit 103.

8.3.2.1.5.3 Minimum conformance requirements

The requirements are specified in Table 8.3.2.1.5-2, with the addition of the parameters in Table 8.3.2.1.5.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.3.2.1.5.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.3.2.1.5.3-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	3	3
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	2	2
PDSCH transmission mode			9	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Precoding			Random wideband precoding per TTI	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			Antenna ports 15, 16, 17, 18	Antenna ports 15, 16	Antenna ports 15, 16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	10 / 4	10 / 4	10 / 4
CSI reference signal configuration			5	6	7
Zero-power CSI-RS configuration I_{CSI-RS} /*ZeroPowerCSI-RS* bitmap		Subframes / bitmap	9 / 1000000000000000	9 / 0100000000000000	9 / 0010000000000000
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of [5].

Table 8.3.2.1.5.3-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration			Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.69 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	4x2 Low	2x2 Low	2x2 Low	85	18.0	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.													
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.													

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1.D.

8.3.2.1.5.4 Test description

8.3.2.1.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.3.2.1.5.3-2, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.88.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.3.2.1.5.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.5.4.3.

8.3.2.1.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.5.5-1 and 8.3.2.1.5.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.3.2.1.5.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.3.2.1.5.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 or 8 using four Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity as specified in Table 8.3.2.1.5.5-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.

5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.3.2.1.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.3.2.1.5.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.2.1.5.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.2.1.5.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	5	Parameter: CSI reference signal configuration	
subframeConfig-r10	10	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}} - 5$ when CSI-RS SubframeConfig is from 5-14; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	1000000000000000	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	9	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.2.1.5.5 Test requirement

Table 8.3.2.1.5.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for throughput test shall meet or exceed the specified value in Table 8.3.2.1.5.5-2 for the specified SNR including test tolerances.

Table 8.3.2.1.5.5-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	14.71	4.14
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	3	3
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	2	2
PDSCH transmission mode			9	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Precoding			Random wideband precoding per TTI	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			Antenna ports 15, 16, 17, 18	Antenna ports 15, 16	Antenna ports 15, 16
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	10 / 4	10 / 4	10 / 4
CSI reference signal configuration			5	6	7
Zero-power CSI-RS configuration I_{CSI-RS} /*ZeroPowerCSI-RS* bitmap		Subframes / bitmap	9 / 1000000000000000	9 / 0100000000000000	9 / 0010000000000000
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of [5].

Table 8.3.2.1.5.5-2: Test Requirement for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration			Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.69 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	4x2 Low	2x2 Low	2x2 Low	85	19.85	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.													
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.													

8.3.2.1.6 TDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with CRS Interference Model - Enhanced Performance Requirement Type B

8.3.2.1.6.1 Test purpose

The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by the CRS of the interfering cell, applying the CRS interference model defined in clause B.6.5.

8.3.2.1.6.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward UE of Category 2 or higher that support enhanced performance requirement Type B.

8.3.2.1.6.3 Minimum conformance requirements

The requirements are specified in Table 8.3.2.1.6.3-2, with the addition of the parameters in Table 8.3.2.1.6.3-1 and the downlink physical channel setup according to Annex C.3.2. In 8.3.2.1.6.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.3.2.1.6.3-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with CRS interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (NOTE 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	3	3
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	2	2
PDSCH transmission mode			8	N/A	N/A
Interference model			N/A	As specified in clause B.6.5	As specified in clause B.6.5
Precoding			Random wideband precoding per TTI	N/A	N/A
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (NOTE 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$
NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
NOTE 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of [5].

Table 8.3.2.1.6.3-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with CRS interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.71 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	14.0	≥2

NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
NOTE 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1.E.

8.3.2.1.6.4 Test description

8.3.2.1.6.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.3.2.1.6.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.3.2.1.6.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.7.4.3.

8.3.2.1.6.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.7.5-1 and 8.3.2.1.7.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.3.2.1.6.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.3.2.1.6.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 or 8 using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity as specified in Table 8.3.2.1.6.5-1.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.
5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.3.2.1.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.3.2.1.6.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.2.1.6.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	Tm8-v920		
codebookSubsetRestriction-r10	Not present		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

8.3.2.1.6.5 Test requirement

Table 8.3.2.1.6.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for throughput test shall meet or exceed the specified value in Table 8.3.2.1.6.5-2 for the specified SNR including test tolerances.

Table 8.3.2.1.6.5-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with CRS interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (NOTE 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.71	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	3	3
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	2	2
PDSCH transmission mode			8	N/A	N/A
Interference model			N/A	As specified in clause B.6.5	As specified in clause B.6.5
Precoding			Random wideband precoding per TTI	N/A	N/A
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (NOTE 3)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

NOTE 1: $P_B = 1$

NOTE 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

NOTE 3: NeighCellsInfo-r12 is described in subclause 6.3.2 of [5].

Table 8.3.2.1.6.5-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with CRS interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (NOTE 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (NOTE 2)	
1	R.71 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	14.9	≥2
NOTE 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.											
NOTE 2: SNR corresponds to $\widehat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.											
NOTE 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.											

8.3.2.1.7 TDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM3 Interference Model - Enhanced Performance Requirement Type B

8.3.2.1.7.1 Test purpose

The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 3 interference model defined in clause B.6.2. In Table 8.3.2.1.7.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells.

8.3.2.1.7.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward that support enhanced performance requirement Type B.

8.3.2.1.7.3 Minimum conformance requirements

The requirements are specified in Table 8.3.2.1.7.3-2, with the addition of the parameters in Table 8.3.2.1.7.3-1 and the downlink physical channel setup according to Annex C.3.2. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.3.2.1.7.3-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with TM3 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	0	-3	-3
	ρ_B	dB	0 (Note 1)	-3	-3
	σ	dB	-3	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	3.28	0.74
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	Random from set {1,2,3}	Random from set {1,2,3}
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	Random from set {1,2}	Random from set {1,2}
PDSCH transmission mode			8	3	3
Interference model			N/A	As specified in clause B.6.2	As specified in clause B.6.2
Precoding			Random wideband precoding per TTI	As specified in clause B.6.2	As specified in clause B.6.2
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of 36.331 [5].

Table 8.3.2.1.7.3-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM3 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.70 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	11.3	≥1

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1.F.

8.3.2.1.7.4 Test description

8.3.2.1.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.3.2.1.5.3-2, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.3.2.1.7.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.7.4.3.

8.3.2.1.7.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.7.5-1 and 8.3.2.1.7.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sets up parameters for cell 2 and cell 3 according to table 8.3.2.1.7.5-1 as appropriate. The CFIs indicated in PCFICH are randomly selected per TTI.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.3.2.1.7.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 or 8 using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity as specified in Table 8.3.2.1.7.5-1.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.
5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.3.2.1.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.3.2.1.7.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.2.1.7.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	Tm8-v920		
codebookSubsetRestriction-r10	Not present		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

8.3.2.1.7.5 Test requirement

Table 8.3.2.1.7.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for throughput test shall meet or exceed the specified value in Table 8.3.2.1.7.5-2 for the specified SNR including test tolerances.

Table 8.3.2.1.7.5-1: Test Parameters for Testing CDM-multiplexed DM RS (Single-layer) with TM3 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	0	-3	-3
	ρ_B	dB	0 (Note 1)	-3	-3
	σ	dB	-3	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	4.08	1.54
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	Random from set {1,2,3}	Random from set {1,2,3}
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes				Random from set {1,2}	Random from set {1,2}
PDSCH transmission mode			8	3	3
Interference model			N/A	As specified in clause B.6.2	As specified in clause B.6.2
Precoding			Random wideband precoding per TTI	As specified in clause B.6.2	As specified in clause B.6.2
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$
Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.
Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of 36.331 [5].

Table 8.3.2.1.7.5-2: Test Requirement for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM3 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.70 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	2x2 Low	85	12.84	≥1

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1, Cell 2 and Cell 3.

8.3.2.1.8 TDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM10 serving cell configuration and TM9 interference model - Enhanced Performance Requirement Type B

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Information in Annex F is TBD

- Test Tolerances are undefined

8.3.2.1.8.1 Test purpose

The purpose of this test is to verify closed loop rank one performance of the UE on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission configured with TM10 in the serving cell is interfered by PDSCH of two interfering cells applying transmission mode 9 interference model defined in clause B6.4.

8.3.2.1.8.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward that support enhanced performance requirement Type B and PDSCH Transmission mode 10.

8.3.2.1.8.3 Minimum conformance requirements

The requirements are specified in Table 8.3.2.1.8.3-2, with the addition of the parameters in Table 8.3.2.1.8.3-1 and the downlink physical channel setup according to Annex C.3.2.

The NAICS network assistance is provided when the serving cell TM10 is configured with QCL-type A and PCID based DM-RS scrambling. The neighbouring cells have transmission mode TM9 and NeighCellsInfo-r12 for interfering cell indicates presence of TM9. In Table 8.3.2.1.8.3-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Table 8.3.2.1.8.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM10 serving cell configuration and TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	3	3
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	2	2
PDSCH transmission mode			10	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Precoding			Random wideband precoding per TTI	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			Antenna ports 15, 16, 17, 18	Antenna ports 15, 16	Antenna ports 15, 16
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	10 / 4	10 / 4	10 / 4
CSI reference signal configuration			5	6	7
Zero-power CSI-RS configuration $I_{CSI\text{-}RS}$ /*ZeroPowerCSI-RS* bitmap		Subframes / bitmap	9 / 1000000000000000	9 / 0100000000000000	9 / 0010000000000000
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$

Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.

Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 8.3.2.1.8.3-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM10 serving cell configuration and TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration			Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.69 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	4x2 Low	2x2 Low	2x2 Low	85	18.0	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.													
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.													

The normative reference for these requirements is TS 36.101 [2] clause 8.3.2.1G

8.3.2.1.8.4 Test description

8.3.2.1.8.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.3.2.1.8.3-2, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.88.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.3.2.1.8.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.8.4.3.

8.3.2.1.8.4.2 Test procedure

1 SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.8.5-1 and 8.3.2.1.8.5-2. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sets up parameters for cell 2 and cell 3 according to table 8.3.2.1.8.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.3.2.1.8.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 or 8 using four Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity as specified in Table 8.3.2.1.8.5-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.

5. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

8.3.2.1.8.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and clause 5.2A.6.2 with the condition SRB2-DRB_NAICS(n,m) with the following exceptions.

Table 8.3.2.1.8.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.2.1.8.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.2.1.8.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	5	Parameter: CSI reference signal configuration	
subframeConfig-r10	10	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}} - 5$ when CSI-RS SubframeConfig is from 5-14; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	1000000000000000	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	9	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.2.1.8.5 Test requirement

Table 8.3.2.1.8.5-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.3.2.1.8.5-2 for the specified SNR including test tolerances.

Table 8.3.2.1.8.5-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM10 serving cell configuration and TM9 interference model

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	0	0	0
	ρ_B	dB	0 (Note 1)	0	0
	σ	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91+TT	3.34+TT
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Number of control OFDM symbols in normal subframes			3	3	3
CFI indicated in PCFICH in normal subframes			3	3	3
Number of control OFDM symbols in special subframes			2	2	2
CFI indicated in PCFICH in special subframes			2	2	2
PDSCH transmission mode			10	9	9
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Precoding			Random wideband precoding per TTI	As specified in clause B.6.4	As specified in clause B.6.4
CSI reference signals			Antenna ports 15, 16, 17, 18	Antenna ports 15, 16	Antenna ports 15, 16
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	10 / 4	10 / 4	10 / 4
CSI reference signal configuration			5	6	7
Zero-power CSI-RS configuration $I_{CSI\text{-}RS}$ /*ZeroPowerCSI-RS* bitmap		Subframes / bitmap	9 / 1000000000000000	9 / 0100000000000000	9 / 0010000000000000
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
MBSFN			Not configured	Not configured	Not configured
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: $P_B = 1$

Note 2: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 3: CSI-RS configurations are according to TS 36.211 [8] subclause 6.10.5.2.

Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 8.3.2.1.8.5-2: Minimum Performance for Enhanced Performance Requirement Type B, CDM-multiplexed DM RS with TM10 serving cell configuration and TM9 interference model

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions			Correlation Matrix and Antenna Configuration			Reference Value		UE Category
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.69 TDD	OP.1 TDD	N/A	N/A	EPA5	EPA5	EPA5	4x2 Low	2x2 Low	2x2 Low	85	18.0+TT	≥1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.													
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.													

8.3.2.2 TDD PDSCH Dual-layer Spatial Multiplexing Performance (UE-Specific Reference Symbols)

8.3.2.2.1 TDD PDSCH Dual-layer Spatial Multiplexing

8.3.2.2.1.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation.

8.3.2.2.1.2 Test applicability

This test applies to Release 9 UEs that support enhanced Dual Layer TDD (TM8) and all types of E-UTRA TDD UE release 10 and forward.

8.3.2.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.2.1.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.2.1.3-2 for the specified SNR.

Table 8.3.2.2.1.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer)

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3
Cell-specific reference symbols			Antenna port 0 and antenna port 1	
Beamforming model			Annex B.4.2	
N_{oc} at antenna port		dBm/15kHz	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)
Number of allocated resource blocks		PRB	50	50
PDSCH transmission mode			8	8

Note 1: $P_B = 1$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.2.2.1.3-2: Minimum performance for CDM-multiplexed DM RS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	4.5	≥2
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	21.7	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.2.1.4 Test description

8.3.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.2.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.2.1.4.3.

8.3.2.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.2.1.3-1, 8.3.2.2.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.2.1.5-1 as appropriate.
BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/Dedicated data for test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.2-1.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.2.1.5-1 as appropriate.

8.3.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.3.2.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm8-v920		
}			
}			
Extension ::= SEQUENCE {			
antennaInfo-v920 ::= SEQUENCE{			
codebookSubsetRestriction-v920 CHOICE {			
n2TxAntenna-tm8-r9	111111		
}			
}			
}			
}			

8.3.2.2.1.5 Test requirement

Table 8.3.2.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.2.1.5-1: Test requirement for CDM-multiplexed DM RS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	5.4	≥2
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	22.6	≥2

8.3.2.2.1_D TDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO

8.3.2.2.1_D.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.2.2.1_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10Applicability requires support for FGI bit 103.

8.3.2.2.1_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.2.1_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.2.1_D.3-2 for the specified SNR.

Table 8.3.2.2.1_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0 and 1
CSI reference signals			Antenna ports 15,16
Beamforming model			Annex B.4.2
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ /$\Delta_{CSI\text{-}RS}$		Subframes	5 / 4
CSI reference signal configuration			8
Zero-power CSI-RS configuration $I_{CSI\text{-}RS}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Number of allocated resource blocks (Note 2)		PRB	50
Simultaneous transmission			No
PDSCH transmission mode			9
Note 1: $P_B = 1$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.2.2.1_D.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	EPA5	2x2 Low	70	14.5	2-8

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.3.

8.3.2.2.1_D.4 Test description

8.3.2.2.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.2.1_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.2.1_D.4.3.

8.3.2.2.1_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.2.1_D.3-1, 8.3.2.2.1_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.2.1_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.2-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.2.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.2.1_D.4.3-1: *Void*

Table 8.3.2.2.1_D.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.3.2.2.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.2.2.1_D.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.2.2.1_D.5 Test requirement

Table 8.3.2.2.1_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.3 for the throughput test shall meet or exceed the specified value in Table 8.3.2.2.1_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.2.1_D.5-1: Test requirement for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	EPA5	2x2 Low	70	15.4	2-8

8.3.2.2.1_D_1 TDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO (Release 11 and forward)

8.3.2.2.1_D_1.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power, and to verify that the UE correctly estimate SNR.

8.3.2.2.1_D_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward that support eDL-MIMO. Applicability requires support for FGI bit 103.

8.3.2.2.1_D_1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.2.1_D_1.3-1 where Cell 1 is the serving cell and Cell 2 is the interfering cell. The downlink physical channel setup is set according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.2.1_D_1.3-2 for the specified SNR.

Table 8.3.2.2.1_D_1.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

Parameter		Unit	Test 1	
			Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
	PDSCH_RA	dB	4	NA
	PDSCH_RB	dB	4	NA

Cell-specific reference signals		Antenna ports 0 and 1	Antenna ports 0 and 1
Cell ID		0	126
CSI reference signals		Antenna ports 15,16	NA
Beamforming model		Annex B.4.2	NA
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}	Subframes	5 / 4	NA
CSI reference signal configuration		8	NA
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	4 / 0010000000000000	NA
N_{oc} at antenna port	dBm/15kHz	-98	-98
$\hat{E}_s / N_{oc}$		Reference Value in Table 8.3.2.3-2	Test specific, 7.25dB
Symbols for unused PRBs		OCNG (Note 2)	NA
Number of allocated resource blocks (Note 2)	PRB	50	NA
Simultaneous transmission		No	NA
PDSCH transmission mode		9	Blanked
Note 1: $P_B = 1$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.2.2.1_D_1.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern		Propagation Condition		Correlation Matrix and Antenna Configuration	Reference value		UE Category
			Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	N/A	ETU5	ETU5	2x2 Low	70	14.8	≥2
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.3.

8.3.2.2.1_D_1.4 Test description

8.3.2.2.1_D_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.2.1_D_1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.2.1_D_1.4.3.

8.3.2.2.1_D_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.2.1_D_1.3-1, 8.3.2.2.1_D_1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of Cell 1 for the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.2.1_D.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.2-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Set Cell 2 as defined in Tables 8.3.2.2.1_D_1.5-1 and 8.3.2.2.1_D_1.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.2.1_D_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.2.1_D_1.4.3-1: *Void*

Table 8.3.2.2.1_D_1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.3.2.2.1_D_1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.2.2.1_D_1.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.3.2.2.1_D_1.5 Test requirement

Table 8.3.2.2.1_D_1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.3 for the throughput test shall meet or exceed the specified value in Table 8.3.2.2.1_D_1.5-1 and 8.3.2.2.1_D_1.5-2 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.2.1_D_1.5-1: Test Requirement for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Test 1	
			Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	4	0
	ρ_B	dB	4 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0 and 1	Antenna ports 0 and 1
Cell ID			0	126
CSI reference signals			Antenna ports 15,16	NA
Beamforming model			Annex B.4.2	NA
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 4	NA
CSI reference signal configuration			8	NA
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4 / 0010000000000000	NA
N_{oc} at antenna port		dBm/15kHz	-98	-98
$\widehat{E}_s / N_{oc}$			Reference Value in Table 8.3.2.2.1_D_1.5-2	6.9dB
Symbols for unused PRBs			OCNG (Note 2)	NA
Number of allocated resource blocks (Note 2)		PRB	50	NA
Simultaneous transmission			No	NA
PDSCH transmission mode			9	Blanked

Note 1: $P_B = 1$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.2.2.1_D_1.5-2: Test requirement for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern		Propagation Condition		Correlation Matrix and Antenna Configuration	Reference value		UE Category
			Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	N/A	ETU5	ETU5	2x2 Low	70	15.6	≥2
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.										

8.3.2.2.2 TDD PDSCH Dual-layer Spatial Multiplexing – Enhanced Performance Requirement Type C

8.3.2.2.2.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation.

8.3.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 12 and forward UE of Category 2 or higher that support enhanced receiver Type C

8.3.2.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.2.2.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.2.2.3-2 for the specified SNR.

Table 8.3.2.2.2.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference symbols			Antenna port 0 and antenna port 1
Beamforming model			Annex B.4.2
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Number of allocated resource blocks		PRB	50
PDSCH transmission mode			8
Note 1: $P_B = 1$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.2.2.2.3-2: Enhanced Performance Requirement Type C for CDM-multiplexed DM RS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	17.0	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.2A.

8.3.2.2.2.4 Test description

8.3.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.2.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.2.2.4.3.

8.3.2.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.2.2.3-1, 8.3.2.2.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.2.2.5-1 as appropriate.
BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/Dedicated data for test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.2-1.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.2.2.5-1 as appropriate.

8.3.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.3.2.2.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm8-v920		
}			
}			
Extension ::= SEQUENCE {			
antennaInfo-v920 ::= SEQUENCE{			
codebookSubsetRestriction-v920 CHOICE {			
n2TxAntenna-tm8-r9	111111		
}			
}			
}			
}			

8.3.2.2.2.5 Test requirement

Table 8.3.2.2.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.2.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.2.2.5-1: Test requirement for Enhanced Performance Requirement Type C for CDM-multiplexed DM RS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	17.9	≥2

8.3.2.3 Dual-Layer Spatial Multiplexing (with multiple CSI-RS configurations)

TBD

8.3.2.4 TDD PDSCH Performance with DCI format 2D and non Quasi Co-located Antenna Ports

8.3.2.4.1_F TDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and single NZP CSI-RS resource for CoMP

8.3.2.4.1_F.1 Test purpose

To verify the UE capability of supporting non quasi-collocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission points share the same Cell ID. In particular the test verifies that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the timing difference between two transmission points, channel parameters estimation and rate matching behaviour according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling.

8.3.2.4.1_F.2 Test applicability

This test applies to E-UTRA TDD category ≥2 UE release 11 and forward, supporting Maximum CSI processes of One on a component carrier within a band with PDSCH transmission mode 10.

8.3.2.4.1_F.3 Minimum conformance requirements

The requirements are specified in Table 8.3.2.4_F.3-3, with the addition of the parameters in Table 8.3.2.4_F.3-1 and Table 8.3.2.4_F.3-2. In table 8.3.2.4_F.3-1 transmission point 1 (TP1) is the serving cell and transmission point 2 (TP2) transmits PDSCH. The downlink physical channel setup for TP1 is according to Table C.3.4-1 and for TP2 according to Table C.3.4-2.

Table 8.3.2.4.1_F.3-1: Test Parameters for quasi co-location type B: same Cell ID

Parameter		Unit	TP 1	TP 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	(Note 2)
CSI-RS 0 antenna ports			NA	Port {15,16}
qcl-CSI-RS-ConfigNZPId-r11, CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	NA	5/4
qcl-CSI-RS-ConfigNZPId-r11, CSI-RS 0 configuration			NA	8
csi-RS-ConfigZPId-r11, Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPower CSI-RS* bitmap			NA	4/ 0000010000000000
N_{oc} at antenna port		dBm/15kHz	-98	-98
SNR		dB	Reference point in Table 8.3.2.4_F.3-3	Reference point in Table 8.3.2.4_F.3-3
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	0
Number of control OFDM symbols			2	2
PDSCH transmission mode			Blanked	10
Number of allocated PRB		PRB	NA	50
*qcl-Operation, '*PDSCH RE Mapping and Quasi-Co-Location Indicator'			Type B, '00'	
Time offset between TPs		μs	NA	Reference point in Table 8.3.2.4_F.3-2
Frequency error between TPs		Hz	NA	0
Beamforming model			NA	Port 7 as specified in clause B.4.1
Symbols for unused PRBs			NA	OCNG (Note 3)

Note 1: $P_B = 1$

Note 2: REs for antenna ports 0 and 1 have zero transmission power.

Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.2.4.1_F.3-2: Configurations of PQI and DL transmission hypothesis for each PQI set

PQI set index	Parameters in each PQI set		DL transmission hypothesis for each PQI Set	
	NZP CSI-RS Index (For quasi co-location)	ZP CSI-RS configuration	TP 1	TP 2
PQI set 0	CSI-RS 0	ZP CSI-RS 0	Blanked	PDSCH

Table 8.3.2.4.1_F.3-3: Minimum performance for quasi co-location type B: same Cell ID

Test Number	Reference Channel	OGCN pattern		Time offset between TPs (μs)	Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		TP1	TP2		TP1	TP2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.52 TDD	NA	OP.1 TDD	2	EPA5	EPA5	2x2 Low	70	12	≥2
2	R.52 TDD	NA	OP.1 TDD	-0.5	EPA5	EPA5	2x2 Low	70	12.4	≥2
Note 1: The propagation conditions for TP1 and TP2 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for TP1 and TP2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of TP2.										

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.4.1.

8.3.2.4.1_F.4 Test description

8.3.2.4.1_F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the TP 1 and TP 2 are set up according to table 8.3.1-1, table 8.3.2.4.1_F.3-1 and 8.3.2.4.1_F.3-2 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.4.1_F.4.3.

8.3.2.4.1_F.4.2 Test procedure

1. SS transmits PDCCH on TP 1. PQI set and PDSCH transmission hypothesis in PDCCH format 2D are configured according to Table 8.3.2.4.1_F.3-2.
2. SS transmits PDSCH on TP 1 and TP 2 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to Table 8.3.2.4.1_F.3-3. The SS sends downlink MAC padding bits on the DL RMC.
3. Set the parameters of the reference channel, timing offset (TP 2 timing - TP 1 timing), the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.4.1_F.3-3 Test 1 as appropriate.

4. Wait for at least 1 second before measuring throughput.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

6. Repeat steps 1 to 4 for Test 2 in Table 8.3.2.4.1_F.3-3.

8.3.2.4.1_F.4.3 Message contents

Table 8.3.2.4.1_F.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	PDSCH-ConfigDedicated-DEFAULT		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigNZPToAddModList-r11	CSI-RS-ConfigNZP-r11-DEFAULT		
csi-RS-ConfigZPToAddModList-r11	CSI-RS-ConfigZP-r11-DEFAULT		
pdsch-ConfigDedicated-v1130	PDSCH-ConfigDedicated-v1130-DEFAULT		
}			

Table 8.3.2.4.1_F.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path:36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		2TX
}			

Table 8.3.2.4.1_F.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			

Table 8.3.2.4.3_F.4.1-4: CSI-RS-ConfigNZP-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {			
csi-RS-ConfigNZPId-r11	1		
antennaPortsCount-r11	an2		
resourceConfig-r11	0		
subframeConfig-r11	4		
scramblingIdentity-r11	0		
qcl-CRS-Info-r11 SEQUENCE {			
qcl-ScramblingIdentity-r11	0		
crs-PortsCount-r11	n2		
mbsfn-SubframeConfigList-r11	Not present		
}			
}			

Table 8.3.2.4.3_F.4.1-5: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	0000010000000000		
subframeConfig-r11	4		
}			

Table 8.3.2.4.3_F.4.1-6: PDSCH-ConfigDedicated-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {			
dmrs-ConfigPDSCH-r11	DMRS-Config-r11-DEFAULT		
qcl-Operation	typeB		
re-MappingQCLConfigToAddModList-r11 SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF SEQUENCE {	1 entry		
pdsch-RE-MappingQCL-ConfigId-r11[1]	1		
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11	Not present		
pdsch-Start-r11	2		
}			
}			
}			

8.3.2.4.1_F.5 Test requirement

Table 8.3.2.4.1_F.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.2.4.1_F.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.4.1_F.5-1: Minimum performance for quasi co-location type B: same Cell ID

Test Number	Reference Channel	OGCN pattern		Time offset between TPs (Note 4)	Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		TP1	TP2		TP1	TP2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.52 TDD	NA	OP.1 TDD	57Ts	EPA5	EPA5	2x2 Low	70	12.9	2-8
2	R.52 TDD	NA	OP.1 TDD	-11Ts	EPA5	EPA5	2x2 Low	70	13.3	2-8
Note 1: The propagation conditions for TP1 and TP2 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for TP1 and TP2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of TP2. Note 4: Timing offset in units of Ts: T_S = 1/(15000 x 2048) seconds, the basic timing unit defined in TS 36.211 [8].										

8.3.2.4.2_F TDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and multiple NZP CSI-RS resources for CoMP

8.3.2.4.2_F.1 Test purpose

To verify the UE capability of supporting non quasi-collocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission points share the same Cell ID by verifying that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the timing difference between two transmission points, channel parameters estimation and rate matching behaviour according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling.

8.3.2.4.2_F.2 Test applicability

This test applies to all types of E-UTRA TDD category ≥2 UE release 11 and forward, supporting Maximum CSI processes of Three or Four on a component carrier within a band with PDSCH transmission mode 10.

8.3.2.4.2_F.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.4.2_F.3-1 and 8.3.2.4.2_F.3-2.

In table 8.3.2.4.2_F.3-1, transmission point 1 (TP 1) is the serving cell transmitting PDCCH, synchronization signals and PBCH, and transmission point 2 (TP 2) has same Cell ID as TP 1. Multiple NZP CSI-RS resources and ZP CSI-RS resources are configured. In each sub-frame, DL PDSCH transmission is dynamically switched between 2 TPs with multiple PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator and downlink transmission hypothesis are defined in Table 8.3.2.4.2_F.3-2. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.4.2_F.3-3 for the specified SNR.

Table 8.3.2.4.2_F.3-1: Test Parameters for timing offset compensation with DPS transmission

parameter		Unit	TP 1	TP 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3

Beamforming model		As specified in clause B.4.1	As specified in clause B.4.1
Cell-specific reference signals		Antenna ports 0,1	(Note 2)
CSI reference signals 0		Antenna ports {15,16}	N/A
CSI-RS 0 periodicity and subframe offset TCSI-RS / ΔCSI-RS	Subframes	5 / 4	N/A
CSI reference signal 0 configuration		0	N/A
CSI reference signals 1		N/A	Antenna ports {15,16}
CSI-RS 1 periodicity and subframe offset TCSI-RS / ΔCSI-RS	Subframes	N/A	5 / 4
CSI reference signal 1 configuration		N/A	8
Zero-power CSI-RS 0 configuration ICSI-RS / ZeroPower CSI-RS bitmap	Subframes /bitmap	4/ 0010000000000000	N/A
Zero-power CSI-RS1 configuration ICSI-RS / ZeroPower CSI-RS bitmapS	Subframes /bitmap	N/A	4/ 0000010000000000
$\hat{E}_s / N_{oc}$	dB	Reference Value in Table 8.3.2.4.2_F.3-3	Reference Value in Table 8.3.2.4.2_F.3-3
N_{oc} at antenna port	dBm/15kHz	-98	-98
BWChannel	MHz	10	10
Cyclic Prefix		Normal	Normal
Cell Id		0	0
Number of control OFDM symbols		2	2
Timing offset between TPs		N/A	Reference Value in Table 8.3.2.4.2-3
Frequency offset between TPs	Hz	N/A	0
Number of allocated resource blocks	PRB	50	50
PDSCH transmission mode		10	10
Probability of occurrence of PDSCH transmission(Note 3)	%	30	70
Symbols for unused PRBs		OCNG (Note 4)	OCNG (Note 4)

Note 1: $P_B = 1$.
Note 2: REs for antenna ports 0 and 1 have zero transmission power.
Note 3: PDSCH transmission from TPs shall be randomly determined independently for each subframe. Probabilities of occurrence of PDSCH transmission from TPs are specified.
Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.2.4.2_F.3-2: Configurations of PQI and DL transmission hypothesis for each PQI set

PQI set index	Parameters in each PQI set		DL transmission hypothesis for each PQI Set	
	NZP CSI-RS Index (For quasi	ZP CSI-RS configuration	TP 1	TP 2

	co-location)			
PQI set 0	CSI-RS 0	ZP CSI-RS 0	PDSCH	Blanked
PQI set 1	CSI-RS 1	ZP CSI-RS 1	Blanked	PDSCH

Table 8.3.2.4.2_F.3-3: Minimum Requirements for timing offset compensation with DPS transmission

Test Number	Timing offset(us)	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
			TP 1	TP 2	TP 1	TP 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	2	R.53 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	70	12.3	≥2
2	-0.5	R.53 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	70	12.5	≥2
Note 1: The propagation conditions for TP 1and TP 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. Note 3: SNR corresponds to $\widehat{E}_s / N_{oc}$ of both TP 1 and TP 2.										

The normative reference for these requirements is TS 36.101 [2] clause 8.3.2.4.2.

8.3.2.4.2_F.4 Test description

8.3.2.4.2_F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the TP 1 and TP 2 are set up according to table 8.3.1-1, 8.3.2.4.2_F.3-1 and 8.3.2.4.2_F.3-2 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.3.2_F.4.3.

8.3.2.4.2_F.4.2 Test procedure

1. SS transmits PDCCH on TP 1. PQI set and PDSCH transmission hypothesis in PDCCH format 2D are configured according to Table 8.3.2.4.2_F.3-2.
2. SS transmits PDSCH on TP 1 and TP 2 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to Tables 8.3.2.4.2_F.3-1 and 8.3.2.4.2_F.3-2. The SS sends downlink MAC padding bits on the DL RMC. PDSCH transmission from TPs shall be randomly determined independently for each subframe. Probabilities of occurrence of PDSCH transmission from TPs are specified according to Table 8.3.2.4.2_F.3-1. The probability of occurrence of PQI set in each TP is equal.

3. Set the parameters of the reference channel, timing offset (TP 2 timing - TP 1 timing), the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.4.2_F.3-3 Test 1 as appropriate.

4. Wait for at least 1 second before measuring throughput.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

6. Repeat steps 1 to 4 for Test 2 in Table 8.3.2.4.2_F.3-3.

8.3.2.4.2_F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.4.2_F.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	PDSCH-ConfigDedicated-DEFAULT		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigNZPToAddModList-r11	CSI-RS-ConfigNZP-r11-DEFAULT		
csi-RS-ConfigZPToAddModList-r11	CSI-RS-ConfigZP-r11-DEFAULT		
pdsch-ConfigDedicated-v1130	PDSCH-ConfigDedicated-v1130-DEFAULT		
}			

Table 8.3.2.4.2_F.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path:36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		2TX
}			

Table 8.3.2.4.2_F.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.2.4.2_F.4.3-4: CSI-RS-ConfigNZP-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {			
csi-RS-ConfigNZPId-r11	For NZP CSI-RS configuration (CSI reference signals 0) = 1 NZP CSI-RS configuration (CSI reference signals 1) = 2		
antennaPortsCount-r11	an2		
resourceConfig-r11	For NZP CSI-RS configuration (CSI reference signals 0) = 0 NZP CSI-RS configuration (CSI reference signals 1) = 8		
subframeConfig-r11	4		
scramblingIdentity-r11	0		
qcl-CRS-Info-r11 SEQUENCE {			
qcl-ScramblingIdentity-r11	0		
crs-PortsCount-r11	n2		
mbsfn-SubframeConfigList-r11	Not present		
}			
}			

Table 8.3.2.4.2_F.4.3-5: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	For Zero-power CSI-RS 0 = 0010000000000000 For Zero-power CSI-RS 1 configuration = 0000010000000000	Parameter: *ZeroPowerCSI-RS*	
subframeConfig-r11	4		
}			

Table 8.3.2.4.2_F.4.3-6: PDSCH-ConfigDedicated-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {			
dmrs-ConfigPDSCH-r11	DMRS-Config-r11-DEFAULT		
qcl-Operation	typeB		
re-MappingQCLConfigToAddModList-r11 SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF SEQUENCE {	2 entries	See Table 8.3.2.4.2_F.3-2	
pdsch-RE-MappingQCL-ConfigId-r11[1]	1	Entry 1	
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11	Not present		
pdsch-Start-r11	2		
}			
csi-RS-ConfigZPId-r11[1]	1		
qcl-CSI-RS-ConfigNZPId-r11[1]	1		
pdsch-RE-MappingQCL-ConfigId-r11[1]	4	Entry 2	
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11	Not present		
pdsch-Start-r11	2		
}			
csi-RS-ConfigZPId-r11[1]	2		
qcl-CSI-RS-ConfigNZPId-r11[1]	2		
}			
}			

8.3.2.4.2_F.5 Test requirements

Table 8.3.2.4.2_F.3-1 and 8.3.2.4.2_F.3-2 defines the primary level setting.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.4.2_F.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.4.2_F.5-1: Test Requirements for timing offset compensation with DPS transmission

Test Number	Timing offset (Note 4)	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
			TP 1	TP 2	TP 1	TP 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	57Ts	R.53 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	70	13.2	2-8
2	11Ts	R.53 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	70	13.4	2-8
Note 1: The propagation conditions for TP1and TP2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of TP1 and TP2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of both TP 1 and TP 2. Note 4: Timing offset in units of Ts: T_S = 1/(15000 x 2048) seconds, the basic timing unit defined in TS 36.211 [8].										

8.3.2.4.3_F TDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Different Cell ID, Colliding CRS and single NZP CSI-RS resource for CoMP

8.3.2.4.3_F.1 Test purpose

To verify the UE capability of supporting non quasi-collocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission points have different Cell ID and colliding CRS by verifying that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the frequency difference between two transmission points, channel parameters estimation and rate matching behaviour according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling.

8.3.2.4.3_F.2 Test applicability

This test applies to all types of E-UTRA TDD category ≥2 UE release 11 and forward, supporting Maximum CSI processes of One, Three or Four on a component carrier within a band with PDSCH transmission mode 10.

8.3.2.4.3_F.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.2-1 and 8.3.2.4.3_F.3-1.

In table 8.3.2.4.3_F.3-1, transmission point 1 (TP 1) is the serving cell transmitting PDCCH, synchronization signals and PBCH, and transmission point 2 (TP 2) transmit PDSCH with different Cell ID. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.4.3_F.3-2 for the specified SNR.

Table 8.3.2.4.3_F.3-1: Test Parameters for quasi co-location type B with different Cell ID and Colliding CRS

parameter		Unit	TP1	TP2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Beamforming model			N/A	As specified in clause B.4.2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals 0			N/A	Antenna ports {15,16}
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	N/A	5 / 4
CSI reference signal 0 configuration			N/A	0
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPower CSI-RS* bitmap		Subframes /bitmap	N/A	4/ 0010000000000000
$\widehat{E}_s / N_{oc}$		dB	Reference point in Table 8.3.2.4.3_F.3-2 + 4dB	Reference Value in Table 8.3.2.4.3_F.3-2
N_{oc} at antenna port		dBm/15kHz	-98	-98
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			1	2
Timing offset between TPs		us	N/A	0
Frequency offset between TPs		Hz	N/A	200
qcl-Operation, 'PDSCH RE Mapping and Quasi-Co-Location Indicator'			Type B, '00'	
PDSCH transmission mode			Blank	10
Number of allocated resource block			N/A	50
Symbols for unused PRBs			N/A	OCNG(Note 2)

Note 1: $P_B = 1$.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.2.4.3_F.3-2: Performance Requirements for quasi co-location type B with different Cell ID and Colliding CRS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		TP 1	TP 2	TP 1	TP 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	

1	R.54 TDD	N/A	OP.1 TDD	EPA5	ETU5	2x2 Low	70	14.7	≥2
Note 1: The propagation conditions for TP 1 and TP 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of TP2.									

The normative reference for these requirements is TS 36.101 [2] clause 8.3.2.4.3.

8.3.2.4.3_F.4 Test description

8.3.2.4.3_F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the TP 1 are set up according to tables 8.3.2-1 and 8.3.2.4.3_F.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.4.3_F.4.3.

8.3.2.4.3_F.4.2 Test procedure

1. SS transmits PDCCH DCI format 2D on TP 1 according to Tables 8.3.2.4.3_F.3-1, 8.3.2.4.3_F.3-2 and Annex C3.4.
2. SS transmits PDSCH on TP 2 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to Tables 8.3.2.4.3_F.3-1, 8.3.2.4.3_F.3-2 and Annex C3.4. The SS sends downlink MAC padding bits on the DL RMC.
3. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.4.3_F.3-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.4.3_F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.4.3_F.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	PDSCH-ConfigDedicated-DEFAULT		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigNZPToAddModList-r11	CSI-RS-ConfigNZP-r11-DEFAULT		
csi-RS-ConfigZPToAddModList-r11	CSI-RS-ConfigZP-r11-DEFAULT		
pdsch-ConfigDedicated-v1130	PDSCH-ConfigDedicated-v1130-DEFAULT		
}			

Table 8.3.2.4.3_F.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path:36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		2TX
}			

Table 8.3.2.4.3_F.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.3.2.4.3_F.4.3-4: CSI-RS-ConfigNZP-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {			
csi-RS-ConfigNZPId-r11	1		
antennaPortsCount-r11	an2		
resourceConfig-r11	0		
subframeConfig-r11	4		
scramblingIdentity-r11	126		
qcl-CRS-Info-r11 SEQUENCE {			
qcl-ScramblingIdentity-r11	0		
crs-PortsCount-r11	n2		
mbsfn-SubframeConfigList-r11	Not present		
}			
}			

Table 8.3.2.4.3_F.4.3-5: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	0010000000000000		
subframeConfig-r11	4		
}			

Table 8.3.2.4.3_F.4.3-6: PDSCH-ConfigDedicated-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {			
dmrs-ConfigPDSCH-r11	DMRS-Config-r11-DEFAULT		
qcl-Operation	typeB		
re-MappingQCLConfigToAddModList-r11 SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF SEQUENCE {	1 entry		
pdsch-RE-MappingQCL-ConfigId-r11[1]	1		
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11	Not present		
pdsch-Start-r11	2		
}			
}			
}			

8.3.2.4.3_F.5 Test requirements

Table 8.3.2.4.3_F.3-1 defines the primary level setting.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.4.3_F.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.4.3_F.5-1: Test Requirements for quasi co-location type B with different Cell ID and Colliding CRS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration (Note 2)	Reference Value		UE Category
		TP 1	TP 2	TP 1	TP 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.54 TDD	N/A	OP.1 TDD	EPA5	ETU5	2x2 Low	70	15.6	2-8
Note 1: The propagation conditions for TP 1 and TP 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. Note 3: SNR corresponds to $\widehat{E}_s / N_{oc}$ of TP2.									

8.3.3 LAA

8.3.3.1 Dual-Layer Spatial Multiplexing with DM-RS

Table 8.3.3.1-1: Common Test Parameters

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes	Processes	8
Maximum number of HARQ transmission (Note 1)		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM
Precoder update granularity		Frequency domain: 1 PRG Time domain: 1 ms
Note 1: For retransmission in partial subframes, the TB size should be kept the same as the initial transmission regardless of the initial transmission is performed in full subframes or partial subframes. Note 2: Void.		

Table 8.3.3.1-2: Additional Test Parameters for LAA SCell(s)

Parameter	Unit	Value
DMTC Periodicity	ms	80
dmtc-PeriodOffset-r12 ms80-r12		0
Discovery signal occasion duration	subframe	1
Power allocation of discovery signal		Same as power allocation of CRS within a transmission burst in the test

8.3.3.1.1 LAA Dual-Layer Spatial Multiplexing with DM-RS with FDD as PCell

8.3.3.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value and verify the rank-2 performance for full RB allocation for CA with LAA Scell(s).

8.3.3.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD Release 13 and forward UE of categories 5 or higher that support E-UTRA FDD and downlink LAA with FDD as PCell. Applicability requires support for FGI bit 103.

8.3.3.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.15.2, with the addition of the relevant parameters in Tables 8.2.3-1 and Tables 8.3.3.1.1.3-1 to 8.3.3.1.1.3-7. The downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.3.1.1.3-7 for the specified SNR. For performance the bandwidths specified in article 5.4.2A are verified.

Table 8.3.3.1.1.3-1: Common Test Parameters

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes	Processes	8
Maximum number of HARQ transmission (Note 1)		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM
Precoder update granularity		Frequency domain: 1 PRG Time domain: 1 ms
Note 1: For retransmission in partial subframes, the TB size should be kept the same as the initial transmission regardless of the initial transmission is performed in full subframes or partial subframes. Note 2: Void.		

Table 8.3.3.1.1.3-2: Additional Test Parameters for LAA SCell(s)

Parameter	Unit	Value
DMTC Periodicity	ms	80
dmtc-PeriodOffset-r12 ms80-r12		0
Discovery signal occasion duration	subframe	1
Power allocation of discovery signal		Same as power allocation of CRS within a transmission burst in the test

For CA with LAA SCell(s), the requirements for dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C are specified in Table 8.3.3.1.1.3-7, with the addition of the parameters in Table 8.3.3.1.1.3-3, Table 8.3.3.1.1.3-4, Table 8.3.3.1.1.3-5 and Table 8.3.3.1.1.3-6. The downlink physical channel setup is set according to Annex C.3.2. The purpose of these tests is to verify the rank-2 performance for full RB allocation for CA with LAA SCell(s).

Table 8.3.3.1.1.3-3: Test Parameters for Large Delay CDD (FRC) for PCell

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (NOTE 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			TM3
Subframe configuration			Non-MBSFN
NOTE 1: $P_B = 1$. NOTE 2: PUCCH format 3 is used to feedback ACK/NACK. NOTE 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.3.3.1.1.3-4: Test Parameters for CDM-multiplexed DM RS (dual layer) for CA with LAA SCell(s)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0 and 1
Cell ID			0
CSI reference signals			Antenna ports 15,16
DMRS ports (dual layer transmission)			port 7 and port 8
Beamforming model			Annex B.4.2
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5/2
CSI reference signal configuration			8
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
PDSCH transmission mode			9
DL Burst transmission pattern for LAA SCell			As specified in B.8
The number of subframes set (S_1) in a burst			{1,3,5,8}
Occupied OFDM symbols set in the last subframe			{6,9,12,14}
Random variable *p* defined in B.8			0.5
timing error relative of LAA SCell to PCell		μs	0
Frequency offset of the *i*-th LAA SCell relative to PCell		Hz	200
Note 1: $P_B = 1$			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.3.1.1.3-5: Single carrier performance Large Delay CDD (FRC) for PCell for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of Nominal maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.6
3MHz	R.11-6 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
5MHz	R.11-2 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.3
10MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9
15MHz	R.11-7 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.8
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	12.9

Table 8.3.3.1.1.3-6: Single carrier performance for CDM-multiplexed DM RS (dual layer) for LAA SCell for multiple CA configurations

Band-width	Sub-test (Note 2)	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of maximum throughput (%) (Note 1)	SNR (dB)
20MHz	1	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14.1
	2	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14
	3	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14.2
	4	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14.2

Note 1: Fraction of nominal maximum throughput is calculated based on random occasions of LAA PDSCH transmission.

Note 2: An UE is required to fulfil only one test of Sub-test 1-4 depending on UE capabilities of endingDwPTS and secondSlotStartingPosition. For an UE not supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 1; For an UE not supporting endingDwPTS but supporting secondSlotStartingPosition, it is required to fulfil Sub-test 2; For an UE supporting endingDwPTS but not supporting secondSlotStartingPosition, it is required to fulfil Sub-test 3; and For an UE supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 4.

Table 8.3.3.1.1.3-7: Minimum performance (FRC) based on single carrier performance for CA with LAA SCell(s)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement (Note 2)	UE Category
	Total	PCell	LAA SCell		
1	2x20	20	20	As defined in Table 8.3.3.1.1.3-5 and Table 8.3.3.1.1.3-6	≥5

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3C.

Note 2: Apply a per-CC requirement defined in Table 8.3.3.1.1.3-5 for PCell and apply a per-CC requirement defined in Table 8.3.3.1.1.3-6 for LAA SCell.

The normative reference for this requirement is TS 36.101 [2] clause 8.3.3.1.1

8.3.3.1.1.4 Test description

8.3.3.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: 20 MHz + 20 MHz.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate.
2. The parameter settings for the cell are set up according to Table 8.3.3.1-1, 8.3.3.1-2 and 8.3.3.1.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.3.1.1.4.3.

8.3.3.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC, as appropriate and defined in Table 8.3.3.1.1.3-4 as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.3.3.1.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.3.3.1.1.3-5 for PCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Table 8.3.3.1.1.3-6 for SCC. The SS sends downlink MAC padding bits on the DL RMC. Additionally every sub-frame SS transmits PDCCH DCI format 1C for CC_RNTI to indicate number of OFDM symbols in the DwPTS of ending partial subframe if required depending on UE capability according to TS 36.213 clause 13A as described in Table 8.3.3.1.1.3-6.
6. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.3.3.1.1.5-1 and 8.3.3.1.1.5-2 as appropriate.
7. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.3.3.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions

Table 8.3.3.1.1.4.3-1: MeasDS-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.6			
Information Element	**Value/remark**	**Comment**	**Condition**
MeasDS-Config-DEFAULT ::= CHOICE {			
Release	NULL		
setup SEQUENCE {			
dmtc-PeriodOffset-r12 CHOICE {			
ms80-r12	0		
}			
ds-OccasionDuration-r12 CHOICE {			
durationTDD-r12	2		
}			
}			
}			

Table 8.3.3.1.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	Tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.3.3.1.1.4.3-3: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm9		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
pdsch-ConfigDedicated-r10	Not present		
}			
Laa-ScellConfiguration-r13 SEQUENCE {			
subframeStartPosition	‘s0’ or ‘s07’	Depending on UE capability, as described in Table 8.3.3.1.1.3-6	
Laa-SCellSubframeConfig	‘00000000’		
}			
}			

Table 8.3.3.1.1.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

Table 8.3.3.1.1.4.3-5: PUCCH-ConfigDedicated-v1020-DEFAULT

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-9A			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {			
pucch-Format-r10 CHOICE {			
format3-r10 SEQUENCE {			
n3PUCCH-AN-List-r10 SEQUENCE {	4		
	101		
	102		
	103		
	104		
}			
twoAntennaPortActivatedPUCCH-Format3-r10	Not present		
}			
}			
}			

8.3.3.1.1.5 Test Requirements

Table 8.3.3.1.1.5-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.15.2 and A.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.3.1.1.5-1 and 8.3.3.1.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.3.1.1.5-1: Test Parameters for Large Delay CDD (FRC) for PCell for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of Nominal maximum throughput (%)	SNR (dB)
20MHz	R.30 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.8

Table 8.3.3.1.1.5-2: Test parameters for CDM-multiplexed DM RS (dual layer) for LAA SCell for multiple CA configurations

Band-width	Sub-test (Note 2)	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of maximum throughput (%) (Note 1)	SNR (dB)
20MHz	1	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	15.0
	2	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14.9
	3	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	15.1
	4	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	15.1

Note 1: Fraction of nominal maximum throughput is calculated based on random occasions of LAA PDSCH transmission.

Note 2: An UE is required to fulfil only one test of Sub-test 1-4 depending on UE capabilities of endingDwPTS and secondSlotStartingPosition. For an UE not supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 1; For an UE not supporting endingDwPTS but supporting secondSlotStartingPosition, it is required to fulfil Sub-test 2; For an UE supporting endingDwPTS but not supporting secondSlotStartingPosition, it is required to fulfil Sub-test 3; and For an UE supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 4.

8.3.3.1.2 LAA Dual-Layer Spatial Multiplexing with DM-RS with TDD as PCell

8.3.3.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value and verify the rank-2 performance for full RB allocation for CA with LAA Scell(s).

8.3.3.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD Release 13 and forward UE of categories 5 or higher that support E-UTRA TDD and downlink LAA with TDD as PCell. Applicability requires support for FGI bit 103.

8.3.3.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A.3.4.2 and Annex A.3.15.2, with the addition of the relevant parameters in Table 8.2.3-1 and Tables 8.3.3.1.2.3-1 to 8.3.3.1.2.3-5. The downlink physical channel setup is set according to Table C.3.2-1 in Annex C.

The parameters specified in Table 8.3.3.1.2.3-1 are valid for TDD CC and LAA SCell(s) unless otherwise stated. And the additional parameters specified in Table 8.3.3.1.2.3-2 are valid for LAA SCell(s).

Table 8.3.3.1.2.3-1: Common Test Parameters

Parameter	Unit	Value
Uplink downlink configuration (Note 1)		1
Special subframe configuration (Note 2)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes	Processes	7
Maximum number of HARQ transmission (Note 3)		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM and 256QAM
Precoder update granularity		Frequency domain: 1 PRG for Transmission modes 9 Time domain: 1 ms
ACK/NACK feedback mode		Multiplexing
Note 1: As specified in Table 4.2-2 in TS 36.211 [4] Note 2: As specified in Table 4.2-1 in TS 36.211 [4] Note 3: For retransmission in partial subframes, the TB size should be kept the same as the initial transmission regardless of the initial transmission is performed in full subframes or partial subframes.		

Table 8.3.3.1.2.3-2: Additional Test Parameters for LAA SCell(s)

Parameter	Unit	Value
DMTC Periodicity	ms	80
dmtc-PeriodOffset-r12 ms80-r12		0
Discovery signal occasion duration	subframe	1
Power allocation of discovery signal		Same as power allocation of CRS within a transmission burst in the test

For CA with LAA SCell(s), the requirements for dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C are specified in Table 8.3.3.1.2.3-7, with the addition of the parameters in Table 8.3.3.1.2.3-3, Table 8.3.3.1.2.3-4 and Table 8.3.3.1.2.3-5. The purpose of these tests is to verify the rank-2 performance for full RB allocation for CA with LAA SCell(s).

Table 8.3.3.1.2.3-3: Test Parameters for Large Delay CDD (FRC) for PCell

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (NOTE 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			TM3
Subframe configuration			Non-MBSFN
NOTE 1: $P_B = 1$. NOTE 2: PUCCH format 3 is used to feedback ACK/NACK. NOTE 3: The same PDSCH transmission mode is applied to each component carrier.			

Table 8.3.3.1.2.3-4: Test Parameters for CDM-multiplexed DM RS (dual layer) for LAA SCell(s)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	4
	ρ_B	dB	4 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0 and 1
Cell ID			0
CSI reference signals			Antenna ports 15,16
DMRS ports (dual layer transmission)			port 7 and port 8
Beamforming model			Annex B.4.2
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5/4
CSI reference signal configuration			8
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4/ 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
PDSCH transmission mode			9
DL Burst transmission pattern for LAA SCell			As specified in B.8
The number of subframes set (S_1) in a burst			{1,3,5,8}
Occupied OFDM symbols set in the last subframe			{6,9,12,14}
Random variable *p* defined in B.8			0.5
Timing error relative of LAA SCell to PCell		μs	0
Frequency offset of th *i*-th LAA SCell relative to PCell		Hz	200
Note 1: $P_B = 1$			
Note 2: These physical resource blocks are assigned only within burst transmissions to a LAA UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.3.1.2.3-5: Single carrier performance Large Delay CDD (FRC) for PCell for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of maximum throughput (%)	SNR (dB)
1.4MHz	R.11-5 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.2
3MHz	R.11-6 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
5MHz	R.11-7 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.6
10MHz	R.11-8 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.8
15MHz	R.11-9 TDD	OP.1 TDD	EVA70	2x2 Low	70	12.9
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.0

Table 8.3.3.1.2.3-6: Single carrier performance for CDM-multiplexed DM RS (dual layer) for LAA SCell(s) for multiple CA configurations

Band-width	Sub-test (Note2)	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of Nominal maximum throughput (%) (Note 1)	SNR (dB)
20MHz	1	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14.1
	2	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14
	3	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14.2
	4	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14.2

Note 1: Fraction of nominal maximum throughput is calculated based on random occasions of LAA PDSCH transmission.

Note 2: An UE is required to fulfil only one test of Sub-test 1-4 depending on UE capabilities of endingDwPTS and secondSlotStartingPosition. For an UE not supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 1; For an UE not supporting endingDwPTS but supporting secondSlotStartingPosition, it is required to fulfil Sub-test 2; For an UE supporting endingDwPTS but not supporting secondSlotStartingPosition, it is required to fulfil Sub-test 3; and For an UE supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 4.

Table 8.3.3.1.2.3-7: Minimum performance (FRC) based on single carrier performance for CA with LAA SCell(s)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement (Note 2)	UE Category
	Total	PCell	LAA SCell		
1	2x20	20	20	As defined in Table 8.3.3.1.2.3-5 and Table 8.3.3.1.2.3-6	≥5

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in TS 36.101 [2] clause 8.1.2.3C.

Note 2: Apply a per-CC requirement defined in Table 8.3.3.1.2.3-5 for PCell and apply a per-CC requirement defined in Table 8.3.3.1.2.3-6 for LAA SCell.

Using this configuration, the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.3.1.2.3-7 for the specified SNR. For performance, the bandwidths specified in clause 5.4.2A are verified.

The normative reference for this requirement is TS 36.101 [2] clause 8.3.3.1.2.

8.3.3.1.2.4 Test description

8.3.3.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: 20 MHz + 20 MHz.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate.
2. The parameter settings for the cell are set up according to Tables 8.3.3.1.2.3-1 to 8.3.3.1.2.3-3 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.3.1.2.4.3.

8.3.3.1.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC, as appropriate and defined in Table 8.3.3.1.2.3-4 as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.3.3.1.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer to TS 36.321 [13], clauses 5.13 and 6.1.3.8). Wait for at least 2 seconds (Refer to TS 36.133 [4], clause 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.3.3.1.2.3-5 for PCC. The SS sends downlink MAC padding bits on the DL RMC.
5. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Table 8.3.3.1.2.3-6 for SCC. The SS sends downlink MAC padding bits on the DL RMC. Additionally, for every sub-frame, SS transmits PDCCH DCI format 1C for CC_RNTI to indicate number of OFDM symbols in the DwPTS of ending partial subframe if required depending on UE capability according to TS 36.213 [10] clause 13A as described in Table 8.3.3.1.2.3-6.
6. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.3.3.1.2.5-1 and 8.3.3.1.2.5-2 as appropriate.
7. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.3.3.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions.

Table 8.3.3.1.2.4.3-1: MeasDS-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.6			
Information Element	**Value/remark**	**Comment**	**Condition**
MeasDS-Config-DEFAULT ::= CHOICE {			
Release	NULL		
setup SEQUENCE {			
dmtc-PeriodOffset-r12 CHOICE {			
ms80-r12	0		
}			
ds-OccasionDuration-r12 CHOICE {			
durationTDD-r12	2		
}			
}			
}			

Table 8.3.3.1.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.3.3.1.2.4.3-3: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm9		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
pdsch-ConfigDedicated-r10	Not present		
}			
Laa-ScellConfiguration-r13 SEQUENCE {			
subframeStartPosition	‘s0’ or ‘s07’	Depending on UE capability, as described in Table 8.3.3.1.1.3-4	
Laa-SCellSubframeConfig	‘00000000’		
}			
}			

Table 8.3.3.1.2.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

Table 8.3.3.1.2.4.3-5: PUCCH-ConfigDedicated-v1020-DEFAULT

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-9A			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {			
pucch-Format-r10 CHOICE {			
format3-r10 SEQUENCE {			
n3PUCCH-AN-List-r10 SEQUENCE {	4		
	101		
	102		
	103		
	104		
}			
twoAntennaPortActivatedPUCCH-Format3-r10	Not present		
}			
}			
}			

8.3.3.1.2.5 Test Requirements

Table 8.3.3.1.2.5-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A.3.4.2 and Annex A.3.15.2 for the throughput test shall meet or exceed the specified value in Table 8.3.3.1.2.5-1 and 8.3.3.1.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.3.1.2.5-1: Test Parameters for Large Delay CDD (FRC) for PCell for multiple CA configurations

Band-width	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
					Fraction of Nominal maximum throughput (%)	SNR (dB)
20MHz	R.30-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.9

Table 8.3.3.1.2.5-2: Test parameters for CDM-multiplexed DM RS (dual layer) for LAA SCell for multiple CA configurations

Band-width	Sub-test (Note 2)	Reference channel	OCNG pattern	Propa-gation condition	Correlation matrix and antenna config.	Reference value	
						Fraction of maximum throughput (%) (Note 1)	SNR (dB)
20MHz	1	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	15.0
	2	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	14.9
	3	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	15.1
	4	R.2 FS3	OP.1 FS3	EVA5	2x2 Low	70	15.1

Note 1: Fraction of nominal maximum throughput is calculated based on random occasions of LAA PDSCH transmission.

Note 2: An UE is required to fulfil only one test of Sub-test 1-4 depending on UE capabilities of endingDwPTS and secondSlotStartingPosition. For an UE not supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 1; For an UE not supporting endingDwPTS but supporting secondSlotStartingPosition, it is required to fulfil Sub-test 2; For an UE supporting endingDwPTS but not supporting secondSlotStartingPosition, it is required to fulfil Sub-test 3; and For an UE supporting both endingDwPTS and secondSlotStartingPosition, it is required to fulfil Sub-test 4.

8.4 Demodulation of PCFICH/PDCCH

8.4.1 FDD

8.4.1.1 FDD PCFICH/PDCCH Single-antenna Port Performance

8.4.1.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for a single-antenna port with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.4.1.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Single antenna port
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.1.3-2.

Table 8.4.1.1.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and Correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 FDD	OP.1 FDD	ETU70	1x2 Low	1	-1.7

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.

8.4.1.1.4 Test description

8.4.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Table 8.4.1.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.1.4.3.

8.4.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Table 8.4.1.1.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.1.5-1 as appropriate.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.1.1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.4.1.1.5 Test requirement

For the parameters specified in Table 8.4.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.1.5-1.

Table 8.4.1.1.5-1: Test requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 FDD	OP.1 FDD	ETU70	1x2 Low	1	-0.9

8.4.1.2 FDD PCFICH/PDCCH Transmit Diversity Performance

8.4.1.2.1 FDD PCFICH/PDCCH Transmit Diversity 2x2

8.4.1.2.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.4.1.2.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1.3-2.

Table 8.4.1.2.1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	1.4 MHz	2 CCE	R.16 FDD	OP.1 FDD	EPA5	2 x 2 Low	1	4.3

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.

8.4.1.2.1.4 Test description

8.4.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 1.4MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.1.4.3.

8.4.1.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.1.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.1.5-1.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.1.2.1.5 Test requirement

For the parameters specified in Table 8.4.1.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1.5-1.

Table 8.4.1.2.1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	1.4 MHz	2 CCE	R.16 FDD	OP.1 FDD	EPA5	2 x 2 Low	1	5.3

8.4.1.2.1_1 FDD PCFICH/PDCCH Transmit Diversity 2x2 (Release 9 and forward)

8.4.1.2.1_1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.2.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.4.1.2.1_1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.1_1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.2.1_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1_1.3-2.

Table 8.4.1.2.1_1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 FDD	EVA70	2 x 2 Low	1	-0.6

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1

8.4.1.2.1_1.4 Test description

8.4.1.2.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.1_1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.1_1.4.3.

8.4.1.2.1_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.1_1.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.1_1.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.1_1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.1_1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.1.2.1_1.5 Test requirement

For the parameters specified in Table 8.4.1.2.1_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1_1.5-1.

Table 8.4.1.2.1_1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 FDD	EVA70	2 x 2 Low	1	+0.4

8.4.1.2.2 FDD PCFICH/PDCCH Transmit Diversity 4x2

8.4.1.2.2.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.4.1.2.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.2.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2.3-2.

Table 8.4.1.2.2.3-2: Minimum performance PDCCH/PCFICH 4 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.17 FDD	OP.1 FDD	EVA5	4 x 2 Medium	1	0.9

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.

8.4.1.2.2.4 Test description

8.4.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.2.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.2.4.3.

8.4.1.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.2.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.2.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.1.2.2.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	11111111111111111111111111111111111111111111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.1.2.2.5 Test requirement

For the parameters specified in Table 8.4.1.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2.5-1.

Table 8.4.1.2.2.5-1: Test requirement PDCCH/PCFICH 4 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.17 FDD	OP.1 FDD	EVA5	4 x 2 Medium	1	1.9

8.4.1.2.2_1 FDD PCFICH/PDCCH Transmit Diversity 4x2 (Release 9 and forward)

8.4.1.2.2_1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.2.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.4.1.2.2_1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.2_1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.2.2_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2_1.3-2.

Table 8.4.1.2.2_1.3-2: Minimum performance PDCCH/PCFICH 4 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 FDD	OP.1 FDD	EPA5	4 x 2 Medium	1	6.3

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.

8.4.1.2.2_1.4 Test description

8.4.1.2.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.2_1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.2_1.4.3.

8.4.1.2.2_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.2_1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.2_1.5-1.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.1.2.2_1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.2_1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	11111111111111111111111111111111111111111111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.1.2.2_1.5 Test requirement

For the parameters specified in Table 8.4.1.2.2_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2_1.5-1.

Table 8.4.1.2.2_1.5-1: Test requirement PDCCH/PCFICH 4 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 FDD	OP.1 FDD	EPA5	4 x 2 Medium	1	+7.3

8.4.1.2.3

8.4.1.2.3_C FDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC

8.4.1.2.3_C.1 FDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

8.4.1.2.3_C.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.1.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.4.1.2.3_C.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.3_C.1.3-1: Void

For the parameters for non-MBSFN ABS specified in Table 8.4.1.2.3_C.1.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_C.1.3-3. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.1.2.3_C.1.3-2, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.4.1.2.3_C.1.3-2: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_C.1.3-3	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 01000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 01000100 00000100	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 10111011 11111011	N/A
Number of control OFDM symbols			3	3
Number of PHICH groups (N_g)			1	N/A
PHICH duration			Extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5];
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5];
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

Table 8.4.1.2.3_C.1.3-3: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	-3.9
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.2.3

8.4.1.2.3_C.1.4 Test description

8.4.1.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.1.2.3_C.1.3-1 and 8.4.1.2.3_C.1.3-2.
3. The downlink signals are initially set up according to Annex C.0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.3_C.1.4.3.

8.4.1.2.3_C.1.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.4.1.2.3_C.1.5-1, 8.4.1.2.3_C.1.5-2, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC in the subframes overlapping with ABS of the aggressor cell. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2A respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity. Propagation conditions are set according to Annex B clause B.2.
2. Measure the Pm-dsg in the subframes overlapping with ABS of the aggressor cell for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.3_C.1.5-2, pass the UE. Otherwise fail the UE.

8.4.1.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.3_C.1.4.3-1: *PHICH-Config-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-4: PHICH-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PHICH-Config-DEFAULT ::= SEQUENCE {			
phich-Duration	extended		Cell 1
phich-Resource	one		
}			

Table 8.4.1.2.3_C.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.4.1.2.3_C.1.4.3-3: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00000100000001000000 01000000010000000100'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.4.1.2.3_C.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00000100000001000000 01000100010000000100'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11111011111110111111 10111011101111111011'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.4.1.2.3_C.1.5 Test requirement

For the parameters specified in Table 8.4.1.2.3_C.1.5-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_C.1.5-2.

Table 8.4.1.2.3_C.1.5-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.6 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.4 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_C.1.5-2	1.3
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 01000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 01000100 00000100	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 10111011 11111011	N/A
Number of control OFDM symbols			3	3
Number of PHICH groups (N_g)			1	N/A
PHICH duration			Extended	N/A
Unused RE-s and PRB-s			OCNG	N/A
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5];
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5];
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

Table 8.4.1.2.3_C.1.5-2: Test Requirement PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	-3
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

8.4.1.2.3_C.2 FDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC (MBSFN ABS)

8.4.1.2.3_C.2.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.1.2.3_C.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.4.1.2.3_C.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.3_C.2.3-1: Void

For the parameters for MBSFN ABS specified in Table 8.4.1.2.3_C.2.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_C.2.3-3. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.1.2.3_C.2.3-2, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.4.1.2.3_C.2.3-2: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_C.2.3-3	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	126
ABS pattern (Note 4)			N/A	0001000000 0100000010 0000001000 0000000000
RLM/RRM Measurement Subframe Pattern (Note 5)			0001000000 0100000010 0000001000 0000000000	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0001000000 0100000010 0000001000 0000000000	N/A
	$C_{CSI,1}$		1110111111 1011111101 1111110111 1111111111	N/A
MBSFN Subframe Allocation (Note 9)			N/A	001000 100001 000100 000000
Number of control OFDM symbols			3	3
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1:	This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2:	This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4:	ABS pattern as defined in [14]. The 4th, 12th, 19th and 27th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7:	Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8:	SIB-1 will not be transmitted in Cell2 in this test.
Note 9:	MBSFN Subframe Allocation as defined in [5], four frames with 24 bits is chosen for MBSFN subframe allocation.
Note 10:	The maximum number of uplink HARQ transmission is ≤ 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.

Table 8.4.1.2.3_C.2.3-3: Minimum performance PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	-4.2
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.2.3

8.4.1.2.3_C.2.4 Test description

8.4.1.2.3_C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.1.2.3_C.2.3-1 and 8.4.1.2.3_C.2.3-2.
3. The downlink signals are initially set up according to Annex C.0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.3_C.2.4.3.

8.4.1.2.3_C.2.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.4.1.2.3_C.2.5-1, 8.4.1.2.3_C.2.5-2, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC in the subframes overlapping with ABS of the aggressor cell. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2A respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity. Propagation conditions are set according to Annex B clause B.2.

2. Measure the Pm-dsg in the subframes overlapping with ABS of the aggressor cell for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.3_C.2.5-2, pass the UE. Otherwise fail the UE.

8.4.1.2.3_C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.3_C.2.4.3-1: *PHICH-Config-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-4: PHICH-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PHICH-Config-DEFAULT ::= SEQUENCE {			
phich-Duration	extended		Cell 1
phich-Resource	one		
}			

Table 8.4.1.2.3_C.2.4.3-2: *SystemInformationBlockType3*: Neighbor cell configuration

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-2: SystemInformationBlockType3			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType3 ::= SEQUENCE {			
neighCellConfig	'00'B (Not all neighbour cells have the same MBSFN subframe allocation as serving cell)		Cell 1
}			

Table 8.4.1.2.3_C.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.4.1.2.3_C.2.4.3-4: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	‘00010000000100000010 00000010000000000000’	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.4.1.2.3_C.2.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00010000000100000010 00000010000000000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11101111111011111101 11111101111111111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.4.1.2.3_C.2.5 Test requirement

For the parameters specified in Table 8.4.1.2.3_C.2.5-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_C.2.5-2.

Table 8.4.1.2.3_C.2.5-1: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.6 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.4 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_C.2.5-2	1.3
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	126
ABS pattern (Note 4)			N/A	0001000000 0100000010 0000001000 0000000000
RLM/RRM Measurement Subframe Pattern (Note 5)			0001000000 0100000010 0000001000 0000000000	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0001000000 0100000010 0000001000 0000000000	N/A
	$C_{CSI,1}$		1110111111 1011111101 1111110111 1111111111	N/A
MBSFN Subframe Allocation (Note 9)			N/A	001000 100001 000100 000000
Number of control OFDM symbols			3	3
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. The 4th, 12th, 19th and 27th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in this test.
Note 9: MBSFN Subframe Allocation as defined in [5], four frames with 24 bits is chosen for MBSFN subframe allocation.
Note 10: The maximum number of uplink HARQ transmission is ≤ 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.

Table 8.4.1.2.3_C.2.5-2: Test Requirement PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	-3.3
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

8.4.1.2.3_D

8.4.1.2.3_E FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC

8.4.1.2.3_E.1 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)

8.4.1.2.3_E.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.1.2.3_E.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.4.1.2.3_E.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

For the parameters for non-MBSFN ABS specified in Table 8.4.1.2.3_E.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_E.1.3-2.

In Tables 8.4.1.2.3_E.1.3-1 and 8.4.1.2.3_E.1.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information TS 36.331 [5] including Cell 2 and Cell 3 is provided.

Table 8.4.1.2.3_E.1.3-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_E.1.3-2	5	3
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 00000100 00000100	00000100 00000100 00000100 00000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 00000100 00000100	N/A	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 11111011 11111011	N/A	N/A

Number of control OFDM symbols		2	Note 7	Note 7
Number of PHICH groups (N_g)		1	N/A	N/A
PHICH duration		Normal	N/A	N/A
Unused RE-s and PRB-s		OCNG	OCNG	OCNG
Cyclic prefix		Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 8: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9: SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

Table 8.4.1.2.3_E.1.3-2: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3		Pm-dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	1	-2.2

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.2.4.

8.4.1.2.3_E.1.4 Test description

8.4.1.2.3_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.1.2.3_E.1.3-1 and 8.4.1.2.3_E.1.3-2.
3. The downlink signals are initially set up according to Annex C.0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.4.1.2.3_E.1.4.3.

8.4.1.2.3_E.1.4.2 Test procedure

1. Set the parameters for Cell 1, Cell 2 and Cell 3, according to Tables 8.4.1.2.3_E.1.5-1, 8.4.1.2.3_E.1.5-2, Annex C.3.2 for Cell 1, and Annex C.3.3 for Cell 2 and Cell 3. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively.

2. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity. Propagation conditions are set according to Annex B clause B.2.

3. Measure the Pm-dsg in the subframes overlapping with ABS of the aggressor cell for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.3_E.1.5-2, pass the UE. Otherwise fail the UE.

8.4.1.2.3_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.4.1.2.3_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00000100 00000100 00000100 00000100 00000100'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.4.1.2.3_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT:

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.4.1.2.3_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00000100 00000100 00000100 00000100 00000100'B	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11111011 11111011 11111011 11111011 11111011'B	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.4.1.2.3_E.1.5 Test requirement

For the parameters specified in Table 8.4.1.2.3_E.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_E.1.5-2.

Table 8.4.1.2.3_E.1.5-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 3)	N/A	N/A

$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_E.1.5-2	4.8	2.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 00000100 00000100	00000100 00000100 00000100 00000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 00000100 00000100	N/A	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 11111011 11111011	N/A	N/A
Number of control OFDM symbols			2	Note 7	Note 7
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 8: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9: SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

Table 8.4.1.2.3_E.1.5-2: Test Requirement PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3		Pm-dsg (%)	SNR (dB) (Note 3)

1	8 CCE	R.15-2 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	1	-1.3
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.											

8.4.1.2.3_E.2 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)

8.4.1.2.3_E.2.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.1.2.3_E.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.4.1.2.3_E.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

For the parameters for non-MBSFN ABS specified in Table 8.4.2.2.3_E.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_E.2.3-2.

In Tables 8.4.1.2.3_E.2.3-1 and 8.4.1.2.3_E.2.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information TS 36.331 [5] including Cell 2 and Cell 3 is provided.

Table 8.4.1.2.3_E.2.3-1: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_E.1.3-2	5	3
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	MBSFN	MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 4)			N/A	0001000000 0100000010 0000001000 0000000000	0001000000 0100000010 0000001000 0000000000
RLM/RRM Measurement Subframe Pattern (Note 5)			0001000000 0100000010 0000001000 0000000000	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0001000000 0100000010 0000001000 0000000000	N/A	N/A
	$C_{CSI,1}$		1110111111 1011111101 1111110111 1111111111	N/A	N/A
MBSFN Subframe Allocation (Note 7)			N/A	001000 100001 000100 000000	001000 100001 000100 000000
Number of control OFDM symbols			2	Note 8	Note 8
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. The 4th, 12th, 19th and 27th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: MBSFN Subframe Allocation as defined in [5], four frames with 24 bits are chosen for MBSFN subframe allocation.
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: The maximum number of uplink HARQ transmission is ≤ 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.
Note 10: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.4.1.2.3_E.2.3-2: Minimum performance PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	1	-2.0

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\bar{E}_s / N_{oc2}$ of Cell 1.

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.2.4.

8.4.1.2.3_E.2.4 Test description

8.4.1.2.3_E.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell1 are set up according to Tables 8.4.1.2.3_E.2.3-1 and 8.4.1.2.3_E.2.3-2.

3. The downlink signals are initially set up according to Annex C.0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clauses B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.4.1.2.3_E.2.4.3.

8.4.1.2.3_E.2.4.2 Test procedure

1. Set the parameters for Cell 1, Cell 2 and Cell3, according to Tables 8.4.1.2.3_E.2.5-1, 8.4.1.2.3_E.2.5-2, Annex C.3.2 for Cell 1, and Annex C.3.3 for Cell 2 and Cell 3. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity. Propagation conditions are set according to Annex B clause B.2.

2. Measure the Pm-dsg in the subframes overlapping with ABS of the aggressor cell for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.3_E.2.5-2, pass the UE. Otherwise fail the UE.

8.4.1.2.3_E.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.4.1.2.3_E.2.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00010000001000000100000010000000'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n4		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
fourFrames	'00100010000100010000 0000' B		
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.4.1.2.3_E.2.4.3-2: PhysicalConfigDedicated-DEFAULT:

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.4.1.2.3_E.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00010000000100000010 00000010000000000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11101111111011111101 11111101111111111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

Table 8.4.1.2.3_E.2.4.3-4: *SystemInformationBlockType3*

Derivation Path: 36.508 [7] clause 4.6.2, Table 4.4.3.3-2 SystemInformationBlockType3			
Information Element	**Value/remark**	**Comment**	**Condition**
neighCellConfig	'00'B (Not all neighbour cells have the same MBSFN subframe allocation as the serving cell)		Cell 1

8.4.1.2.3_E.2.5 Test requirement

For the parameters specified in Table 8.4.1.2.3_E.2.5-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_E.2.5-2.

Table 8.4.1.2.3_E.2.5-1: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 3)	N/A	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_E.1.5-2	4.8	2.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	MBSFN	MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 4)			N/A	0001000000 0100000010 0000001000 0000000000	0001000000 0100000010 0000001000 0000000000
RLM/RRM Measurement Subframe Pattern (Note 5)			0001000000 0100000010 0000001000 0000000000	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0001000000 0100000010 0000001000 0000000000	N/A	N/A
	$C_{CSI,1}$		1110111111 1011111101 1111110111 1111111111	N/A	N/A
MBSFN Subframe Allocation (Note 7)			N/A	001000 100001 000100 000000	001000 100001 000100 000000
Number of control OFDM symbols			2	Note 8	Note 8
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. The 4th, 12th, 19th and 27th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: MBSFN Subframe Allocation as defined in [5], four frames with 24 bits are chosen for MBSFN subframe allocation.
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9: The maximum number of uplink HARQ transmission is ≤ 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.
Note 10: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.4.1.2.3_E.2.5-2: Test Requirement PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	1	-1.1

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\bar{E}_s / N_{oc2}$ of Cell 1.

8.4.1.2.4

8.4.1.2.5 FDD Enhanced Downlink Control Channel Performance Type A for PCFICH/PDCCH, 2 Tx Antenna Port under Asynchronous Network

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.4.1.2.5.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for PCFICH/PDCCH for 2 transmit diversity under Asynchronous network with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels remains below a given reference value.

8.4.1.2.5.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Test Applicability TBD

8.4.1.2.5.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH. The parameters specified in Table 8.4.1.2.5.3-1 and Table 8.4.1.2.5.3-2.

In Table 8.4.1.2.5.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is not provided.

Table 8.4.1.2.5.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.4.1.2.5.3-2: Additional Test Parameters for PDCCH/PCFICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA PHICH_RA PDSCH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB PDSCH_RB OCNG_RB	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of DL control region OFDM symbols			3	3	3
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
PDSCH TM			4	3	3
Interference model			N/A	As specified in clause B.5.2	As specified in clause B.5.2
Probability of occurrence of PDSCH transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Time offset relative to Cell 1		ms	N/A	0.33	0.67
Frequency shift relative to Cell 1		Hz	N/A	0	0
Note 1: According to Clause 6.9 in TS 36.211 [4].					

For the parameters specified in Table 8.4.1.2.5.3-1 and Table 8.4.1.2.5.3-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.5.3-3.

Table 8.4.1.2.5.3-3: Minimum Performance for PDCCH/PCFICH for Enhanced Downlink Control Channel Performance Requirement Type A

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	2 CCE	R.16-1 FDD	OP.1 FDD	EVA70	EVA70	EVA70	2x2 Low	1	16.5
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.1.5.

8.4.1.2.5.4 Test description

8.4.1.2.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.5.3-1 and Table 8.4.1.2.5.3-2.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.5.4.3.

8.4.1.2.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.5.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be closed loop spatial multiplexing.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.5.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.5.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.4.1.2.5.5 Test requirement

For the parameters specified in Table 8.4.1.2.5.3-1 and Table 8.4.1.2.5.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.5.5-1.

Table 8.4.1.2.5.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	2 CCE	R.16-1 FDD	OP.1 FDD	EVA70	EVA70	EVA70	2x2 Low	1	TBD

Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3.
Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 4: SNR corresponds to $\widehat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.

8.4.1.2.6 FDD Enhanced Downlink Control Channel Performance Type A for PCFICH/PDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

-Message exceptions

8.4.1.2.6.1 Test purpose

This test verifies the enhanced downlink control channel performance requirement Type A for PCFICH/PDCCH for 2 transmit diversity with Non-Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels remains below a given reference value.

8.4.1.2.6.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Test Applicability TBD

8.4.1.2.6.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH. The parameters specified in Table 8.4.1.2.6.3-1 and Table 8.4.1.2.6.3-2.

In Table 8.4.1.2.6.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.4.1.2.6.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.4.1.2.6.3-2: Additional Test Parameters for PDCCH/PCFICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of DL control region OFDM symbols			3	3	3
CFI indicated in PCFICH			3	3	3
PHICH Ng (Note 1)			1/6	N/A	N/A
PHICH duration			Normal	N/A	N/A
PDSCH TM			4	N/A	N/A
Interference model			NA	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time Offset relative to Cell 1		µs	N/A	2	3
Frequency shift relative to Cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [4]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.4.1.2.6.3-1 and Table 8.4.1.2.6.3-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.6.3-3.

Table 8.4.1.2.6.3-3: Minimum Performance for PDCCH/PCFICH for Enhanced Downlink Control Channel Performance Requirement Type A

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	4 CCE	R.16-2 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	1	12.8
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.1.6.

8.4.1.2.6.4 Test description

8.4.1.2.6.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.6.3-1 and Table 8.4.1.2.6.3-2.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.6.4.3.

8.4.1.2.6.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.6.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be closed loop spatial multiplexing.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.6.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.6.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.4.1.2.6.5 Test requirement

For the parameters specified in Table 8.4.1.2.6.3-1 and Table 8.4.1.2.6.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.6.5-1.

Table 8.4.1.2.6.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	4 CCE	R.16-2 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	1	TBD
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

8.4.1.2.7 FDD Enhanced Downlink Control Channel Performance Type B for PCFICH/PDCCH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

-Message exceptions

8.4.1.2.7.1 Test purpose

This test verifies the enhanced downlink control channel performance requirement Type B for PCFICH/PDCCH for 2 transmit diversity with Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels remains below a given reference value.

8.4.1.2.7.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Test Applicability TBD

8.4.1.2.7.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH. The parameters specified in Table 8.4.1.2.7.3-1 and Table 8.4.1.2.7.3-2.

In Table 8.4.1.2.7.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.4.1.2.7.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.4.1.2.7.3-2: Additional Test Parameters for PDCCH/PCFICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	6	1
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of DL control region OFDM symbols			1	1	1
CFI indicated in PCFICH			1	1	1
PHICH Ng (Note 1)			1/6	N/A	N/A
PHICH duration			Normal	N/A	N/A
PDSCH TM			4	N/A	N/A
Interference model			NA	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time Offset relative to Cell 1		µs	N/A	2	3
Frequency shift relative to Cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [4]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.4.1.2.7.3-1 and Table 8.4.1.2.7.3-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.7.3-3.

Table 8.4.1.2.7.3-3: Minimum Performance for PDCCH/PCFICH for Enhanced Downlink Control Channel Performance Requirement Type B

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	2 CCE	R.16-3 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	1	12.7
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.1.7.

8.4.1.2.7.4 Test description

8.4.1.2.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.7.3-1 and Table 8.4.1.2.7.3-2.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.7.4.3.

8.4.1.2.7.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.7.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be closed loop spatial multiplexing.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.7.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.7.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.4.1.2.7.5 Test requirement

For the parameters specified in Table 8.4.1.2.7.3-1 and Table 8.4.1.2.7.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.7.5-1.

Table 8.4.1.2.7.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	2 CCE	R.16-3 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	1	TBD
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

8.4.1.2.8 FDD Enhanced Downlink Control Channel Performance Type B for PCFICH/PDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

-Message exceptions

8.4.1.2.8.1 Test purpose

This test verifies the enhanced downlink control channel performance requirement Type B for PCFICH/PDCCH for 2 transmit diversity with Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels remains below a given reference value.

8.4.1.2.8.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Test Applicability TBD

8.4.1.2.8.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH. The parameters specified in Table 8.4.1.2.8.3-1 and Table 8.4.1.2.8.3-2.

In Table 8.4.1.2.8.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.4.1.2.8.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.4.1.2.8.3-2: Additional Test Parameters for PDCCH/PCFICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of DL control region OFDM symbols			1	1	1
CFI indicated in PCFICH			1	1	1
PHICH Ng (Note 1)			1/6	N/A	N/A
PHICH duration			Normal	N/A	N/A
PDSCH TM			4	N/A	N/A
Interference model				As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time Offset relative to Cell 1		µs	N/A	2	3
Frequency shift relative to Cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [4]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.4.1.2.8.3-1 and Table 8.4.1.2.8.3-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.8.3-3.

Table 8.4.1.2.8.3-3: Minimum Performance for PDCCH/PCFICH for Enhanced Downlink Control Channel Performance Requirement Type B

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	4 CCE	R.16-4 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	1	10.3
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.1.8.

8.4.1.2.8.4 Test description

8.4.1.2.8.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.8.3-1 and Table 8.4.1.2.8.3-2.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.8.4.3.

8.4.1.2.8.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.8.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be closed loop spatial multiplexing.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.8.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.8.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.8.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.4.1.2.8.5 Test requirement

For the parameters specified in Table 8.4.1.2.8.3-1 and Table 8.4.1.2.8.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.8.5-1.

Table 8.4.1.2.8.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	4 CCE	R.16-4 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	1	TBD
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

8.4.2 TDD

8.4.2.1 TDD PCFICH/PDCCH Single-antenna Port Performance

8.4.2.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for a single-antenna port with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.4.2.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Single antenna port
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.1.3-2.

Table 8.4.2.1.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 TDD	OP.1 TDD	ETU70	1x2Low	1	-1.6

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.1.4 Test description

8.4.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.

2. The parameter settings for the cell are set up according to 8.4.2.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.1.4.3.

8.4.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Table 8.4.2.1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.1.5-1 as appropriate.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.1.5-1, pass the UE. Otherwise fail the UE.

8.4.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.1.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	Ssp4		
}			

8.4.2.1.5 Test requirement

For the parameters specified in Table 8.4.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.1.5-1.

Table 8.4.2.1.5-1: Test requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 TDD	OP.1 TDD	ETU70	1x2Low	1	-0.8

8.4.2.2 TDD PCFICH/PDCCH Transmit Diversity Performance

8.4.2.2.1 TDD PCFICH/PDCCH Transmit Diversity 2x2

8.4.2.2.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.4.2.2.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group			

For the parameters specified in Table 8.4.2.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1.3-2.

Table 8.4.2.2.1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	1.4 MHz	2 CCE	R.16 TDD	OP.1 TDD	EPA5	2 x 2 Low	1	4.2

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.2.1.4 Test description

8.4.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 1.4MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to 8.4.2.2.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.1.4.3.

8.4.2.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.2.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.1.5-1, pass the UE. Otherwise fail the UE

8.4.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.2.1.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.4.2.2.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.2.2.1.5 Test requirement

For the parameters specified in Table 8.4.2.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1.5-1.

Table 8.4.2.2.1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	1.4 MHz	2 CCE	R.16 TDD	OP.1 TDD	EPA5	2 x 2 Low	1	5.2

8.4.2.2.1_1 TDD PCFICH/PDCCH Transmit Diversity 2x2 (Release 9 and forward)

8.4.2.2.1_1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.2.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.4.2.2.1_1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.1_1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group			

For the parameters specified in Table 8.4.2.2.1_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1_1.3-2.

Table 8.4.2.2.1_1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 TDD	OP.1 TDD	EVA70	2 x 2 Low	1	0.1

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.2.1_1.4 Test description

8.4.2.2.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to 8.4.2.2.1_1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.1_1.4.3.

8.4.2.2.1_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.1_1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.2.1_1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.1_1.5-1, pass the UE. Otherwise fail the UE

8.4.2.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.2.1_1.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.4.2.2.1_1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.2.2.1_1.5 Test requirement

For the parameters specified in Table 8.4.2.2.1_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1_1.5-1.

Table 8.4.2.2.1_1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 TDD	OP.1 TDD	EVA70	2 x 2 Low	1	+1.0

8.4.2.2.2 TDD PCFICH/PDCCH Transmit Diversity 4x2

8.4.2.2.2.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.4.2.2.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.2.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.2.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2.3-2.

Table 8.4.2.2.2.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.17 TDD	OP.1 TDD	EVA5	4 x 2 Medium	1	1.2

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.2.2.4 Test description

8.4.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11.

2. The parameter settings for the cell are set up according to 8.4.2.2.2.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.2.4.3.

8.4.2.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.2.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.2.2.5-1 as appropriate.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.2.5-1, pass the UE. Otherwise fail the UE

8.4.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.2.2.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.4.2.2.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	1111111111111111111111111111111111111111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.2.2.2.5 Test requirement

For the parameters specified in Table 8.4.2.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2.5-1.

Table 8.4.2.2.2.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.17 TDD	OP.1 TDD	EVA5	4 x 2 Medium	1	2.2

8.4.2.2.2_1 TDD PCFICH/PDCCH Transmit Diversity 4x2 (Release 9 and forward)

8.4.2.2.2_1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.2.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.4.2.2.2_1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.2_1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.2.2.2_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2_1.3-2.

Table 8.4.2.2.2_1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 TDD	OP.1 TDD	EPA5	4 x 2 Medium	1	6.5

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.2.2_1.4 Test description

8.4.2.2.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to 8.4.2.2.2_1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.2_1.4.3.

8.4.2.2.2_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.2_1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.2.2_1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.2_1.5-1, pass the UE. Otherwise fail the UE

8.4.2.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.2.2_1.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.4.2.2.2_1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	1111111111111111111 1111111111111111111 1111111111111111111 1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.2.2.2_1.5 Test requirement

For the parameters specified in Table 8.4.2.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2_1.5-1.

Table 8.4.2.2.2_1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 TDD	OP.1 TDD	EPA5	4 x 2 Medium	1	+7.5

8.4.2.2.3_C TDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC

8.4.2.2.3_C.1 TDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

8.4.2.2.3_C.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.2.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.4.2.2.3_C.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.3_C.1.3-1: Void

For the parameters for non-MBSFN ABS specified in Table 8.4.2.2.3_C.1.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_C.1.3-3. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.2.2.3_C.1.3-2, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.4.2.2.3_C.1.3-2: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_C.1.3-3	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern(Note 5)			0000000001 0000000001	N/A
CSI Subframe Sets(Note 6)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			3	3
ACK/NACK feedback mode			Multiplexing	N/A
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

Table 8.4.2.2.3_C.1.3-3: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-3.9
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.3

8.4.2.2.3_C.1.4 Test description

8.4.2.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.2.2.3_C.1.3-1 and 8.4.2.2.3_C.1.3-2.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.3_C.1.4.3.

8.4.2.2.3_C.1.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.4.2.2.3_C.1.3-2, 8.4.2.2.3_C.1.5-1, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC in the subframes overlapping with ABS of the aggressor cell. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2A respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity. Propagation conditions are set according to Annex B clause B.2.
2. Measure the Pm-dsg in the subframes overlapping with ABS of the aggressor cell for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.3_C.1.5-2, pass the UE. Otherwise fail the UE.

8.4.2.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.2.2.3_C.1.4.3-1: *PHICH-Config-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-4: PHICH-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PHICH-Config-DEFAULT ::= SEQUENCE {			
phich-Duration	extended		Cell 1
phich-Resource	one		
}			

Table 8.4.2.2.3_C.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.4.2.2.3_C.1.4.3-3: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.4.2.2.3_C.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.4.2.2.3_C.1.5 Test requirement

For the parameters specified in Table 8.4.2.2.3_C.1.5-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_C.1.5-2.

Table 8.4.2.2.3_C.1.5-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.6 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.4 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_C.1.5-2	1.3
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern(Note 5)			0000000001 0000000001	N/A
CSI Subframe Sets(Note 6)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			3	3
ACK/NACK feedback mode			Multiplexing	N/A
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

Table 8.4.2.2.3_C.1.5-2: Test Requirement PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-3
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

8.4.2.2.3_C.2 TDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC (MBSFN ABS)

8.4.2.2.3_C.2.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.2.2.3_C.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.4.2.2.3_C.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.3_C.2.3-1: Void

For the parameters for MBSFN ABS specified in Table 8.4.2.2.3_C.2.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_C.2.3-3.

The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.2.2.3_C.2.3-2, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.4.2.2.3_C.2.3-2: Minimum performance PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_C.2.3-3	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	126
ABS pattern (Note 4)			N/A	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern(Note 5)			0000000001 0000000001	N/A
CSI Subframe Sets(Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A
MBSFN Subframe Allocation (Note 9)			N/A	000010
Number of control OFDM symbols			3	3
ACK/NACK feedback mode			Multiplexing	N/A
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. The 10th and 20th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in this test.
Note 9: MBSFN Subframe Allocation as defined in [5], one frame with 6 bits is chosen for MBSFN subframe allocation.

Table 8.4.2.2.3_C.2.3-3: Minimum performance PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions(Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-4.1
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.3

8.4.2.2.3_C.2.4 Test description

8.4.2.2.3_C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.2.2.3_C.2.3-1.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.3_C.2.4.3.

8.4.2.2.3_C.2.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.4.2.2.3_C.2.3-2, 8.4.2.2.3_C.2.5-1, C.3.3-1 of Annex C.3.3 as appropriate, and SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC in the subframes overlapping with ABS of the aggressor cell. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2A respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity. Propagation conditions are set according to Annex B clause B.2.
2. Measure the Pm-dsg in the subframes overlapping with ABS of the aggressor cell for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.3_C.2.5-2, pass the UE. Otherwise fail the UE.

8.4.2.2.3_C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.2.2.3_C.2.4.3-1: *PHICH-Config-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-4: PHICH-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PHICH-Config-DEFAULT ::= SEQUENCE {			
phich-Duration	extended		Cell 1
phich-Resource	one		
}			

Table 8.4.2.2.3_C.2.4.3-2: *SystemInformationBlockType3*: Neighbour cell configuration

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-2: SystemInformationBlockType3			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType3 ::= SEQUENCE {			
neighCellConfig	'00'B (Not all neighbour cells have the same MBSFN subframe allocation as serving cell)		Cell 1
}			

Table 8.4.2.2.3_C.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.4.2.2.3_C.2.4.3-4: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.4.2.2.3_C.2.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001110001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.4.2.2.3_C.2.5 Test requirement

For the parameters specified in Table 8.4.2.2.3_C.2.5-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_C.2.5-2.

Table 8.4.2.2.3_C.2.5-1: Minimum performance PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.6 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.4 (Note 3)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_C.2.5-2	1.3
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Time Offset between Cells		Ms	2.5 (synchronous cells)	
Cell Id			0	126
ABS pattern (Note 4)			N/A	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern(Note 5)			0000000001 0000000001	N/A
CSI Subframe Sets(Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A
MBSFN Subframe Allocation (Note 9)			N/A	000010
Number of control OFDM symbols			3	3
ACK/NACK feedback mode			Multiplexing	N/A
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. The 10th and 20th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in this test.
Note 9: MBSFN Subframe Allocation as defined in [5], one frame with 6 bits is chosen for MBSFN subframe allocation.

Table 8.4.2.2.3_C.2.5-2: Test Requirement PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions(Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-3.2
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									

8.4.2.2.3_D

8.4.2.2.3_E TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC

8.4.2.2.3_E.1 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)

8.4.2.2.3_E.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.2.2.3_E.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE and CRS interference handling and ss-CCH interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.4.2.2.3_E.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

For the parameters for non-MBSFN ABS specified in Table 8.4.2.2.3_E.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_E.1.3-2.

In Tables 8.4.2.2.3_E.1.3-1 and 8.4.2.2.3_E.1.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information TS 36.331 [5] including Cell 2 and Cell 3 is provided.

Table 8.4.2.2.3_E.1.3-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_E.1.3-2	5	3
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 4)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 7	Note 7
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 7: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 8: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9: SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

Table 8.4.2.2.3_E.1.3-2: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3		Pm-dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 TDD	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	1	-2.0
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.											

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.4.

8.4.2.2.3_E.1.4 Test description

8.4.2.2.3_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.2.2.3_E 1.3-1 and 8.4.2.2.3_E.1.3-2.
3. The downlink signals are initially set up according to Annex C.0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.4.2.2.3_E.1.4.3.

8.4.2.2.3_E.1.4.2 Test procedure

1. Set the parameters for Cell 1, Cell 2 and Cell 3, according to Tables 8.4.2.2.3_E.1.5-1, 8.4.2.2.3_E.1.5-2, Annex C.3.2 for Cell 1, and Annex C.3.3 for Cell 2 and Cell 3. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2A respectively.
2. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity. Propagation conditions are set according to Annex B clause B.2.
3. Measure the Pm-dsg in the subframes overlapping with ABS of the aggressor cell for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.3_E.1.5-2, pass the UE. Otherwise fail the UE.

8.4.2.2.3_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.4.2.2.3_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.4.2.2.3_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT:

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.4.2.2.3_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'1100111000 1100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 8.4.2.2.3_E.1.4.3-2-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 8.4.2.2.3_E.1.4.3-2-5: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing		
}			

8.4.2.2.3_E.1.5 Test requirement

For the parameters specified in Table 8.4.2.2.3_E.1.5-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_E.1.5-2.

Table 8.4.2.2.3_E.1.5-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 3)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_E.1.5-2	4.8	2.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 4)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 7	Note 7
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 7: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 8: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9: SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

Table 8.4.2.2.3_E.1.5-2: Test Requirement PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3		Pm-dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 TDD	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	1	-1.1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.											

8.4.2.2.3_E.2 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)

8.4.2.2.3_E.2.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.2.2.3_E.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE and CRS interference handling and ss-CCH interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.4.2.2.3_E.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

For the parameters for non-MBSFN ABS specified in Table 8.4.2.2.3_E.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_E.2.3-2.

In Tables 8.4.2.2.3_E.2.3-1 and 8.4.2.2.3_E.2.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information TS 36.331 [5] including Cell 2 and Cell 3 is provided.

Table 8.4.2.2.3_E.2.3-1: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_E.2.3-2	5	3
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	MBSFN	MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 4)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
MBSFN Subframe Allocation (Note 7)			N/A	000010	000010
Number of control OFDM symbols			2	Note 8	Note 8
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. The 10th and 20th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 7: MBSFN Subframe Allocation as defined in [7], one frame with 6 bits is chosen for MBSFN subframe allocation.
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 9: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell 1 and Cell 2 is the same.
Note 10: SIB-1 will not be transmitted in Cell 2 in this test.

Table 8.4.2.2.3_E.2.3-2: Minimum performance PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3		Pm-dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 TDD	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	1	-1.8
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\bar{E}_s / N_{oc2}$ of Cell 1.											

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.4.

8.4.2.2.3_E.2.4 Test description

8.4.2.2.3_E.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.2.2.3_E.2.3-1 and 8.4.2.2.3_E.2.3-2.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.4.2.2.3_E.2.4.3.

8.4.2.2.3_E.2.4.2 Test procedure

1. Set the parameters for Cell1, Cell2 and Cell3, according to Tables 8.4.2.2.3_E.2.5-1, 8.4.2.2.3_E.2.5-2, Annex C.3.2 for Cell 1, and Annex C.3.3 for Cell 2 and Cell 3. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2A respectively.
2. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity. Propagation conditions are set according to Annex B clause B.2.
3. Measure the Pm-dsg in the subframes overlapping with ABS of the aggressor cell for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.3_E.2.5-2, pass the UE. Otherwise fail the UE.

8.4.2.2.3_E.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 8.4.2.2.3_E.2.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000010' B		
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.4.2.2.3_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT:

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.4.2.2.3_E.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001110001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 8.4.2.2.3_E.2.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 8.4.2.2.3_E.2.4.3-5: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing		
}			

Table 8.4.2.2.3_E.2.4.3-6: *SystemInformationBlockType3*

Derivation Path: 36.508 [7] clause 4.6.2, Table 4.4.3.3-2 SystemInformationBlockType3			
Information Element	**Value/remark**	**Comment**	**Condition**
neighCellConfig	'00'B (Not all neighbour cells have the same MBSFN subframe allocation as the serving cell)		Cell 1

8.4.2.2.3_E.2.5 Test requirement

For the parameters specified in Table 8.4.2.2.3_E.2.5-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_E.2.5-2.

Table 8.4.2.2.3_E.2.5-1: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 3)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_E.2.5-2	4.8	2.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	MBSFN	MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 4)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
MBSFN Subframe Allocation (Note 7)			N/A	000010	000010
Number of control OFDM symbols			2	Note 8	Note 8
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. The 10th and 20th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 7: MBSFN Subframe Allocation as defined in [7], one frame with 6 bits is chosen for MBSFN subframe allocation.
Note 8: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 9: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell 1 and Cell 2 is the same.
Note 10: SIB-1 will not be transmitted in Cell 2 in this test.

Table 8.4.2.2.3_E.2.5-2: Test Requirement PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Correlation Matrix and Antenna Configuration (Note 2)	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3		Pm-dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 TDD	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	1	-0.9
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\bar{E}_s / N_{oc2}$ of Cell 1.											

8.4.2.2.4

8.4.2.2.5 TDD Enhanced Downlink Control Channel Performance Type A for PCFICH/PDCCH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

-Message exceptions

8.4.2.2.5.1 Test purpose

This test verifies the enhanced downlink control channel performance requirement Type A for PCFICH/PDCCH for 2 transmit diversity with Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels remains below a given reference value.

8.4.2.2.5.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Test Applicability TBD.

8.4.2.2.5.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH. The parameters specified in Table 8.4.2.2.5.3-1 and Table 8.4.2.2.5.3-2.

In Table 8.4.2.2.5.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.4.2.2.5.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.4.2.2.5.3-2: Additional Test Parameters for PDCCH/PCFICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	6	1
UL/DL Configuration			0	0	0
Special Subframe Configuration			4	4	4
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of DL control region OFDM symbols			3 for subframes 0 and 5 2 for subframes 1 and 6		
CFI indicated in PCFICH			3 for subframes 0 and 5 2 for subframes 1 and 6		
PHICH Ng (Note 1)			1/6	N/A	N/A
PHICH duration			Normal	N/A	N/A
PDSCH TM			4	N/A	N/A
Interference model				As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time Offset relative to Cell 1		µs	N/A	2	3
Frequency shift relative to Cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [4]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.4.2.2.5.3-1 and Table 8.4.2.2.5.3-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.5.3-3.

Table 8.4.2.2.5.3-3: Minimum Performance for PDCCH/PCFICH for Enhanced Downlink Control Channel Performance Requirement Type A

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	2 CCE	R.16-1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	1	16.1
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.5.

8.4.2.2.5.4 Test description

8.4.2.2.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.4.2.2.5.3-1 and Table 8.4.2.2.5.3-2.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.5.4.3.

8.4.2.2.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.5.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be closed loop spatial multiplexing.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.2.2.5.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.5.5-1, pass the UE. Otherwise fail the UE.

8.4.2.2.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.4.2.2.5.5 Test requirement

For the parameters specified in Table 8.4.2.2.5.3-1 and Table 8.4.2.2.5.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.5.5-1.

Table 8.4.2.2.5.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	2 CCE	R.16-1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	1	TBD
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

8.4.2.2.6 TDD Enhanced Downlink Control Channel Performance Type A for PCFICH/PDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

-Message exceptions

8.4.2.2.6.1 Test purpose

This test verifies the enhanced downlink control channel performance requirement Type A for PCFICH/PDCCH for 2 transmit diversity with Non-Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels remains below a given reference value.

8.4.2.2.6.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Test Applicability TBD

8.4.2.2.6.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH. The parameters specified in Table 8.4.2.2.6.3-1 and Table 8.4.2.2.6.3-2.

In Table 8.4.2.2.6.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.4.2.2.6.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.4.2.2.6.3-2: Additional Test Parameters for PDCCH/PCFICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
UL/DL Configuration			0	0	0
Special Subframe Configuration			4	4	4
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of DL control region OFDM symbols			3 for subframes 0 and 5 2 for subframes 1 and 6		
CFI indicated in PCFICH			3 for subframes 0 and 5 2 for subframes 1 and 6		
PHICH Ng (Note 1)			1/6	N/A	N/A
PHICH duration			Normal	N/A	N/A
PDSCH TM			4	N/A	N/A
Interference model				As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time Offset relative to Cell 1		µs	N/A	2	3
Frequency shift relative to Cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [4]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.4.2.2.6.3-1 and Table 8.4.2.2.6.3-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.6.3-3.

Table 8.4.2.2.6.3-3: Minimum Performance for PDCCH/PCFICH for Enhanced Downlink Control Channel Performance Requirement Type A

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	4 CCE	R.16-2 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	1	13.3
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.6.

8.4.2.2.6.4 Test description

8.4.2.2.6.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.4.2.2.6.3-1 and Table 8.4.2.2.6.3-2.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.6.4.3.

8.4.2.2.6.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.6.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be closed loop spatial multiplexing.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.2.2.6.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.6.5-1, pass the UE. Otherwise fail the UE.

8.4.2.2.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.4.2.2.6.5 Test requirement

For the parameters specified in Table 8.4.2.2.6.3-1 and Table 8.4.2.2.6.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.6.5-1.

Table 8.4.2.2.6.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	4 CCE	R.16-2 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	1	TBD
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

8.4.2.2.7 TDD Enhanced Downlink Control Channel Performance Type B for PCFICH/PDCCH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

-Message exceptions

8.4.2.2.7.1 Test purpose

This test verifies the enhanced downlink control channel performance requirement Type B for PCFICH/PDCCH for 2 transmit diversity with Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels remains below a given reference value.

8.4.2.2.7.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Test Applicability TBD

8.4.2.2.7.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH. The parameters specified in Table 8.4.2.2.7.3-1 and Table 8.4.2.2.7.3-2.

In Table 8.4.2.2.7.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.4.2.2.7.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.4.2.2.7.3-2: Additional Test Parameters for PDCCH/PCFICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	6	1
UL/DL Configuration			0	0	0
Special Subframe Configuration			4	4	4
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of DL control region OFDM symbols			1	1	1
CFI indicated in PCFICH			1	1	1
PHICH Ng (Note 1)			1/6	N/A	N/A
PHICH duration			Normal	N/A	N/A
PDSCH TM			4	N/A	N/A
Interference model				As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time Offset relative to Cell 1		µs	N/A	2	3
Frequency shift relative to Cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [4]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.4.2.2.7.3-1 and Table 8.4.2.2.7.3-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.7.3-3.

Table 8.4.2.2.7.3-3: Minimum Performance for PDCCH/PCFICH for Enhanced Downlink Control Channel Performance Requirement Type B

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	2 CCE	R.16-3 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	1	13.7
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.7.

8.4.2.2.7.4 Test description

8.4.2.2.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.4.2.2.7.3-1 and Table 8.4.2.2.7.3-2.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.7.4.3.

8.4.2.2.7.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.7.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be closed loop spatial multiplexing.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.2.2.7.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.7.5-1, pass the UE. Otherwise fail the UE.

8.4.2.2.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.4.2.2.7.5 Test requirement

For the parameters specified in Table 8.4.2.2.7.3-1 and Table 8.4.2.2.7.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.7.5-1.

Table 8.4.2.2.7.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	2 CCE	R.16-3 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	1	TBD
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

8.4.2.2.8 TDD Enhanced Downlink Control Channel Performance Type B for PCFICH/PDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

-Message exceptions

8.4.2.2.8.1 Test purpose

This test verifies the enhanced downlink control channel performance requirement Type B for PCFICH/PDCCH for 2 transmit diversity with Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels remains below a given reference value.

8.4.2.2.8.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Test Applicability TBD

8.4.2.2.8.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH. The parameters specified in Table 8.4.2.2.8.3-1 and Table 8.4.2.2.8.3-2.

In Table 8.4.2.2.8.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.4.2.2.8.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refers to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.4.2.2.8.3-2: Additional Test Parameters for PDCCH/PCFICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	6
UL/DL Configuration			0	0	0
Special Subframe Configuration			4	4	4
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of DL control region OFDM symbols			1	1	1
CFI indicated in PCFICH			1	1	1
PHICH Ng (Note 1)			1/6	N/A	N/A
PHICH duration			Normal	N/A	N/A
PDSCH TM			4	N/A	N/A
Interference model				As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time Offset relative to Cell 1		µs	N/A	2	3
Frequency shift relative to Cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [4]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.4.2.2.8.3-1 and Table 8.4.2.2.8.3-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.8.3-3.

Table 8.4.2.2.8.3-3: Minimum Performance for PDCCH/PCFICH for Enhanced Downlink Control Channel Performance Requirement Type B

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	4 CCE	R.16-4 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	1	11.2
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.8.

8.4.2.2.8.4 Test description

8.4.2.2.8.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.4.2.2.8.3-1 and Table 8.4.2.2.8.3-2.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.8.4.3.

8.4.2.2.8.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.8.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be closed loop spatial multiplexing.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.2.2.8.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.8.5-1, pass the UE. Otherwise fail the UE.

8.4.2.2.8.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.4.2.2.8.5 Test requirement

For the parameters specified in Table 8.4.2.2.8.3-1 and Table 8.4.2.2.8.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.8.5-1.

Table 8.4.2.2.8.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test Number	Aggregation level	Reference Channel	OCNG Pattern (Note 1)	Propagation Conditions (Note 2)			Antenna Configuration and Correlation Matrix (Note 3)	Reference Value	
				Cell 1	Cell 2	Cell 3		Pm-dsg (%)	SNR (dB) (Note 4)
1	4 CCE	R.16-4 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	1	TBD
Note 1: The OCNG pattern applies for Cell 1, Cell 2 and Cell 3. Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 3: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 4: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1 as defined in clause 8.1.1.									

8.4.3 LAA

The parameters specified in Table 8.4.3-1 are valid for all LAA PDCCH tests unless otherwise stated.

Table 8.4.3-1: Common test Parameters for PDCCH

Parameter		Unit	Transmit diversity
Downlink power allocation (Note 1)	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
PHICH Ng (Note 1)			1
PHICH duration			Normal
Unused RE-s and PRB-s (Note 2)			OCNG
Cell ID			0
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: In LAA Scell(s), PCFICH_RB, PHICH_RA, and PHICH_RB are not available. Note 2: OCNG is applied only within LAA burst.			

8.4.3.1 Transmit Diversity Performance

8.4.3.1.1 LAA PCFICH/PDCCH Transmit Diversity 2x2 with FDD as Pcell

8.4.3.1.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.3.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward that support DL LAA with E-UTRA FDD as PCell

8.4.3.1.1.3 Minimum conformance requirements

The average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.3.1.1.3-2 for Pcell and in Table 8.4.3.1.1.3-3 for LAA Scell(s), with the addition of the parameters in Table 8.4.3-1, and Table 8.4.3.1.1.3-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.4.3.1.1.3-1: Test Parameters for LAA Scell(s)

Parameter	Unit	Value
DMTC Periodicity	ms	80
dmtc-PeriodOffset-r12 ms80-r12		0
Downlink Burst transmission pattern for LAA SCell		As specified in B.8
The number of subframes set (S_1) in a burst		{1,3, 5, 8}
Uniform random number (p) in the burst model		0.5
Occupied OFDM symbols set in the last subframe		{6, 9, 12,14}
timing error relative of LAA SCell to PCell	μs	15
Frequency offset of th *i*-th LAA SCell relative to PCell	Hz	200
Note 1: The same PDSCH transmission mode is applied to each component carrier. Note 2: The OCNG shall be applied for the non-scheduled OFDM symbols within the burst, and which OFDM symbols are scheduled within the burst is according to UE capability.		

Table 8.4.3.1.1.3-2: Single carrier performance for CCs which are not LAA Scells for multiple CA configurations

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 TDD	EVA5	2 x 2 Low	1	-0.6

Table 8.4.3.1.1.3-3: Single carrier performance for LAA Scell(s) for multiple CA configurations

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	20 MHz	4 CCE	R.3 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	0.2
2	20 MHz	4 CCE	R.3 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	0.2
3	20 MHz	4 CCE	R.3 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	0.3
4	20 MHz	4 CCE	R.3 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	0.1
Note1:	UE is required to fulfil only one test among test 1-4 depending on it's capability for endingDwPTS and secondSlotStartingPosition. For UE don't support endingDwPTS and secondSlotStartingPosition, it is required to fulfil test 1; For UE don't support endingDwPTS and support secondSlotStartingPosition, it is required to fulfil test 2; For UE support endingDwPTS and don't support secondSlotStartingPosition, it is required to fulfil test 3; and For UE support both endingDwPTS and secondSlotStartingPosition, it is required to fulfil test 4.							

The normative reference for this requirement is TS 36.101 [2] clause 8.4.3.1.1.1.

8.4.3.1.1.4 Test description

8.4.3.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10+20 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate.
2. The parameter settings for the cell are set up according to Table 8.4.3-1.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.3.1.1.4.3.

8.4.3.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.4.3.1.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.3.1.1.3-2 for PCC. The details of PDCCH and PDSCH are specified in A.3.5.1. The SS sends downlink MAC padding bits on the DL RMC.

5. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.4.3.1.1.3-1 and 8.4.3.1.1.3-3 for SCC. The details of PDCCH and PDSCH are specified in A.3.5.3. The SS sends downlink MAC padding bits on the DL RMC. SS transmits PDCCH DCI format 1C for CC_RNTI every sub-frame to indicate number of OFDM symbols in the DwPTS of ending partial subframe if required depending on UE capability according to TS 36.213 clause 13A as described in Table 8.4.3.1.1.3-3.

6. Set the parameters of the reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.3.1.1.5-1 and 8.4.3.1.1.5-2 as appropriate.

7. Measure the Pm-dsg separately for PCC and SCC for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.3.1.1.5-1 for PCC and less than value specified in table 8.4.3.1.1.5-2 for SCC, pass the UE. Otherwise fail the UE

8.4.3.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.4.3.1.1.4.3-1: MeasDS-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.6			
Information Element	**Value/remark**	**Comment**	**Condition**
MeasDS-Config-DEFAULT ::= CHOICE {			
Release	NULL		
setup SEQUENCE {			
dmtc-PeriodOffset-r12 CHOICE {			
ms80-r12	0		
}			
ds-OccasionDuration-r12 CHOICE {			
durationTDD-r12	2		
}			
}			
}			

Table 8.4.3.1.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.4.3.1.1.4.3-3: PhysicalConfigDedicatedSCell-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10 CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
Laa-ScellConfiguration-r13 SEQUENCE {			
subframeStartPosition	's0' or 's07'	Depending on UE capability, as described in Table 8.4.3.1.1.3-3	
Laa-SCellSubframeConfig	'00000000'		
}			
}			

8.4.3.1.1.5 Test requirement

For the parameters specified in Table 8.4.3.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.3.1.1.5-1 for PCC and Table 8.4.3.1.1.5-2 for SCC.

Table 8.4.3.1.1.5-1: Single carrier performance for CCs which are not LAA Scells for multiple CA configurations

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 TDD	EVA5	2 x 2 Low	1	0.3

Table 8.4.3.1.1.5-2: Single carrier performance for LAA Scell(s) for multiple CA configurations

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	20 MHz	4 CCE	R.3 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	1.1
2	20 MHz	4 CCE	R.3 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	1.1
3	20 MHz	4 CCE	R.3 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	1.2
4	20 MHz	4 CCE	R.3 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	1.0
Note1: UE is required to fulfil only one test among test 1-4 depending on it's capability for endingDwPTS and secondSlotStartingPosition. For UE don't support endingDwPTS and secondSlotStartingPosition, it is required to fulfil test 1; For UE don't support endingDwPTS and support secondSlotStartingPosition, it is required to fulfil test 2; For UE support endingDwPTS and don't support secondSlotStartingPosition, it is required to fulfil test 3; and For UE support both endingDwPTS and secondSlotStartingPosition, it is required to fulfil test 4.								

8.4.3.1.2 LAA PCFICH/PDCCH Transmit Diversity 2x2 with TDD as Pcell

8.4.3.1.2.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.3.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 13 and forward that support DL LAA with E-UTRA TDD as PCell

8.4.3.1.2.3 Minimum conformance requirements

The average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.3.1.1.3-2 for Pcell and in Table 8.4.3.1.1.3-3 for LAA Scell(s), with the addition of the parameters in Table 8.4.3-1, and Table 8.4.3.1.1.3-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.4.3.1.2.3-1: Test Parameters for LAA Scell(s)

Parameter	Unit	Value
DMTC Periodicity	ms	80
dmtc-PeriodOffset-r12 ms80-r12		0
Downlink Burst transmission pattern for LAA SCell		As specified in B.8
The number of subframes set (S_1) in a burst		{1,3, 5, 8}
Uniform random number (p) in the burst model		0.5
subframeStartPosition		‘s07’
Occupied OFDM symbols set in the last subframe		{6, 9, 12,14}
timing error relative of LAA SCell to PCell	μs	15
Frequency offset of th *i*-th LAA SCell relative to PCell	Hz	200
Note 1: The same PDSCH transmission mode is applied to each component carrier. Note 2: The OCNG shall be applied for the non-scheduled OFDM symbols within the burst, and which OFDM symbols are scheduled within the burst is according to UE capability.		

Table 8.4.3.1.2.3-2: Single carrier performance for CCs which are not LAA Scells for multiple CA configurations

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 TDD	EVA5	2 x 2 Low	1	-0.6

Table 8.4.3.1.2.3-3: Single carrier performance for LAA Scell(s) for multiple CA configurations

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	20 MHz	4 CCE	R.4 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	0.2
2	20 MHz	4 CCE	R.4 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	0.2
3	20 MHz	4 CCE	R.4 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	0.3
4	20 MHz	4 CCE	R.4 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	0.1
Note1 : UE is required to fulfil only one test among test 1-4 depending on it's capability for endingDwPTS and secondSlotStartingPosition. For UE don't support endingDwPTS and secondSlotStartingPosition, it is required to fulfil test 1; For UE don't support endingDwPTS and support secondSlotStartingPosition, it is required to fulfil test 2; For UE support endingDwPTS and don't support secondSlotStartingPosition, it is required to fulfil test 3; and For UE support both endingDwPTS and secondSlotStartingPosition, it is required to fulfil test 4.								

The normative reference for this requirement is TS 36.101 [2] clause 8.4.3.1.2.

8.4.3.1.2.4 Test description

8.4.3.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10+20 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate.
2. The parameter settings for the cell are set up according to Table 8.4.3-1.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.3.1.2.4.3.

8.4.3.1.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.4.3.1.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.3.1.2.3-2 for PCC. The details of PDCCH and PDSCH are specified in A.3.5.2. The SS sends downlink MAC padding bits on the DL RMC.

5. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.4.3.1.2.3-1 and 8.4.3.1.2.3-3 for SCC. The details of PDCCH and PDSCH are specified in A.3.5.3. The SS sends downlink MAC padding bits on the DL RMC. SS transmits PDCCH DCI format 1C for CC_RNTI every sub-frame to indicate number of OFDM symbols in the DwPTS of ending partial subframe if required depending on UE capability according to TS 36.213 clause 13A as described in Table 8.4.3.1.2.3-3.

6. Set the parameters of the reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.3.1.2.5-1 and 8.4.3.1.2.5-2 as appropriate.

7. Measure the Pm-dsg separately for PCC and SCC for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.3.1.2.5-1 for PCC and less than value specified in table 8.4.3.1.2.5-2 for SCC, pass the UE. Otherwise fail the UE

8.4.3.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.4.3.1.2.4.3-1: MeasDS-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.6			
Information Element	**Value/remark**	**Comment**	**Condition**
MeasDS-Config-DEFAULT ::= CHOICE {			
Release	NULL		
setup SEQUENCE {			
dmtc-PeriodOffset-r12 CHOICE {			
ms80-r12	0		
}			
ds-OccasionDuration-r12 CHOICE {			
durationTDD-r12	2		
}			
}			
}			

Table 8.4.3.1.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.4.3.1.2.4.3-3: PhysicalConfigDedicatedSCell-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		
codebookSubsetRestriction-r10 CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
Laa-ScellConfiguration-r13 SEQUENCE {			
subframeStartPosition	's0' or 's07'	Depending on UE capability, as described in Table 8.4.3.1.2.3-3	
Laa-SCellSubframeConfig	'00000000'		
}			
}			

8.4.3.1.2.5 Test requirement

For the parameters specified in Table 8.4.3.1.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.3.1.2.5-1 for PCC and Table 8.4.3.1.2.5-2 for SCC.

Table 8.4.3.1.2.5-1: Single carrier performance for CCs which are not LAA Scells for multiple CA configurations

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 TDD	EVA5	2 x 2 Low	1	-0.6

Table 8.4.3.1.2.5-2: Single carrier performance for LAA Scell(s) for multiple CA configurations

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	20 MHz	4 CCE	R.4 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	1.1
2	20 MHz	4 CCE	R.4 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	1.1
3	20 MHz	4 CCE	R.4 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	1.2
4	20 MHz	4 CCE	R.4 FS3	OP.1 FS3	EVA5	2 x 2 Low	1	1.0
Note1 : UE is required to fulfil only one test among test 1-4 depending on it's capability for endingDwPTS and secondSlotStartingPosition. For UE don't support endingDwPTS and secondSlotStartingPosition, it is required to fulfil test 1; For UE don't support endingDwPTS and support secondSlotStartingPosition, it is required to fulfil test 2; For UE support endingDwPTS and don't support secondSlotStartingPosition, it is required to fulfil test 3; and For UE support both endingDwPTS and secondSlotStartingPosition, it is required to fulfil test 4.								

8.5 Demodulation of PHICH

8.5.1 FDD

8.5.1.1 FDD PHICH Single-antenna Port Performance

8.5.1.1.1 Test purpose

This test verifies the demodulation performance of PHICH for a single antenna port with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.5.1.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.1.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.1.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.1.3-2.

Table 8.5.1.1.3-2: Minimum performance PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 FDD	ETU70	1 x 2 Low	0.1	5.5
2	10 MHz	R.24	OP.1 FDD	ETU70	1 x 2 Low	0.1	0.6

The normative reference for this requirement is TS 36.101 [2] clause 8.5.

8.5.1.1.4 Test description

8.5.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Table 8.5.1.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.1.4.3.

8.5.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.1.5-1 Test 1 as appropriate.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
   If Pm-an is less than the value specified in table 8.5.1.1.5-1, pass the UE. Otherwise fail the UE.
5. Repeat the same procedure (steps 1 to 3) with test conditions according to the Table 8.5.1.1.5-1 for Test 2.

8.5.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions

Table 8.5.1.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.1.5 Test requirement

For the parameters specified in Table 8.5.1.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.1.5-1.

Table 8.5.1.1.5-1: Test requirement PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 FDD	ETU70	1 x 2 Low	0.1	6.4
2	10 MHz	R.24	OP.1 FDD	ETU70	1 x 2 Low	0.1	1.5

8.5.1.2 FDD PHICH Transmit Diversity Performance

8.5.1.2.1 FDD PHICH Transmit Diversity 2x2

8.5.1.2.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.5.1.2.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.2.1.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.1.3-2

Table 8.5.1.2.1.3-2: Minimum performance PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	1.4 MHz	R.19	OP.1 FDD	EPA5	2 x 2 Low	0.1	5.6
1A	5MHz (Note 1)	R.19-1	OP.1 FDD	EVA 70	2x2 Low	0.1	4
Note 1: Test case applicability is defined in 8.1.2.1.							

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.

8.5.1.2.1.4 Test description

8.5.1.2.1.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: Depending on the bandwidth specified per test number in Table 8.5.1.2.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.1.4.3.

8.5.1.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.1.5-1.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.1.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.2.1.5 Test requirement

For the parameters specified in Table 8.5.1.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.1.5-1.

Table 8.5.1.2.1.5-1: Test requirement PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	1.4 MHz	R.19	OP.1 FDD	EPA5	2 x 2 Low	0.1	6.7
1A	5MHz (Note 1)	R.19-1	OP.1 FDD	EVA 70	2x2 Low	0.1	5.1
Note 1: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.							

8.5.1.2.1_1 FDD PHICH Transmit Diversity 2x2 (Release 9 and forward)

8.5.1.2.1_1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.5.1.2.1_1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.1_1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s		OCNG	
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.2.1_1.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.1_1.3-2

Table 8.5.1.2.1_1.3-2: Minimum performance PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 FDD	EVA70	2 x 2 Low	0.1	4.4
1A	5MHz (Note 1)	R.19-1	OP.1 FDD	EVA 70	2x2 Low	0.1	4
Note 1: Test case applicability is defined in 8.1.2.1.							

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.

8.5.1.2.1_1.4 Test description

8.5.1.2.1_1.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.1.2.1_1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.1_1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.1_1.4.3.

8.5.1.2.1_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.1_1.5-1.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.1_1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.1_1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.1_1.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.1_1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.2.1_1.5 Test requirement

For the parameters specified in Table 8.5.1.2.1_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.1_1.5-1.

Table 8.5.1.2.1_1.5-1: Test requirement PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 FDD	EVA70	2 x 2 Low	0.1	+5.5
1A	5MHz (Note 1)	R.19-1	OP.1 FDD	EVA 70	2x2 Low	0.1	+5.1
Note 1: Test case is applicable (according to sub clause 8.1.2.1) to UE's which, from the E-UTRA operating bands defined in Table 5.2-1, support only E-UTRA band 31.							

8.5.1.2.2 FDD PHICH Transmit Diversity 4x2

8.5.1.2.2.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.5.1.2.2.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.2.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.2.2.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.2.3-2.

Table 8.5.1.2.2.3-2: Minimum performance PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.20	OP.1 FDD	EVA5	4 x 2 Medium	0.1	6.0

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.

8.5.1.2.2.4 Test description

8.5.1.2.2.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.2.4.3.

8.5.1.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.2.5-1.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.2.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.2.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK). If Pm-an is less than the value specified in table 8.5.1.2.2.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.2.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.2.2.5 Test requirement

For the parameters specified in Table 8.5.1.2.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.2.5-1.

Table 8.5.1.2.2.5-1: Test requirement PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.20	OP.1 FDD	EVA5	4 x 2 Medium	0.1	7.0

8.5.1.2.2_1 FDD PHICH Transmit Diversity 4x2 (Release 9 and forward)

8.5.1.2.2_1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.5.1.2.2_1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.2_1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s		OCNG	
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.2.2_1.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.2_1.3-2.

Table 8.5.1.2.2_1.3-2: Minimum performance PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 FDD	EPA5	4 x 2 Medium	0.1	6.1

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.

8.5.1.2.2_1.4 Test description

8.5.1.2.2_1.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.2_1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.2_1.4.3.

8.5.1.2.2_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.2_1.5-1.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.2_1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.2_1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK). If Pm-an is less than the value specified in table 8.5.1.2.2_1.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.2_1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.2.2_1.5 Test requirement

For the parameters specified in Table 8.5.1.2.2_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.2_1.5-1.

Table 8.5.1.2.2_1.5-1: Test requirement PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 FDD	EPA5	4 x 2 Medium	0.1	+7.1

8.5.1.2.3

8.5.1.2.3_A

8.5.1.2.3_B

8.5.1.2.3_C FDD PHICH Transmit Diversity 2x2 for eICIC

8.5.1.2.3_C.1 FDD PHICH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

8.5.1.2.3_C.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.5.1.2.3_C.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.3_C.1.3-1: Test Parameters for PHICH

Parameter	Unit	Unit	Cell 1	Cell 2
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.1.2.3_C.1.3-2	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 01000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 01000100 00000100	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 10111011 11111011	N/A
Number of control OFDM symbols			3	3
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in the 26th subframe indicated by the ABS pattern.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

For the parameters specified in Table 8.5.1.2.3_C.1.3-1, the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.3_C.1.3-2. In Table 8.5.1.2.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.5.1.2.3_C.1.3-2: Minimum performance PHICH

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Antenna Configuration and Correlation Matrix	Reference Value	
		Cell 1	Cell 2	Cell 1	Cell 2		Pm-an (%)	SNR (dB) (Note 2)
1	R.19_1	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	0.1	4.6
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.								
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.								
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.								

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.2.3.

8.5.1.2.3_C.1.4 Test description

8.5.1.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna transmit diversity 2x2 configuration.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.3_C.1.3-1 and 8.5.1.2.3_C.1.3-2.
3. Downlink signals are initially set up according to Annex C.0, C.1, C.3.2 and C.3.3 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.3_C.1.4.3.

8.5.1.2.3_C.1.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.5.1.2.3_C.1.5-1, 8.5.1.2.3_C.1.5-2, C.3.3-1 of Annex C.3.3 as appropriate. Propagation conditions are set according to Annex B clause B.2.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 via PDCCH DCI format 0 with the new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmission will transmit the associated ACK. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriateTTI-s. Table 8.5.1.2.3_C.1.4.2-1 indicates the transmissions for two cycles.

Table 8.5.1.2.3_C.1.4.2-1: PHICH test pattern

TTI	6	10	14	18	22	26	30	34	38
PDCCH	S	-	-	-	S	-	-	-	S
PUSCH	-	T	-	R	-	T	-	R	-
PHICH	-	-	A	-	-	-	A	-	-
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK Note 3: In the other TTI-s there are no DCI-0, PHICH and PUSCH transmissions									

3. SS will monitor for uplink retransmissions due to ACK missed-detection. Such re-transmission (if it occurs) will potentially happen in TTI 18 (34 and so on). DTX from the UE side on this TTI is counted as successful ACK receptions while any transmission on this TTI is counted as NACK.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.3_C.1.5-2, pass the UE. Otherwise fail the UE.

8.5.1.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.3_C.1.4.3-1: PHICH-Config

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-4			
Information Element	**Value/remark**	**Comment**	**Condition**
PHICH-Config-DEFAULT ::= SEQUENCE {			
phich-Duration	extended		Cell 1
phich-Resource	one		
}			

Table 8.5.1.2.3_C.1.4.3-2: *MAC-MainConfig-RBC*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

Table 8.5.1.2.3_C.1.4.3-3: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00000100000001000000 01000000010000000100'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.5.1.2.3_C.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00000100000001000000 01000100010000000100'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11111011111110111111 10111011101111111011'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.5.1.2.3_C.1.5 Test requirement

For the parameters specified in Table 8.5.1.2.3_C.1.5-1, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.3_C.1.5-2.

Table 8.5.1.2.3_C.1.5-1: Test Parameters for PHICH

Parameter	Unit	Cell 1	Cell 2	
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.6 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.4 (Note 3)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.1.2.3_C.1.5-2	1.3
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 01000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 01000100 00000100	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 10111011 11111011	N/A
Number of control OFDM symbols			3	3
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in the 26th subframe indicated by the ABS pattern.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

Table 8.5.1.2.3_C.1.5-2: Test requirement FDD PHICH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Antenna Configuration and Correlation Matrix	Reference Value	
		Cell 1	Cell 2	Cell 1	Cell 2		Pm-an (%)	SNR (dB) (Note 2)
1	R.19_1	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	0.1	5.5
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.								
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.								
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.								

8.5.1.2.3_D

8.5.1.2.3_E FDD PHICH Transmit Diversity 2x2 for feICIC

8.5.1.2.3_E.1 FDD PHICH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)

8.5.1.2.3_E.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value where PHICH transmission subframes overlap with ABS of the aggressor cell.

8.5.1.2.3_E.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.5.1.2.3_E.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.3_E.1.3-1: Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.1.2.3_E.1.3-2	5	3
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	N/A	N/A
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 00000100 00000100	00000100 00000100 00000100 00000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 00000100 00000100	N/A	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 11111011 11111011	N/A	N/A
Number of control OFDM symbols			2	Note 7	Note 7
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3:	This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4:	ABS pattern as defined in [9]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in the 26th subframe indicated by the ABS pattern.
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]
Note 7:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 8:	The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9:	SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

For the parameters specified in Table 8.5.1.2.3_E.1.3-1, the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.3_E.1.3-2. In Table 8.5.1.2.3_E.1.3-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information is provided for Cell 2 and Cell 3.

Table 8.5.1.2.3_E.1.3-2: Minimum performance PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19_1	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EVA5	EVA5	2x2 Low	0.1	5.0
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.										
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.										
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.2.4.

8.5.1.2.3_E.1.4 Test description

8.5.1.2.3_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna transmit diversity 2x2 configuration.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.3_E.1.3-1 and 8.5.1.2.3_E.1.3-2.
3. Downlink signals are initially set up according to Annex C.0, C.1, C.3.2 and C.3.3 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.5.1.2.3_E.1.4.3.

8.5.1.2.3_E.1.4.2 Test procedure

1. Set the parameters for Cell1, Cell2 and Cell3 according to Tables 8.5.1.2.3_E.1.3-1, 8.5.1.2.3_E.1.5-1 and C.3.3-2 of Annex C.3.3 as appropriate. Propagation conditions are set according to Annex B clause B.2.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 via PDCCH DCI format 0 with the new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmission will transmit the associated ACK. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriateTTI-s. Table 8.5.1.2.3_E.1.4.2-1 indicates the transmissions for two cycles.

Table 8.5.1.2.3_E.1.4.2-1: PHICH test pattern

TTI	6	10	14	18	22	26	30	34	38
PDCCH	S	-	-	-	S	-	-	-	S
PUSCH	-	T	-	R	-	T	-	R	-
PHICH	-	-	A	-	-	-	A	-	-
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK Note 3: In the other TTI-s there are no DCI-0, PHICH and PUSCH transmissions									

3. SS will monitor for uplink retransmissions due to ACK missed-detection. Such re-transmission (if it occurs) will potentially happen in TTI 18 (34 and so on). DTX from the UE side on this TTI is counted as successful ACK receptions while any transmission on this TTI is counted as NACK.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an in the subframes overlapping with ABS of the aggressor cell. Pm-an is (NACK) / (ACK + NACK).
   If Pm-an is less than the value specified in table 8.5.1.2.3_E.1.5-2, pass the UE. Otherwise fail the UE.

8.5.1.2.3_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions

Table 8.5.1.2.3_E.1.4.3-1: *MAC-MainConfig-RBC*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

Table 8.5.1.2.3_E.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00000100000001000000 01000000010000000100'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.5.1.2.3_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00000100000001000000 01000000010000000100'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11111011111110111111 10111111101111111011'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.5.1.2.3_E.1.5 Test requirement

For the parameters specified in Table 8.5.1.2.3_E.1.5-1, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.3_E.1.5-2.

Table 8.5.1.2.3_E.1.5-1: Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 3)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.1.2.3_E.1.5-2	4.8	2.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	N/A	N/A
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 00000100 00000100	00000100 00000100 00000100 00000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 00000100 00000100	N/A	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 11111011 11111011	N/A	N/A
Number of control OFDM symbols			2	Note 7	Note 7
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3:	This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4:	ABS pattern as defined in [9]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in the 26th subframe indicated by the ABS pattern.
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]
Note 7:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 8:	The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9:	SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

Table 8.5.1.2.3_E.1.5-2: Test requirement FDD PHICH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19_1	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EVA5	EVA5	2x2 Low	0.1	5.9
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.										

8.5.1.2.4

8.5.1.2.5 FDD Enhanced Downlink Control Channel Performance Requirement Type A for PHICH- 2 Tx Antenna Ports under Asynchronous Network

Editor’s Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.5.1.2.5.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for PHICH for 2 transmit diversity under Asynchronous network with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.5.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Detailed Test Applicability TBD

8.5.1.2.5.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection). The parameters specified in Table 8.5.1.2.5.3-1 and Table 8.5.1.2.5.3-2.

The purpose of this test is to verify the PHICH performance with 2 transmit antennas when the serving cell PHICH transmission is interfered by two interfering cells and applying interference model defined in clause B.5.2. In Table

8.5.1.2.5.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is not provided.

Table 8.5.1.2.5.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s		OCNG	
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

Table 8.5.1.2.5.3-2: Additional Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA PHICH_RA PDSCH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PHICH_RB PDCCH_RB PDSCH_RB OCNG_RB	dB	-3	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of control OFDM symbols			1	1	1
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Interference model			N/A	As specified in clause B.5.2	As specified in clause B.5.2
Probability of occurrence of PDSCH transmission rank in interfering cells	Rank 1	%	N/A	80	80
	Rank 2	%	N/A	20	20
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Time offset relative to Cell 1		ms	N/A	0.33	0.67
Frequency offset relative to Cell 1		Hz	N/A	0	0
Note 1: According to Clause 6.9 in TS 36.211 [4].					

For the parameters specified in Table 8.5.1.2.5.3-1 and Table 8.5.1.2.5.3-2, the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.5.3-3

Table 8.5.1.2.5.3-3: Minimum performance PHICH for Enhanced Downlink Control Channel Performance Requirement Type A

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA70	EVA70	EVA70	2x2 Low	0.1	17.9
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.										
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.										
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.2.5.

8.5.1.2.5.4 Test description

8.5.1.2.5.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.1.2.5.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.5.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.5.4.3.

8.5.1.2.5.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.5.5-1.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.5.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.5.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.5.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.5.1.2.5.5 Test requirement

For the parameters specified in Table 8.5.1.2.5.3-1 and Table 8.5.1.2.5.3-2, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.5.5-1.

Table 8.5.1.2.5.5-1: Test requirement PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA7 0	EVA7 0	EVA7 0	2x2 Low	0.1	TBD
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

8.5.1.2.6 FDD Enhanced Downlink Control Channel Performance Requirement Type A for PHICH - 2 Tx Antenna Ports with Non-Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.5.1.2.6.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for PHICH for 2 transmit diversity with Non-Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss

detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.6.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Detailed Test Applicability TBD

8.5.1.2.6.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection). The parameters specified in Table 8.5.1.2.6.3-1 and Table 8.5.1.2.6.3-2.

The purpose of this test is to verify the PHICH performance with 2 transmit antennas when the serving cell PHICH transmission is interfered by two interfering cells with the dominant interferer having the non-colliding CRS pattern and applying interference model defined in clause B.7.1. In Table 8.5.1.2.6.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.5.1.2.6.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH duration			Normal	Normal
PHICH Ng (Note 1)			Ng = 1	Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG	OCNG
Cell ID			0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic prefix			Normal	Normal
Note 1: according to Clause 6.9 in TS 36.211 [8]				

Table 8.5.1.2.6.3-2: Additional Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of control OFDM symbols			1	1	1
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Interference model			N/A	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [8]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.5.1.2.6.3-1 and Table 8.5.1.2.6.3-2, the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.6.3-3.

Table 8.5.1.2.6.3-3: Minimum performance PHICH for Enhanced Downlink Control Channel Performance Requirement Type A

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	0.1	15.8
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.2.6.5.

8.5.1.2.6.4 Test description

8.5.1.2.6.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.1.2.6.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Table 8.5.1.2.6.3-1.

3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clauses B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.6.4.3.

8.5.1.2.6.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.6.5-1.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.6.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.6.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.6.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.5.1.2.6.5 Test requirement

For the parameters specified in Table 8.5.1.2.6.3-1 and Table 8.5.1.2.6.3-2, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.6.5-1.

Table 8.5.1.2.6.5-1: Test requirement PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	0.1	TBD
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\bar{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

8.5.1.2.7 FDD Enhanced Downlink Control Channel Performance Requirement Type B for PHICH - 2 Tx Antenna Ports with Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.5.1.2.7.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type B for PHICH for 2 transmit diversity with Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.7.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Detailed Test Applicability TBD

8.5.1.2.7.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection). The parameters specified in Table 8.5.1.2.7.3-1 and Table 8.5.1.2.7.3-2.

The purpose of this test is to verify the PHICH performance with 2 transmit antennas when the serving cell PHICH transmission is interfered by two interfering cells with the dominant interferer having the colliding CRS pattern and applying interference model defined in clause B.7.1. In Table 8.5.1.2.7.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.5.1.2.7.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH duration			Normal	Normal
PHICH Ng (Note 1)			Ng = 1	Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG	OCNG
Cell ID			0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic prefix			Normal	Normal
Note 1: according to Clause 6.9 in TS 36.211 [8]				

Table 8.5.1.2.7.3-2: Additional Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	6	1
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of control OFDM symbols			1	1	1
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Interference model			N/A	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [8]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.5.1.2.7.3-1 and Table 8.5.1.2.7.3-2, the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.7.3-3.

Table 8.5.1.2.7.3-3: Minimum performance PHICH for Enhanced Downlink Control Channel Performance Requirement Type B

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	0.1	13.4
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.2.7.5.

8.5.1.2.7.4 Test description

8.5.1.2.7.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.1.2.7.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.7.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.7.4.3.

8.5.1.2.7.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.7.5-1.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.7.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.7.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.7.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.5.1.2.7.5 Test requirement

For the parameters specified in Table 8.5.1.2.7.3-1 and Table 8.5.1.2.7.3-2, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.7.5-1.

Table 8.5.1.2.7.5-1: Test requirement PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	0.1	TBD
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

8.5.1.2.8 FDD Enhanced Downlink Control Channel Performance Requirement Type B for PHICH - 2 Tx Antenna Ports with Non-Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.5.1.2.8.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type B for PHICH for 2 transmit diversity with Non-Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss

detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.8.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Detailed Test Applicability TBD

8.5.1.2.8.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection). The parameters specified in Table 8.5.1.2.8.3-1 and Table 8.5.1.2.8.3-2.

The purpose of this test is to verify the PHICH performance with 2 transmit antennas when the serving cell PHICH transmission is interfered by two interfering cells with the dominant interferer having the non-colliding CRS pattern and applying interference model defined in clause B.7.1. In Table 8.5.1.2.8.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.5.1.2.8.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH duration			Normal	Normal
PHICH Ng (Note 1)			Ng = 1	Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG	OCNG
Cell ID			0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic prefix			Normal	Normal
Note 1: according to Clause 6.9 in TS 36.211 [8]				

Table 8.5.1.2.8.3-2: Additional Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of control OFDM symbols			1	1	1
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Interference model			N/A	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [8]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.5.1.2.8.3-1 and Table 8.5.1.2.8.3-2, the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.8.3-3.

Table 8.5.1.2.8.3-3: Minimum performance PHICH for Enhanced Downlink Control Channel Performance Requirement Type B

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	0.1	15.0
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.2.8.5.

8.5.1.2.8.4 Test description

8.5.1.2.8.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.1.2.8.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Table 8.5.1.2.8.3-1.

3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clauses B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.8.4.3.

8.5.1.2.8.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.8.5-1.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.8.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.8.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.8.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.8.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.5.1.2.8.5 Test requirement

For the parameters specified in Table 8.5.1.2.8.3-1 and Table 8.5.1.2.8.3-2, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.8.5-1.

Table 8.5.1.2.8.5-1: Test requirement PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	EPA5	2x2 Low	0.1	TBD
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\bar{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

8.5.2 TDD

8.5.2.1 TDD PHICH Single-antenna Port Performance

8.5.2.1.1 Test purpose

This test verifies the demodulation performance of PHICH for a single antenna port with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.5.2.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.1.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.1.3-2.

Table 8.5.2.1.3-2: Minimum performance of PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 TDD	ETU70	1 x 2 Low	0.1	5.8
2	10 MHz	R.24	OP.1 TDD	ETU70	1 x 2 Low	0.1	1.3

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.1.4 Test description

8.5.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1

Bandwidths to be tested: As specified per test number in Tables 8.5.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex a, Figure A.9.
2. The parameter settings for the cell are set up according to 8.5.2.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.1.4.3.

8.5.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.1.5-1 Test 1 as appropriate.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1); SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.1.4.2-1 indicates the transmissions for one cycle.
3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

Table 8.5.2.1.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.1.5-1, pass the UE. Otherwise fail the UE.
5. Repeat the same procedure (steps 1 to 4) with test conditions according to the Table 8.5.2.1.5-1 for Test 2.

8.5.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions

Table 8.5.1.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.2.1.5 Test requirement

For the parameters specified in Table 8.5.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.1.5-1.

Table 8.5.2.1.5-1: Test requirement of PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 TDD	ETU70	1 x 2 Low	0.1	6.7
2	10 MHz	R.24	OP.1 TDD	ETU70	1 x 2 Low	0.1	2.2

8.5.2.2 TDD PHICH Transmit Diversity Performance

8.5.2.2.1 TDD PHICH Transmit Diversity 2x2

8.5.2.2.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.5.2.2.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1.3-2.

Table 8.5.2.2.1.3-2: Minimum performance of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	1.4 MHz	R.19	OP.1 TDD	EPA5	2 x 2 Low	0.1	5.3

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.2.1.4 Test description

8.5.2.2.1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Bandwidths to be tested: 1.4 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A Figure A.10.

2. The parameter settings for the cell are set up according to Table 8.5.2.2.1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.1.4.3.

8.5.2.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.1.5-1.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.1.4.2-1 indicates the transmissions for one cycle.

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.1.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.1.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	
…			

8.5.2.2.1.5 Test requirement

For the parameters specified in Table 8.5.2.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1.5-1.

Table 8.5.2.2.1.5-1: Test requirement of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	1.4 MHz	R.19	OP.1 TDD	EPA5	2 x 2 Low	0.1	6.4

8.5.2.2.1_1 TDD PHICH Transmit Diversity 2x2 (Release 9 and forward)

8.5.2.2.1_1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.5.2.2.1_1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.1_1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s		OCNG	
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.2.1_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1_1.3-2.

Table 8.5.2.2.1_1.3-2: Minimum performance of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 TDD	EVA70	2 x 2 Low	0.1	4.2

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.2.1_1.4 Test description

8.5.2.2.1_1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.1_1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.1_1.4.3.

8.5.2.2.1_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.1_1.5-1.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.1_1.4.2-1 indicates the transmissions for one cycle.

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.1_1.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.1_1.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.1_1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.2.2.1_1.5 Test requirement

For the parameters specified in Table 8.5.2.2.1_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1_1.5-1.

Table 8.5.2.2.1_1.5-1: Test requirement of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 TDD	EVA70	2 x 2 Low	0.1	+5.3

8.5.2.2.2 TDD PHICH Transmit Diversity 4x2

8.5.2.2.2.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.5.2.2.2.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.2.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.2.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2.3-2.

Table 8.5.2.2.2.3-2: Minimum performance of PHICH 4 Tx Antenna port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.20	OP.1 TDD	EVA5	4 x 2 Medium	0.1	6.1

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.2.2.4 Test description

8.5.2.2.2.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.

2. The parameter settings for the cell are set up according to Table 8.5.2.2.2.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.2.4.3.

8.5.2.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.2.5-1.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.2.4.2-1 indicates the transmissions for one cycle.

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.2.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.2.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.2.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	
…			

8.5.2.2.2.5 Test requirement

For the parameters specified in Table 8.5.2.2.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2.5-1.

Table 8.5.2.2.2.5-1: Test requirement of PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.20	OP.1 TDD	EVA5	4 x 2 Medium	0.1	7.1

8.5.2.2.2_1 TDD PHICH Transmit Diversity 4x2 (Release 9 and forward)

8.5.2.2.2_1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.5.2.2.2_1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.2_1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6, other PDCCH resource shall be occupied by non-zero data.	
Unused RE-s and PRB-s		OCNG	
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.2.2_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2_1.3-2.

Table 8.5.2.2.2_1.3-2: Minimum performance of PHICH 4 Tx Antenna port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 TDD	EPA5	4 x 2 Medium	0.1	6.2

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.2.2_1.4 Test description

8.5.2.2.2_1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Channel Bandwidths to be tested: 5 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.

2. The parameter settings for the cell are set up according to Table 8.5.2.2.2_1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.2_1.4.3.

8.5.2.2.2_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.2_1.5-1.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.2_1.4.2-1 indicates the transmissions for one cycle.

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.2_1.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.2_1.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.2_1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.2.2.2_1.5 Test requirement

For the parameters specified in Table 8.5.2.2.2_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2_1.5-1.

Table 8.5.2.2.2_1.5-1: Test requirement of PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 TDD	EPA5	4 x 2 Medium	0.1	+7.2

8.5.2.2.3

8.5.2.2.3_A

8.5.2.2.3_B

8.5.2.2.3_C TDD PHICH Transmit Diversity 2x2 for eICIC

8.5.2.2.3_C.1 TDD PHICH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

8.5.2.2.3_C.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.5.2.2.3_C.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.3_C.1.3-1: Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.2.2.3_C.1.3-2	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			3	3
ACK/NACK feedback mode			Multiplexing	N/A
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in subframe 5
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

For the parameters specified in Table 8.5.2.2.3_C.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.3_C.1.3-2. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3, In Table 8.5.2.2.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.5.2.2.3_C.1.3-2: Minimum performance of PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Antenna Configuration and Correlation Matrix	Reference Value	
		Cell 1	Cell 2	Cell 1	Cell 2		Pm-an (%)	SNR (dB) (Note 2)
1	R.19_1	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	0.1	4.6
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.								
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.								
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.								

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.2.3.

8.5.2.2.3_C.1.4 Test description

8.5.2.2.3_C.1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A Figure A.40 for antenna transmit diversity 2x2 configuration.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.3_C.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.3_C.1.4.3.

8.5.2.2.3_C.1.4.2 Test procedure

1. Set the parameters for Cell1 and Cell2 according to Tables 8.5.2.2.3_C.1.3-1, 8.5.2.2.3_C.1.5-1, C.3.3-1 of Annex C.3.3 as appropriate. Propagation conditions are set according to Annex B clause B.2.
2. SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with the new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmission shall transmit the associated ACK. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriateTTI-s. Table 8.5.2.2.3_C.1.4.2-1 indicates the transmissions for two cycles.
3. SS will only monitor for uplink retransmissions due to ACK missed-detection. Such re-transmission (if it occurs) will potentially happen in TTI 24 (44 and so on). DTX from the UE side on this TTI is counted as successful ACK reception, while any transmission on this TTI is counted as NACK.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.3_C.1.5-2, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.3_C.1.4.2-1: PHICH test pattern

TTI	10	14	20	24	30	34	40	44	50
PDCCH	S	-	-	-	S	-	-	-	S
PUSCH	-	T	-	R	-	T	-	R	-
PHICH	-	-	A	-	-	-	A	-	-
Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK Note 3: TDD UL/DL configuration 1 is used here Note 4: In the other TTI-s there are no DCI-0, PHICH and PUSCH transmissions									

8.5.2.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.3_C.1.4.3-1: PHICH-Config

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-4			
Information Element	**Value/remark**	**Comment**	**Condition**
PHICH-Config-DEFAULT ::= SEQUENCE {			
phich-Duration	extended		Cell 1
phich-Resource	One		
}			

Table 8.5.2.2.3_C.1.4.3-2: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	
…			

Table 8.5.2.2.3_C.1.4.3-3: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.5.2.2.3_C.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.5.2.2.3_C.1.5 Test requirement

For the parameters specified in Table 8.5.2.2.3_C.1.5-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.3_C.1.5-2.

Table 8.5.2.2.3_C.1.5-1: Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.6 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.4 (Note 3)	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.2.2.3_C.1.5-2	1.3
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			3	3
ACK/NACK feedback mode			Multiplexing	N/A
Number of PHICH groups (N_g)			1	N/A
PHICH duration			extended	N/A
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in subframe 5
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

Table 8.5.2.2.3_C.1.5-2: Test requirement of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 TDD	EPA5	2 x 2 Low	0.1	5.5

8.5.2.2.3_D

8.5.2.2.3_E TDD PHICH Transmit Diversity 2x2 for feICIC

8.5.2.2.3_E.1 TDD PHICH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)

8.5.2.2.3_E.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved where PHICH transmission subframes overlap with ABS of the aggressor cell.

8.5.2.2.3_E.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling and ss-CCH interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

8.5.2.2.3_E.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.3_E.1.3-1: Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.2.2.3_E.1.3-2	5	3
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	N/A	N/A
ABS pattern (Note 4)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 7	Note 7
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [9]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in subframe 5
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]
Note 7: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by “0” of ABS pattern.
Note 8: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9: SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

For the parameters specified in Table 8.5.2.2.3_E.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.3_E.1.3-2. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3, In Table 8.5.2.2.3_E.1.3-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information is provided for Cell 2 and Cell 3.

Table 8.5.2.2.3_E.1.3-2: Minimum performance of PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19_1	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EVA5	EVA5	2x2 Low	0.1	5.7
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.										
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.										
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.2.4.

8.5.2.2.3_E.1.4 Test description

8.5.2.2.3_E.1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A Figure A.48 for antenna transmit diversity 2x2 configuration.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.3_E.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 8.5.2.2.3_E.1.4.3.

8.5.2.2.3_E.1.4.2 Test procedure

1. Set the parameters for Cell1, Cell2 and Cell3 according to Tables 8.5.2.2.3_E.1.3-1, 8.5.2.2.3_E.1.5-1 and C.3.3-2 of Annex C.3.3 as appropriate. Propagation conditions are set according to Annex B clause B.2.
2. SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with the new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmission shall transmit the associated ACK. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriateTTI-s. Table 8.5.2.2.3_E.1.4.2-1 indicates the transmissions for two cycles.
3. SS will only monitor for uplink retransmissions due to ACK missed-detection. Such re-transmission (if it occurs) will potentially happen in TTI 24 (44 and so on). DTX from the UE side on this TTI is counted as successful ACK reception, while any transmission on this TTI is counted as NACK.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an in the subframes overlapping with ABS of the aggressor cell. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.3_E.1.5-2, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.3_E.1.4.2-1: PHICH test pattern

TTI	10	14	20	24	30	34	40	44	50
PDCCH	S	-	-	-	S	-	-	-	S
PUSCH	-	T	-	R	-	T	-	R	-
PHICH	-	-	A	-	-	-	A	-	-
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK Note 3: TDD UL/DL configuration 1 is used here Note 4: In the other TTI-s there are no DCI-0, PHICH and PUSCH transmissions									

8.5.2.2.3_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1, with the following exceptions:

Table 8.5.2.2.3_E.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

Table 8.5.2.2.3_E.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000 001'	BIT STRING (SIZE (20))	
}			
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 8.5.2.2.3_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001110001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.5.2.2.3_E.1.5 Test requirement

For the parameters specified in Table 8.5.2.2.3_E.1.5-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.3_E.1.5-2.

Table 8.5.2.2.3_E.1.5-1: Test Parameters for PHICH

Parameter		**Unit**	**Cell 1**	**Cell 2**	**Cell 3**
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-98 (Note 1)	N/A	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93.1 (Note 3)	N/A	N/A

$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.2.2.3_E.1.5-2	4.8	2.8
$BW_{Channel}$		MHz	10	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	N/A	N/A
ABS pattern (Note 4)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			2	Note 7	Note 7
ACK/NACK feedback mode			Multiplexing	N/A	N/A
Number of PHICH groups (N_g)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Unused RE-s and PRB-s			OCNG	OCNG	OCNG
Cyclic prefix			Normal	Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [9]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in subframe 5
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]
Note 7: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 8: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9: SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

Table 8.5.2.2.3_E.1.5-2: Test requirement TDD PHICH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19_1	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EVA5	EVA5	2x2 Low	0.1	6.6

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1.

8.5.2.2.4

8.5.2.2.5 TDD Enhanced Downlink Control Channel Performance Requirement Type A for PHICH- 2 Tx Antenna Ports with Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.5.2.2.5.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for PHICH for 2 transmit diversity with Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.2.2.5.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Detailed Test Applicability TBD

8.5.2.2.5.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection). The parameters specified in Table 8.5.2.2.5.3-1 and Table 8.5.2.2.5.3-2.

The purpose of this test is to verify the PHICH performance with 2 transmit antennas when the serving cell PHICH transmission is interfered by two interfering cells with the dominant interferer having the colliding CRS pattern and applying interference model defined in clause B.7.1. In Table 8.5.2.2.5.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.5.2.2.5.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port	Transmit diversity
Uplink downlink configuration (Note 1)			1	1
Special subframe configuration (Note 2)			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH duration			Normal	Normal
PHICH Ng (Note 3)			Ng = 1	Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG	OCNG
Cell ID			0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic prefix			Normal	Normal
ACK/NACK feedback mode			Multiplexing	Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8]				

Table 8.5.2.2.5.3-2: Additional Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	6	1
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of control OFDM symbols			1	1	1
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Interference model			N/A	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [4]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.5.2.2.5.3-1 and Table 8.5.2.2.5.3-2, the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.5.3-3.

Table 8.5.2.2.5.3-3: Minimum performance PHICH for Enhanced Downlink Control Channel Performance Requirement Type A

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	0.1	16.2
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.										
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.										
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.2.5.5.

8.5.2.2.5.4 Test description

8.5.2.2.5.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.2.2.5.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.5.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.5.4.3.

8.5.2.2.5.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.5.5-1.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.5.4.2-1 indicates the transmissions for one cycle.
3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.5.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.5.4.2-1: PHICH test pattern

Subframe Index	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.5.2.2.5.5 Test requirement

For the parameters specified in Table 8.5.2.2.5.3-1 and Table 8.5.2.2.5.3-2, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.2.2.5.5-1.

Table 8.5.2.2.5.5-1: Test requirement PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	0.1	TBD

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.

8.5.2.2.6 TDD Enhanced Downlink Control Channel Performance Requirement Type A for PHICH - 2 Tx Antenna Ports with Non-Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.5.2.2.6.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for PHICH for 2 transmit diversity with Non-Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.2.2.6.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Detailed Test Applicability TBD

8.5.2.2.6.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection). The parameters specified in Table 8.5.2.2.6.3-1 and Table 8.5.1.2.6.3-2.

The purpose of this test is to verify the PHICH performance with 2 transmit antennas when the serving cell PHICH transmission is interfered by two interfering cells with the dominant interferer having the non-colliding CRS pattern and applying interference model defined in clause B.7.1. In Table 8.5.2.2.6.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.5.2.2.6.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port	Transmit diversity
Uplink downlink configuration (Note 1)			1	1
Special subframe configuration (Note 2)			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH duration			Normal	Normal
PHICH Ng (Note 3)			Ng = 1	Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG	OCNG
Cell ID			0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic prefix			Normal	Normal
ACK/NACK feedback mode			Multiplexing	Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8]				

Table 8.5.2.2.6.3-2: Additional Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of control OFDM symbols			1	1	1
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Interference model			N/A	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [8]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.5.2.2.6.3-1 and Table 8.5.2.2.6.3-2, the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.6.3-3

Table 8.5.2.2.6.3-3: Minimum performance PHICH for Enhanced Downlink Control Channel Performance Requirement Type A

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	0.1	16.1
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.2.6.5.

8.5.2.2.6.4 Test description

8.5.2.2.6.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.2.2.6.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Table 8.5.2.2.6.3-1.

3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clauses B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.6.4.3.

8.5.2.2.6.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.6.5-1.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.6.4.2-1 indicates the transmissions for one cycle.

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.6.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.6.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.5.2.2.6.5 Test requirement

For the parameters specified in Table 8.5.2.2.6.3-1 and Table 8.5.2.2.6.3-2, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.2.2.6.5-1.

Table 8.5.2.2.6.5-1: Test requirement PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	0.1	TBD
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\bar{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

8.5.2.2.7 TDD Enhanced Downlink Control Channel Performance Requirement Type B for PHICH- 2 Tx Antenna Ports with Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.5.2.2.7.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type B for PHICH for 2 transmit diversity with Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.2.2.7.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Detailed Test Applicability TBD

8.5.2.2.7.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection). The parameters specified in Table 8.5.2.2.7.3-1 and Table 8.5.2.2.7.3-2.

The purpose of this test is to verify the PHICH performance with 2 transmit antennas when the serving cell PHICH transmission is interfered by two interfering cells with the dominant interferer having the colliding CRS pattern and applying interference model defined in clause B.7.1. In Table 8.5.2.2.7.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.5.2.2.7.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port	Transmit diversity
Uplink downlink configuration (Note 1)			1	1
Special subframe configuration (Note 2)			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH duration			Normal	Normal
PHICH Ng (Note 3)			Ng = 1	Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG	OCNG
Cell ID			0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic prefix			Normal	Normal
ACK/NACK feedback mode			Multiplexing	Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8]				

Table 8.5.2.2.7.3-2: Additional Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	6	1
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of control OFDM symbols			1	1	1
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Interference model			N/A	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [8]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.5.2.2.7.3-1 and Table 8.5.2.2.7.3-2, the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.7.3-3.

Table 8.5.2.2.7.3-3: Minimum performance PHICH for Enhanced Downlink Control Channel Performance Requirement Type B

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	0.1	14.0
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.										
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.										
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.2.7.5.

8.5.2.2.7.4 Test description

8.5.2.2.7.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.2.2.7.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.7.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.7.4.3.

8.5.2.2.7.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.7.5-1.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.7.4.2-1 indicates the transmissions for one cycle.
3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.7.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.7.4.2-1: PHICH test pattern

Subframe Index	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.5.2.2.7.5 Test requirement

For the parameters specified in Table 8.5.2.2.7.3-1 and Table 8.5.2.2.7.3-2, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.2.2.7.5-1.

Table 8.5.2.2.7.5-1: Test requirement PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	0.1	TBD

Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.
Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.

8.5.2.2.8 TDD Enhanced Downlink Control Channel Performance Requirement Type B for PHICH- 2 Tx Antenna Ports with Non-Colliding CRS Dominant Interferer

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.5.2.2.8.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type B for PHICH for 2 transmit diversity with Non-Colliding CRS Dominant Interferer with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.2.2.8.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Detailed Test Applicability TBD

8.5.2.2.8.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection). The parameters specified in Table 8.5.2.2.8.3-1 and Table 8.5.2.2.8.3-2.

The purpose of this test is to verify the PHICH performance with 2 transmit antennas when the serving cell PHICH transmission is interfered by two interfering cells with the dominant interferer having the non-colliding CRS pattern and applying interference model defined in clause B.7.1. In Table 8.5.2.2.8.3-2, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.5.2.2.8.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port	Transmit diversity
Uplink downlink configuration (Note 1)			1	1
Special subframe configuration (Note 2)			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH duration			Normal	Normal
PHICH Ng (Note 3)			Ng = 1	Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG	OCNG
Cell ID			0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic prefix			Normal	Normal
ACK/NACK feedback mode			Multiplexing	Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8]				

Table 8.5.2.2.8.3-2: Additional Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	PDCCH_RA OCNG_RA	dB	-3	-3	-3
	PHICH_RA	dB	-3	N/A	N/A
	PCFICH_RB PDCCH_RB OCNG_RB	dB	-3	-3	-3
	PHICH_RB	dB	-3	N/A	N/A
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Number of control OFDM symbols			1	1	1
PHICH Ng (Note 1)			1	N/A	N/A
PHICH duration			Normal	N/A	N/A
Interference model			N/A	As specified in clause B.7.1	As specified in clause B.7.1
Unused RE-s and PRB-s (Note 2)			OCNG	OCNG	OCNG
Time offset to cell 1		us	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
Note 1: According to Clause 6.9 in TS 36.211 [8]. Note 2: For Cell 2 and Cell 3 unused RE-s and PRB-s do not include control region REs.					

For the parameters specified in Table 8.5.2.2.8.3-1 and Table 8.5.2.2.8.3-2, the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.8.3-3.

Table 8.5.2.2.8.3-3: Minimum performance PHICH for Enhanced Downlink Control Channel Performance Requirement Type B

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	0.1	15.5
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\hat{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.2.8.5.

8.5.2.2.8.4 Test description

8.5.2.2.8.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.5.2.2.8.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Table 8.5.2.2.8.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.8.4.3.

8.5.2.2.8.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.8.5-1.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.8.4.2-1 indicates the transmissions for one cycle.
3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.8.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.8.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.8.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.5.2.2.8.5 Test requirement

For the parameters specified in Table 8.5.2.2.8.3-1 and Table 8.5.2.2.8.3-2, the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.2.2.8.5-1.

Table 8.5.2.2.8.5-1: Test requirement PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern			Propagation Conditions (Note 1)			Antenna Configuration and Correlation Matrix (Note 2)	Reference Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3		Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 Low	0.1	TBD
Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Note 3: SNR corresponds to $\bar{E}_s / N_{oc2}$ of Cell 1 as defined in clause 8.1.1.										

8.6 Demodulation of PBCH

RAN4 will specify the PBCH performance requirements and has recommended that these requirements do not need to be tested.

8.7 Sustained downlink data rate provided by lower layers

8.7.1 FDD

The parameters specified in Table 8.7.1-1 are valid for all FDD tests unless otherwise stated.

Table 8.7.1-1: Common Test Parameters (FDD)

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0 (Note 1)
Inter-TTI Distance		1
Number of HARQ processes	Processes	Downlink: 8 Uplink: 8
Maximum number of HARQ transmission		Downlink: 4 Uplink: 1
Scheduling of retransmissions		1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur. 3. Despite of 1) and 2) the number of RB-s to be allocated in each SF remains firm as specified in the RMC. Thus in case of RMC-s with SF dependent allocation, for retransmissions the TBS and the modulation scheme (MCS) are indicated implicitly ($29 \le I_{\mathrm{MCS}} \le 31$) according to TS 36.213 [10] subclause 7.1.7.2.
Redundancy version coding sequence		{0,0,1,2} for 64QAM and 256QAM
Number of OFDM symbols for PDCCH	OFDM symbols	1
Cross carrier scheduling		Not configured
Propagation condition		Static propagation condition No external noise sources are applied
Note 1: For CA tests, Cell ID = 0 applies to P-Cell, Cell ID = n (where n is 1, 2, 3..) applies to S-Celln (where n is 1, 2, 3..), respectively		

The normative reference for this requirement is TS 36.101[2] clause 8.7.1.

8.7.1.1 FDD sustained data rate performance

8.7.1.1.1 Test purpose

The purpose of the test is to verify that the Layer 1 and Layer 2 correctly process in a sustained manner the received packets corresponding to the maximum number of DL-SCH transport block bits received within a TTI for the UE category indicated. The sustained downlink data rate shall be verified in terms of the success rate of delivered PDCP SDU(s) by Layer 2. The test case below specifies the RF conditions and the required success rate of delivered TB by Layer 1 to meet the sustained data rate requirement. The size of the TB per TTI corresponds to the largest possible DL-SCH transport block for each UE category using the maximum number of layers for spatial multiplexing. Transmission modes 1 and 3 are used with radio conditions resembling a scenario where sustained maximum data rates are available. Test case is selected according to table 8.7.1.1.1-1 depending on UE capability for CA and EPDCCH.

Table 8.7.1.1.1-1: SDR test applicability

	Single carrier UE not supporting EPDCCH	CA UE not supporting EPDCCH	Single carrier UE supporting EPDCCH	CA UE supporting EPDCCH

FDD	8.7.1.1, 8.7.1.1_1	8.7.1.1_A	8.7.3.1	8.7.1.1_A, 8.7.3.1

8.7.1.1.2 Test applicability

This test applies to E-UTRA FDD Release 9 and forward UEs of category 1 to 4 and not supporting 256QAM in DL.

8.7.1.1.3 Minimum requirements

Table 8.7.1.1.3-1: Void

The requirements are specified in Table 8.7.1.1.3-3, with the addition of the parameters in Table 8.7.1.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category as specified in Table 8.7.1.1.3-4. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.1.1.3-2: Test Parameters for sustained downlink data rate (FDD)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
1	10	1	1 x 2	N/A	0	0	0	-85	OP.6 FDD
2	10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3, 4, 6	20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3A	10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3C, 4B	15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD

Table 8.7.1.1.3-3: Minimum Requirement (FDD)

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
1	10296	R.31-1 FDD	95
2	25456	R.31-2 FDD	95
3	51024	R.31-3 FDD	95
3A	36696 (Note 2)	R.31-3A FDD	85
3C	51024	R.31-3C FDD	85
4	75376 (Note 3)	R.31-4 FDD	85
4B	55056 (Note 5)	R.31-4B FDD	85
6	75376 (Note 3)	R.31-4 FDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 35160 bits for sub-frame 5.
Note 3: 71112 bits for sub-frame 5.
Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.
Note 5: 52752 bits for sub-frame 5.

Table 8.7.1.1.3-4: Test points for sustained data rate (FRC)

CA config	Maximum supported Bandwidth (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	3A	3A	-	-
	15	-	-	3C	4B	-	-
	20	-	-	3	4	6	6
Note 1: If UE can be tested for CA configuration, single carrier test is skipped.							
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.							

The normative reference for this requirement is TS 36.101[2] clause 8.7.1

8.7.1.1.4 Test description

8.7.1.1.4.1 Initial conditions

Table 8.7.1.1.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	R.31-1 FDD	R.1-1 FDD	10296	1	FLOOR((TB_{size} - 96)/8)	1275
2	R.31-2 FDD	R.1-2 FDD	25456	3	FLOOR((TB_{size} – 152)/24)	1054
3	R.31-3 FDD	R.1-3 FDD	51024	5	FLOOR((TB_{size} -– 208)/40)	1270
3A	R.31-3A FDD	R.1-3A FDD	36696 (Note 3)	4	FLOOR((TB_{size} – 184)/32)	1141
3C	R.31-3C FDD	R.1-4B FDD	51024	5	FLOOR((TB_{size} -– 208)/40)	1270
4	R.31-4 FDD	R.1-4 FDD	75376 (Note 4)	7	FLOOR((TB_{size} – 264)/56)	1341
4B	R.31-4B FDD	R.1-4B FDD	55056 (Note 5)	5	FLOOR((TB_{size} -– 208)/40)	1371

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 35160 bits for sub-frame 5

Note 4: 71112 bits for sub-frame 5

Note 5: 52752 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.1.1.5-2 depending on the UE category according to Table 8.7.1.1.5-3.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.3 for test 1 and Figure A.10 for tests 2-4 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.1.1.5-2 and Table 8.7.1.1.5-1 depending on the UE category according to Table 8.7.1.1.5-3.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.1.1.4.3. PhysicalConfigDedicated-DEFAULT for transmission mode 3 is defined in Table 8.7.1.1.4.3-3.

8.7.1.1.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
2. The SS looks up TB_{size} in Table 8.7.1.1.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.1.1.5-3.
3. SS sets the counters $N_{DL_newtx}N_{DL_retx}$, N_{UL_PDCP}, and N_{DL_PDCP} to 0.
4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
6. Steps 4 to 5 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and $_{NDL_retx}$) in order to validate HARQ feedback received from the UE.
9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
10. The UE passes the test if A ≥ "corresponding TB success rates according to Table 8.7.1.1.5-1" and B = 0.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.1.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.1.1.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.8.2.1.6-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.1.1.5 Test requirement

The requirements are specified in Table 8.7.1.1.5-1 depending on the UE category according to Table 8.7.1.1.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
1	10296	R.31-1 FDD	95
2	25456	R.31-2 FDD	95
3	51024	R.31-3 FDD	95
3A	36696 (Note 2)	R.31-3A FDD	85
3C	51024	R.31-3C FDD	85
4	75376 (Note 3)	R.31-4 FDD	85
4B	55056 (Note 5)	R.31-4B FDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 35160 bits for sub-frame 5.
Note 3: 71112 bits for sub-frame 5.
Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.
Note 5: 52752bits for sub-frame 5.

Table 8.7.1.1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
1	10	1	1 x 2	N/A	0	0	0	-85	OP.6 FDD
2	10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3,4	20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3A	10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3C, 4B	15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD

Table 8.7.1.1.5-3: Test applicability per UE category

CA config	Maximum supported Bandwidth (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	3A	3A	-	-
	15	-	-	3C	4B	-	-
	20	-	-	3	4	-	-

Note 1: If UE can be tested for CA configuration, single carrier test is skipped.
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.

8.7.1.1_1 FDD sustained data rate performance (Rel-10 and forward)

8.7.1.1_1.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.1.1_1.2 Test applicability

This test case applies to E-UTRA FDD UE release 10 and forward of UE category 6 and 7.

8.7.1.1_1.3 Minimum requirements

Same minimum conformance requirements as in clause 8.7.1.1.3.

8.7.1.1_1.4 Test description

Same test description as in clause 8.7.1.1.4 with the following exceptions:

- Connection diagram Figure A.10 (without using faders and AWGN generators).
- Instead of Table 8.7.1.1.4.1-1 -> use Table 8.7.1.1_1.4-1.
- Instead of Table 8.7.1.1.5-1 -> use Table 8.7.1.1_1.5-1.
- Instead of Table 8.7.1.1.5-2 -> use Table 8.7.1.1_1.5-2.
- Instead of Table 8.7.1.1.5-3 -> use Table 8.7.1.1_1.5-3.

Table 8.7.1.1_1.4-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement Channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
6	R.31-4 FDD	R.1-4 FDD	75376 (Note 3)	7	FLOOR((TB_{size} – 264)/56))	1341

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size – Size of Timing Advance - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 71112 bits for sub-frame 5

8.7.1.1_1.5 Test requirement

The requirements are specified in Table 8.7.1.1_1.5-1 depending on the UE category according to Table 8.7.1.1_1.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_1.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
6	75376 (Note 2)	R.31-4 FDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: 71112 bits for sub-frame 5.

Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.1.1_1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
6	20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD

Table 8.7.1.1_1.5-3: Test applicability per UE category

CA config	Maximum supported Bandwidth (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	20	-	-	-	-	6	6
Note 1: If UE can be tested for CA configuration, single carrier test is skipped. Note 2: For non-CA UE, test is selected for maximum supported bandwidth.							

8.7.1.1_A FDD sustained data rate performance for CA

8.7.1.1_A.1 FDD Sustained data rate performance for CA (2DL CA)

8.7.1.1_A.1.1 Test purpose

Same test purpose as 8.7.1.1

8.7.1.1_A.1.2 Test applicability

This test applies to E-UTRA FDD release 10 and forward UEs of category 3, 4, 6, 7, 9 and 10 which support inter-band OR intra-band contiguous DL CA and not support 256QAM in DL.

This test also applies to E-UTRA FDD release 11 and forward UEs of category 3, 4, 6, 7, 9 and 10 which support intra band non-contiguous DL CA and not support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.1.1_A.1.3 Minimum requirements

Table 8.7.1.1_A.1.3-1: Void

For UE not supporting 256QAM, the requirements are specified in Table 8.7.1.1_A.1.3-3, with the addition of the parameters in Table 8.7.1.1_A.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category, CA capability and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.1.1_A.1.3-4. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.1.3-2: Test Parameters for sustained downlink data rate for CA (FDD)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
3,4	20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3B, 4A	2x10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6A	2x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6B	10+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6C	10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6D	15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6E	2x15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6F	15+5	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6G	20+5	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK for Test 1-6E, and PUCCH format 3 is used to feedback ACK/NACK for Test 7-7G.									

Table 8.7.1.1_A.1.3-3: Minimum requirement for CA (FDD)

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
3	51024	R.31-3 FDD	95
3B	25456	R.31-2 FDD	95
4	75376 (Note 3)	R.31-4 FDD	85
4A	36696 (Note 2)	R.31-3A FDD	85
6A	75376 (Note 3)	R.31-4 FDD	85
6B	36696 (Note 2) for 10MHz CC 55056 for 15MHz CC	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC	85
6C	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
6D	55056 for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
6E	55056 (Note 5) for two 15MHz CCs	R.31-4B FDD for two 15MHz CCs	85
6F	55056 (Note 5) for 15MHz CC 18336 (Note 6) for 5MHz CC	R.31-5 FDD for 15MHz CC R.31-6 FDD for 5MHz CC	85
6G	75376 (Note 3) for 20MHz CC 18336 (Note 6) for 5MHz CC	R.31-4 FDD for 20MHz CC R.31-6 FDD for 5MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 35160 bits for sub-frame 5. Note 3: 71112 bits for sub-frame 5. Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. Note 5: 52752bits for sub-frame 5. Note 6: 15840bits for sub-frame 0.			

Table 8.7.1.1_A.1.3-4: Test points for sustained data rate for CA (FRC)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9,10
CA with 2CCs	10+10	-	-	3B	4A	4A	4A
	10+15	-	-	3B	4A	6B	6B
	10+20	-	-	3B	4A	6C	6C
	15+15			3B	4A	6E	6E
	15+20	-	-	3B	4A	6D	6D
	20+5	-	-	3	4	6G	6G
	20+20	-	-	3B or 3 (Note 4)	4A or 4 (Note 4)	6A	6A
	15+5			3B	4A	6F	6F

Note 1: Void.
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.
Note 3: Void.
Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, the single carrier test is selecte, i.e., Test 3 for UE category 3 and Test 4 for UE category 4. Otherwise, Test 3B applies for category 3 UE and Test 4A applies for category 4 UE.
Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.
Note 6: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.

The normative reference for this requirement is TS 36.101[2] clause 8.7.1

8.7.1.1_A.1.4 Test description

8.7.1.1_A.1.4.1 Initial conditions

Table 8.7.1.1_A.1.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
3	R.31-3 FDD	R.1-4 FDD	51024	7	FLOOR((TBsize – 264)/56)	1341
3B	R.31-2 FDD	R.1-2 FDD	25456	3	FLOOR((TBsize – 152)/24)	1054
4	R.31-4 FDD	R.1-4 FDD	75376 (Note 4)	7	FLOOR((TBsize – 264)/56)	1341
4A	R.31-3A FDD	R.1-3A FDD	36696 (Note 3)	4	FLOOR((TBsize – 184)/32)	1141
6A	R.31-4 FDD	R.1-4 FDD	75376 (Note 4)	7	FLOOR((TBsize – 264)/56)	1341
6B	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC	R.1-4B FDD	36696 (Note 3) for 10MHz CC 55056 for 15MHz CC	4 for 10MHz CC 6 for 15 MHz CC	FLOOR((TB_{size} – 184)/32) for 10MHz CC FLOOR((TBsize – 240)/48) for 15 MHz CC	1141 for 10MHz CC 1142 for 15MHz CC
6C	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	36696 (Note 3) for 10MHz CC 75376 (Note 4) for 20MHz CC	4 for 10MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 184)/32) for 10MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1141 for 10MHz CC 1341 for 20MHz CC
6D	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	55056 for 15MHz CC 75376 (Note 4) for 20MHz CC	6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1142 for 15MHz CC 1341 for 20MHz CC
6E	R.31-4B FDD for two 15MHz CCs	R.1-4B FDD	55056 (Note 5) for two 15MHz CCs	6 for two 15MHz CCs	FLOOR((TB_{size} – 240)/48) for two 15 MHz CCs	1142 for two 15MHz CCs
6F	R.31-5 FDD for 15MHz CC R.31-6 FDD for 5MHz CC	R.1-4B FDD	55056 (Note 5) for 15MHz CC 18336 (Note 6) for 5MHz CC	2 for 5MHz CC 6 for 15MHz CC	FLOOR((TB_{size} – 128)/16) for 5MHz CC FLOOR((TB_{size} – 240)/48) for 15 MHz CC	1138 for 5MHz CC 1142 for 15MHz CC
6G	R.31-4 FDD for 20MHz CC R.31-6 FDD for 5MHz CC	R.1-4 FDD	75376 (Note 4) for 20MHz CC 18336 (Note 6) for 5MHz CC	7 for 20 MHz CC 2 for 5MHz CC	FLOOR((TBsize – 264)/56) for 20 MHz CC FLOOR((TB_{size} – 128)/16) for 5MHz CC	1341 for 20MHz CC 1138 for 5MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:

	PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.
Note 3:	35160 bits for sub-frame 5.
Note 4:	71112 bits for sub-frame 5.
Note 5:	52752 bits for sub-frame 5.
Note 6:	15840bits for sub-frame 0.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.1.1_A.1.5-2 depending on the UE category according to Table 8.7.1.1_A.1.5-3.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.1.1_A.1.5-2 and Table 8.7.1.1_A.1.5-1 depending on the UE category according to Table 8.7.1.1_A.1.5-3.

3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.1.1_A.1.4.3.

8.7.1.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.1.1_A.1.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.1.1_A.1.4.3-3A.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. The SS looks up TB_{size} in Table 8.7.1.1_A.1.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.1.1_A.1.5-3.

6. SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1_A.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs

to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.1.1_A.1.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1_A.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.1.1_A.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.1.1_A.1.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.1.1_A.1.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.1.1_A.1.5 Test requirement

The requirements are specified in Table 8.7.1.1_A.1.5-1 depending on the UE category according to Table 8.7.1.1_A.1.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.1.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
3	51024	R.31-3 FDD	95
3B	25456	R.31-2 FDD	95
4	75376 (Note 3)	R.31-4 FDD	85
4A	36696 (Note 2)	R.31-3A FDD	85
6A	75376 (Note 3) for 20MHz CC	R.31-4 FDD for 20MHz CC	85
6B	36696 (Note 2) for 10MHz CC 55056 for 15MHz CC	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC	85
6C	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
6D	55056 for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
6E	55056 (Note 6) for two 15MHz CCs	R.31-4B FDD for two 15MHz CCs	85
6F	55056 (Note 6) for 15MHz CC 18336 (Note 8) for 5MHz CC	R.31-5 FDD for 15MHz CC R.31-6 FDD for 5MHz CC	85
6G	75376 (Note 3) for 20MHz CC 18336 (Note 8) for 5MHz CC	R.31-4 FDD for 20MHz CC R.31-6 FDD for 5MHz CC	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 35160 bits for sub-frame 5.
Note 3: 71112 bits for sub-frame 5.
Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.
Note 5: For category 6 and 7 UE, select one CA configuration among CA configurations corresponding to largest aggregated CA bandwidth signalled by UE.
Note 6: 52752 bits for sub-frame 5.
Note 7: In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.
Note 8: 15840bits for sub-frame 0.

Table 8.7.1.1_A.1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
3, 4	20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3B, 4A	2x10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6A	2x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6B	10+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6C	10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6D	15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6E	2x15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6F	15+5	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6G	20+5	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD

Note 1: PUCCH format 1b with channel selection is used to feedback ACK/NACK.

Table 8.7.1.1_A.1.5-3: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9,10
CA with 2CCs	10+10	-	-	3B	4A	4A	4A
	10+15	-	-	3B	4A	6B	6B
	10+20	-	-	3B	4A	6C	6C
	15+15			3B	4A	6E	6E
	15+20	-	-	3B	4A	6D	6D
	20+5	-	-	3	4	6G	6G
	20+20	-	-	3B or 3 (Note 4)	4A or 4 (Note 4)	6A	6A
	15+5			3B	4A	6F	6F
Note 1: Void. Note 2: For non-CA UE, test is selected for maximum supported bandwidth. Note 3: Void. Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, the single carrier test is selecte, i.e., Test 3 for UE category 3 and Test 4 for UE category 4. Otherwise, Test 3B applies for category 3 UE and Test 4A applies for category 4 UE. Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3. Note 6: Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Only one test point to be tested							

8.7.1.1_A.2 FDD Sustained data rate performance for CA (3DL CA)

8.7.1.1_A.2.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.1.1_A.2.2 Test applicability

This test case applies to all types of E-UTRA FDD UE release 10 and forward of UE category 9, 10, 11 and 12 that support 3DL Intra-band contiguous CA or 3DL Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA and not support 256QAM in DL.

This test case applies to all types of E-UTRA FDD UE release 10 and forward of UE category 6 and 7 that support 3DL Intra-band contiguous CA or 3DL Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA and support at most 40MHz aggregated bandwidth and not support 256QAM in DL.

This test case also applies to all types of E-UTRA FDD UE release 11 and forward of UE category 9, 10, 11 and 12 that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA and not support 256QAM in DL.

This test case also applies to all types of E-UTRA FDD UE release 11 and forward of UE category 6 and 7 that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA and support at most 40MHz aggregated bandwidth and not support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.1.1_A.2.3 Minimum conformance requirements

For UE not supporting 256QAM, the requirements are specified in Table 8.7.1.1_A.2.3-2, with the addition of the parameters in Table 8.7.1.1_A.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.1.1_A.2.3-3. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.2.3-1: test parameters for sustained downlink data rate (FDD 64QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
6A	2x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6D	15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7	3x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7A	15+20+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7B	10+20+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7C	15+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7D	10+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7E	10+10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7F	10+15+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7G	5+10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7H	5+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7I	5+10+10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK for Test 1-6E, and PUCCH format 3 is used to feedback ACK/NACK for Test 7-7G.									

Table 8.7.1.1_A.2.3-2: Minimum requirement (FDD 64QAM)

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
6A	75376 (Note 3)	R.31-4 FDD	85
6D	55056 for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7	75376 (Note 3)	R.31-4 FDD	85
7A	55056 (Note 5) for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7B	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
7C	55056 (Note 5) for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7D	36696 (Note 2) for 10MHz CC 55056 (Note 5) for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7E	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
7F	36696 (Note 2) for 10MHz CC 55056 (Note 5) for 15MHz CC	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC	85
7G	18336 (Note 6) for 5MHz CC 36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
7H	18336 (Note 6) for 5MHz CC 55056 (Note 5) for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-6 FDD for 5MHz CC R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7I	18336 (Note 6) for 5MHz CC 36696 (Note 2) for 10MHz CC	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 35160 bits for sub-frame 5. Note 3: 71112 bits for sub-frame 5. Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. Note 5: 52752bits for sub-frame 5. Note 6: 15840bits for sub-frame 0.				

Table 8.7.1.1_A.2.3-3: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9,10	Cat 11, 12
CA with 3CCs	3x20	-	-	-	-	6A	7	7
	15+20+20	-	-	-	-	6A	7A	7A
	10+20+20	-	-	-	-	6A	7B	7B
	15+15+20					6D	7C	7C
	10+15+20	-	-	-	-	6D	7D	7D
	10+10+20	-	-	-	-	7E	7E	7E
	10+15+15	-	-	-	-	7F	7F	7F
	5+10+20	-	-	-	-	7G	7G	7G
	5+15+20	-	-	-	-	7H	7H	7H
	5+10+10	-	-	-	-	7I	7I	7I

Note 1: Void.
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.
Note 3: Void.
Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, the single carrier test is selecte, i.e., Test 3 for UE category 3 and Test 4 for UE category 4. Otherwise, Test 3B applies for category 3 UE and Test 4A applies for category 4 UE.
Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

The normative reference for this requirement is TS 36.101 [2] clause 8.7.1.

8.7.1.1_A.2.4 Test description

8.7.1.1_A.2.4.1 Initial conditions

Table 8.7.1.1_A.2.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
6A	R.31-4 FDD for two 20MHz CCs	R.1-4 FDD	75376 (Note 4)	7 for two 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for two 20MHz CCs
6D	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	55056 for 15MHz CC 75376 (Note 4) for 20MHz CC	6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1142 for 15MHz CC 1341 for 20MHz CC
7	R.31-4 FDD for three 20MHz CCs	R.1-4 FDD	75376 (Note 4)	7 for three 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for three 20MHz CCs
7A	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	55056 for 15MHz CC 75376 (Note 4) for 20MHz CC	6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1142 for 15MHz CC 1341 for 20MHz CC
7B	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	36696 (Note 3) for 10MHz CC 75376 (Note 4) for 20MHz CC	4 for 10MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 184)/32) for 10MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1141 for 10MHz CC 1341 for 20MHz CC
7C	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	55056 for 15MHz CC 75376 (Note 4) for 20MHz CC	6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1142 for 15MHz CC 1341 for 20MHz CC
7D	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	36696 (Note 3) for 10MHz CC 55056 for 15MHz CC 75376 (Note 4) for 20MHz CC	4 for 10MHz CC 6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 184)/32) for 10MHz CC FLOOR((TB_{size} – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1141 for 10MHz CC 1142 for 15MHz CC 1341 for 20MHz CC
7E	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	36696 (Note 3) for 10MHz CC 75376 (Note 4) for 20MHz CC	4 for 10MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 184)/32) for 10MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1141 for 10MHz CC 1341 for 20MHz CC

7F	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC	R.1-4B FDD	36696 (Note 3) for 10MHz CC 55056 for 15MHz CC	4 for 10MHz CC 6 for 15MHz CC	FLOOR((TB$_{size}$ – 184)/32) for 10MHz CC FLOOR((TB$_{size}$ – 240)/48) for 15 MHz CC	1141 for 10MHz CC 1142 for 15MHz CC
7G	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	18336 (Note 6) for 5MHz CC 36696 (Note 3) for 10MHz CC 75376 (Note 4) for 20MHz CC	2 for 5MHz CC 4 for 10MHz CC 7 for 20 MHz CC	FLOOR((TB$_{size}$ – 128)/16) for 5MHz CC FLOOR((TB$_{size}$ – 184)/32) for 10MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1138 for 5MHz CC 1141 for 10MHz CC 1341 for 20MHz CC
7H	R.31-6 FDD for 5MHz CC R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	18336 (Note 6) for 5MHz CC 55056 for 15MHz CC 75376 (Note 4) for 20MHz CC	2 for 5MHz CC 6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB$_{size}$ – 128)/16) for 5MHz CC FLOOR((TB$_{size}$ – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1138 for 5MHz CC 1142 for 15MHz CC 1341 for 20MHz CC
7I	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC	R.1-1 FDD	18336 (Note 6) for 5MHz CC 36696 (Note 3) for 10MHz CC	2 for 5MHz CC 4 for 10MHz CC	FLOOR((TB$_{size}$ – 128)/16) for 5MHz CC FLOOR((TB$_{size}$ – 184)/32) for 10MHz CC	1138 for 5MHz CC 1141 for 10MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits).
This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 35160 bits for sub-frame 5.

Note 4: 71112 bits for sub-frame 5.

Note 5: 52752 bits for sub-frame 5.

Note 6: 15840bits for sub-frame 0.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.1.1_A.2.5-2 depending on the UE category according to Table 8.7.1.1_A.2.5-3.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.1-1 and Table 8.7.1.1_A.2.5-1 depending on the UE category according to Table 8.7.1.1_A.2.5-3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.1.1_A.2.4.3.

8.7.1.1_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with two SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.1.1_A.2.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.1.1_A.2.4.3-3A.

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13,6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. The SS looks up TB_{size} in Table 8.7.1.1_A.2.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.1.1_A.2.5-3.

6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1_A.2.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.1.1_A.2.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1_A.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.1.1_A.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.1.1_A.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.1.1_A.2.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.1.1_A.2.5 Test requirement

The requirements are specified in Table 8.7.1.1_A.2.5-1 depending on the UE category according to Table 8.7.1.1_A.2.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.2.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
7	75376 (Note 3)	R.31-4 FDD	85
7A	55056 (Note 5) for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7B	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
7C	55056 (Note 5) for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7D	36696 (Note 2) for 10MHz CC 55056 (Note 5) for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7E	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
7F	36696 (Note 2) for 10MHz CC 55056 (Note 5) for 15MHz CC	R.31-3A FDD for 10MHz CC R.31-5 FDD for 15MHz CC	85
7G	18336 (Note 6) for 5MHz CC 36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
7H	18336 (Note 6) for 5MHz CC 55056 (Note 5) for 15MHz CC 75376 (Note 3) for 20MHz CC	R.31-6 FDD for 5MHz CC R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85
7I	18336 (Note 6) for 5MHz CC 36696 (Note 2) for 10MHz CC	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 35160 bits for sub-frame 5.
Note 3: 71112 bits for sub-frame 5.
Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.
Note 5: 52752bits for sub-frame 5.
Note 6: 15840bits for sub-frame 0.

Table 8.7.1.1_A.2.5-2: test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
7	3x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7A	15+20+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7B	10+20+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7C	15+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7D	10+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7E	10+10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7F	10+15+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7G	5+10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7H	5+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7I	5+10+10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1: PUCCH format 1b with channel selection is used to feedback ACK/NACK for Tests 6A and 6D, and PUCCH format 3 is used to feedback ACK/NACK for Test 7-7G.									

Table 8.7.1.1_A.2.5-3: Test points per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9,10	Cat 11, 12
CA with 3CCs	3x20	-	-	-	-	6A	7	7
	15+20+20	-	-	-	-	6A	7A	7A
	10+20+20	-	-	-	-	6A	7B	7B
	15+15+20					6D	7C	7C
	10+15+20	-	-	-	-	6D	7D	7D
	10+10+20	-	-	-	-	7E	7E	7E
	10+15+15	-	-	-	-	7F	7F	7F
	5+10+20	-	-	-	-	7G	7G	7G
	5+15+20	-	-	-	-	7H	7H	7H
	5+10+10	-	-	-	-	7I	7I	7I
Note 1: Void. Note 2: Void. Note 3: Void. Note 4: Void. Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3. Note 6: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 7: Test 6A and 6D are tested in 8.7.1.1_A.1								

8.7.1.1_A.3 Void

8.7.1.1_A.4 FDD Sustained data rate performance for CA (4DL CA)

8.7.1.1_A.4.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.1.1_A.4.2 Test applicability

This test case applies to all types of E-UTRA FDD UE release 11 and forward of UE category 11 and 12 that support 4DL Intra-band contiguous CA or 4DL Inter-band CA or 4DL with Intra-band contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Intra-band contiguous CA and not support 256QAM in DL.

This test case applies to all types of E-UTRA FDD UE release 11 and forward of UE category 9 and 10 that support 4DL Intra-band contiguous CA or 4DL Inter-band CA or 4DL with Intra-band contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Intra-band contiguous CA and support at most 60MHz aggregated bandwidth and not support 256QAM in DL.

8.7.1.1_A.4.3 Minimum conformance requirements

For UE not supporting 256QAM, the requirements are specified in Table 8.7.1.1_A.4.3-2, with the addition of the parameters in Table 8.7.1.1_A.4.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.1.1_A.4.3-3. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.4.3-1: test parameters for sustained downlink data rate (FDD 64QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
7	3x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
8	4x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
8A	20+20+20+10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
8B	20+20+10+10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
8D	20+10+10+5	3	2 x2	10	-3	-3	0	-85	OP.1 FDD
Note 1: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK for Test 1-6E, and PUCCH format 3 is used to feedback ACK/NACK for Test 7-7G.									

Table 8.7.1.1_A.4.3-2: Minimum requirement (FDD 64QAM)

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
7	75376 (Note 3)	R.31-4 FDD	85
8	75376 (Note 3)	R.31-4 FDD	85
8A	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
8B	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
8D	18336 (Note 6) for 5MHz CC 36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 35160 bits for sub-frame 5. Note 3: 71112 bits for sub-frame 5. Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. Note 5: 52752bits for sub-frame 5. Note 6: 15840bits for sub-frame 0.			

Table 8.7.1.1_A.4.3-3: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9,10	Cat 11, 12 / DL Cat. 11,12	DL Cat. 15
CA with 4CCs	4x20	-	-	-	-	-	7	8	8
	20+20+20+10	-	-	-	-	-	7	8A	8A
	20+20+10+10	-	-	-	-	-	8B	8B	8B
	20+10+10+5	-	-	-	-	-	8D	8D	8D

Note 1: Void.
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.
Note 3: Void.
Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, the single carrier test is selected, i.e. Test 3 for UE category 3 and Test 4 for UE category 4. Otherwise, Test 3B applies for category 3 UE and Test 4A applies for category 4 UE.
Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.
Note 6: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.

The normative reference for this requirement is TS 36.101 [2] clause 8.7.1.

8.7.1.1_A.4.4 Test description

8.7.1.1_A.4.4.1 Initial conditions

Table 8.7.1.1_A.4.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
7	R.31-4 FDD for three 20MHz CCs	R.1-4 FDD	75376 (Note 4)	7 for three 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for three 20MHz CCs
8	R.31-4 FDD for four 20MHz CCs	R.1-4 FDD	75376 (Note 4)	7 for four 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for 20MHz CC
8A	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	36696 (Note 3) for 10MHz CC 75376 (Note 4) for 20MHz CC	4 for 10MHz CC 7 for 20 MHz CC	FLOOR((TB$_{size}$ – 184)/32) for 10MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1141 for 10MHz CC 1341 for 20MHz CC
8B	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	36696 (Note 3) for 10MHz CC 75376 (Note 4) for 20MHz CC	4 for 10MHz CC 7 for 20 MHz CC	FLOOR((TB$_{size}$ – 184)/32) for 10MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1141 for 10MHz CC 1341 for 20MHz CC
8D	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	18336 (Note 6) for 5MHz CC 36696 (Note 3) for 10MHz CC 75376 (Note 4) for 20MHz CC	2 for 5MHz CC 4 for 10MHz CC 7 for 20 MHz CC	FLOOR((TB$_{size}$ – 128)/16) for 5MHz CC FLOOR((TB$_{size}$ – 184)/32) for 10MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1138 for 5MHz CC 1141 for 10MHz CC 1341 for 20MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size – AMD PDU header size - MAC header size – Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 35160 bits for sub-frame 5.

Note 4: 71112 bits for sub-frame 5.

Note 5: 52752bits for sub-frame 5.

Note 6: 15840bits for sub-frame 0.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.1.1_A.4.5-2 depending on the UE category according to Table 8.7.1.1_A.4.5-3.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.1-1 and Table 8.7.1.1_A.4.5-1 depending on the UE category according to Table 8.7.1.1_A.4.5-3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.1.1_A.4.4.3.

8.7.1.1_A.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with three SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.1.1_A.4.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.1.1_A.4.4.3-3A.
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13,6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. The SS looks up TB_{size} in Table 8.7.1.1_A.4.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.1.1_A.4.5-3.
6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1_A.4.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
11. The SS calculates the TB success rate as $A = 100\% * N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.1.1_A.4.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1_A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1_A.4.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.1.1_A.4.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfigSMC SEQUENCE {			
securityAlgorithmConfig SEQUENCE {			
cipheringAlgorithm	eea2		
}			
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.1.1_A.4.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.1.1_A.4.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.1.1_A.4.5 Test requirement

The requirements are specified in Table 8.7.1.1_A.4.5-1 depending on the UE category according to Table 8.7.1.1_A.4.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.4.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
8	75376 (Note 3)	R.31-4 FDD	85
8A	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
8B	36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
8D	18336 (Note 6) for 5MHz CC 36696 (Note 2) for 10MHz CC 75376 (Note 3) for 20MHz CC	R.31-6 FDD for 5MHz CC R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 35160 bits for sub-frame 5. Note 3: 71112 bits for sub-frame 5. Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. Note 5: 52752bits for sub-frame 5. Note 6: 15840bits for sub-frame 0.			

Table 8.7.1.1_A.4.5-2: test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
8	4x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
8A	20+20+20+10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
8B	20+20+10+10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
8D	20+10+10+5	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1: void									

Table 8.7.1.1_A.4.5-3: Test points per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9,10	Cat 11, 12
CA with 4CCs	4x20	-	-	-	-	-	7	8
	20+20+20+10	-	-	-	-	-	7	8A
	20+20+10+10	-	-	-	-	-	8B	8B
	20+10+10+5	-	-	-	-	-	8D	8D
Note 1-4: Void. Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3. Note 6: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 7: Test 7 is tested in 8.7.1.1_A.2								

8.7.1.1_A.5 FDD Sustained data rate performance for CA (5DL CA)

Editor's notes: This test case is incomplete. The following items are missing or are incomplete:

- UL RMC for 5-DL CA in loopback mode needs to be further investigated

8.7.1.1_A.5.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.1.1_A.5.2 Test applicability

This test case applies to all types of E-UTRA FDD UE release 11 and forward UE of DL category 15 that support 5DL with Intra-band contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA.

This test case also applies to all types of E-UTRA FDD UE release 12 and forward UE of DL category 15 that support 5DL Inter-band CA,

8.7.1.1_A.5.3 Minimum conformance requirements

For UE not supporting 256QAM, the requirements are specified in Table 8.7.1.1_A.5.3-2, with the addition of the parameters in Table 8.7.1.1_A.5.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.1.1_A.5.3-3. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.5.3-1: test parameters for sustained downlink data rate (FDD 64QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
8	4x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
9	5x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD

Table 8.7.1.1_A.5.3-2: Minimum requirement (FDD 64QAM)

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
8	75376 (Note 3)	R.31-4 FDD	85
9	75376 (Note 3)	R.31-4 FDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: Void Note 3: 71112 bits for sub-frame 5. Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.			

Table 8.7.1.1_A.5.3-3: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9,10	Cat 11, 12	DL Cat. 15
								DL Cat. 11,12	
CA with 5CCs	5x20	-	-	-	-	-	-	8	9
Note 1: Void. Note 2: For non-CA UE, test is selected for maximum supported bandwidth. Note 3: Void. Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, the single carrier test is selected, i.e., Test 3 for UE category 3 and Test 4 for UE category 4. Otherwise, Test 3B applies for category 3 UE and Test 4A applies for category 4 UE. Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3. Note 6: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

The normative reference for this requirement is TS 36.101 [2] clause 8.7.1.

8.7.1.1_A.5.4 Test description

8.7.1.1_A.5.4.1 Initial conditions

Table 8.7.1.1_A.5.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
8	R.31-4 FDD for four 20MHz CCs	R.1-4 FDD	75376 (Note 4)	7 for four 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for 20MHz CC
9	R.31-4 FDD for five 20MHz CCs	R.1-4 FDD	75376 (Note 4)	7 for five 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for 20MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits).
This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: Void.

Note 4: 71112 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.1.1_A.5.5-2 depending on the UE category according to Table 8.7.1.1_A.5.5-3.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators).

2. The parameter settings for the cell are set up according to Table 8.7.1-1 and Table 8.7.1.1_A.5.5-1 depending on the UE category according to Table 8.7.1.1_A.5.5-3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.1.1_A.5.4.3.

8.7.1.1_A.5.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with four SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.1.1_A.5.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.1.1_A.5.4.3-3A.
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13,6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. The SS looks up TB_{size} in Table 8.7.1.1_A.5.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.1.1_A.5.5-3.
6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1_A.5.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.1.1_A.5.5-1" and B = 0.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1_A.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1_A.5.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.1.1_A.5.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.1.1_A.5.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.1.1_A.5.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.1.1_A.5.5 Test requirement

The requirements are specified in Table 8.7.1.1_A.5.5-1 depending on the UE category according to Table 8.7.1.1_A.5.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.5.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
8	75376 (Note 3)	R.31-4 FDD	85
9	75376 (Note 3)	R.31-4 FDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: Void
Note 3: 71112 bits for sub-frame 5.
Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.1.1_A.5.5-2: test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
8	4x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
9	5x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD

Table 8.7.1.1_A.5.5-3: Test points per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9,10	Cat 11, 12 / DL Cat. 11,12	DL Cat. 15
CA with 5CCs	5x20	-	-	-	-	-	-	8	9

Note 1: Void.
Note 2: Void
Note 3: Void.
Note 4: Void
Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.
Note 6: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.
Note 7: Test 8 is tested in 8.7.1.1_A.4

8.7.1.1_H FDD sustained data rate performance for 256QAM in DL

Editor's notes:

- Discussion on DL EVM for 256QAM demodulation test as per R5-155895 is still ongoing

- Whether UL modulation mode QPSK is suitable to use is FFS

8.7.1.1_H.1 FDD sustained data rate performance for 256QAM in DL (Single Carrier)

8.7.1.1_H.1.1 Test purpose

The purpose of the test is to verify that the Layer 1 and Layer 2 correctly process in a sustained manner the received packets corresponding to the maximum number of DL-SCH transport block bits received within a TTI for the UE category indicated. The sustained downlink data rate shall be verified in terms of the success rate of delivered PDCP SDU(s) by Layer 2. The test case below specifies the RF conditions and the required success rate of delivered TB by Layer 1 to meet the sustained data rate requirement. The size of the TB per TTI corresponds to the largest possible DL-SCH transport block for each UE category using the maximum number of layers for spatial multiplexing. Transmission mode 3 is used with radio conditions resembling a scenario where sustained maximum data rates are available.

8.7.1.1_H.1.2 Test applicability

This test applies to E-UTRA FDD UEs Release 12 and forward of UE DL category 13 that support 256QAM in DL.

8.7.1.1_H.1.3 Minimum requirements

For UE supporting 256QAM, the requirements are specified in Table 8.7.1.1_H.1.3-2, with the addition of the parameters in Table 8.7.1.1_H.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.1.1_H.1.3-3, the TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.1.1.3-3 is not applicable.

Table 8.7.1.1_H.1.3-1: test parameters for sustained downlink data rate (FDD 256QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
1	20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD

Table 8.7.1.1_H.1.3-2: Minimum requirement (FDD 256QAM)

Test	Measurement channel	Reference value
		TB success rate [%]
1	R.68 FDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.		
Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.1.1_H.1.3-3: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 / DL Cat. 11, 12	DL Cat. 13				
Single carrier	20	-	1				

The normative reference for this requirement is TS 36.101[2] clause 8.7.1

8.7.1.1_H.1.4 Test description

Same test description as in clause 8.7.1.1.4 with the following exceptions:

- Connection diagram Figure A.10 (without using faders and AWGN generators).
- Instead of Table 8.7.1.1.4.1-1 -> use Table 8.7.1.1_H.1.4-1.
- Instead of Table 8.7.1.1.5-1 -> use Table 8.7.1.1_H.1.5-1.
- Instead of Table 8.7.1.1.5-2 -> use Table 8.7.1.1_H.1.5-2.
- Instead of Table 8.7.1.1.5-3 -> use Table 8.7.1.1_H.1.5-3.

Table 8.7.1.1_H.1.4-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	R.68 FDD	R.1-4 FDD	97896	10	FLOOR((TB_{size} - 352)/80)	1219

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

8.7.1.1_H.1.5 Test requirement

The requirements are specified in Table 8.7.1.1_H.1.5-1 depending on the UE category according to Table 8.7.1.1_H.1.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_H.1.5-1: Test requirements per test

Test	Measurement channel	Reference value
		TB success rate [%]
1	R.68 FDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.1.1_H.1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
1	20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD

Table 8.7.1.1_H.1.5-3: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 / DL Cat. 11, 12	DL Cat. 13				
Single carrier	20	-	1				

8.7.1.1_H.2 FDD Sustained data rate performance for CA (2DL CA) for 256QAM in DL

8.7.1.1_H.2.1 Test purpose

Same test purpose as 8.7.1.1

8.7.1.1_H.2.2 Test applicability

This test applies to E-UTRA FDD UE release 12 and forward of UE DL category 11, 12 and 13 that support 256QAM in DL and 2DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.1.1_H.2.3 Minimum requirements

For UE supporting 256QAM, the requirements are specified in Table 8.7.1.1_H.2.3-2, with the addition of the parameters in Table 8.7.1.1_H.2.3-1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.1.1_H.2.3-3, the TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.1.1_A.1.3-3 is not applicable.

Table 8.7.1.1_H.2.3-1: test parameters for sustained downlink data rate (FDD 256QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
2	2x10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3	10+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
4	10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
5	2x15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6	15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7	2x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.									

Table 8.7.1.1_H.2.3-2: Minimum requirement (FDD 256QAM)

Test	Measurement channel	Reference value
		TB success rate [%]
2	R.68-2 FDD	85
3	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC	85
4	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85
5	R.68-1 FDD	85
6	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
7	R.68 FDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.		
Note 2: The TB success rate is defined as TB success rate = $100\%*N_{DL_correct_rx}/ (N_{DL_newtx} + N_{DL_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.1.1_H.2.3-3: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 DL Cat. 11, 12	DL Cat. 13				
CA with 2CCs	2x10	2	2				
	10+15	3	3				
	10+20	4	4				
	2x15	5	5				
	15+20	6	6				
	20+20	7	7				

The normative reference for this requirement is TS 36.101[2] clause 8.7.1

8.7.1.1_H.2.4 Test description

Same test description as in clause 8.7.1.1_A.1.4 with the following exceptions:

- Instead of Table 8.7.1.1_A.1.4.1-1 -> use Table 8.7.1.1_H.2.4-1.
- Instead of Table 8.7.1.1_A.1.5-1 -> use Table 8.7.1.1_H.2.5-1.
- Instead of Table 8.7.1.1_A.1.5-2 -> use Table 8.7.1.1_H.2.5-2.
- Instead of Table 8.7.1.1_A.1.5-3 -> use Table 8.7.1.1_H.2.5-3.

Table 8.7.1.1_H.2.4-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
2	R.68-2 FDD	R.1-2 FDD	48936(Note 5)	5	FLOOR((TBsize – 208)/40)	1218
3	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC	R.1-4B FDD	48936 (Note 5) for 10MHz CC 75376 (Note 4) for 15MHz CC	5 for 10MHz CC 7 for 15MHz CC	FLOOR((TBsize – 208)/40) for 10MHz CC FLOOR((TBsize – 264)/64) for 15MHz CC	1218 for 10MHz CC 1341 for 15MHz CC
4	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	48936 (Note 5) for 10MHz CC 97896 (Note 3) for 20MHz CC	5 for 10MHz CC 10 for 20MHz CC	FLOOR((TBsize – 208)/40) for 10MHz CC FLOOR((TB$_{size}$ - 352)/80) for 20MHz CC	1218 for 10MHz CC 1219 for 20MHz CC
5	R.68-1 FDD	R.1-4B FDD	75376(Note 4)	7	FLOOR((TB$_{size}$ – 264)/64)	1341
6	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	75376 (Note 4) for 15MHz CC 97896(Note 3) for 20MHz CC	7 for 15MHz CC 10 for 20 MHz CC	FLOOR((TB$_{size}$ – 264)/64) for 15MHz CC FLOOR((TB$_{size}$ - 352)/80) for 20 MHz CC	1341 for 15MHz CC 1219 for 20MHz CC
7	R.68 FDD	R.1-4 FDD	97896(Note 3)	10	FLOOR((TB$_{size}$ - 352)/80)	1219

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits).
This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

8.7.1.1_H.2.5 Test requirement

The requirements are specified in Table 8.7.1.1_H.2.5-1 depending on the UE category according to Table 8.7.1.1_H.2.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_H.2.5-1: Test requirements per test

Test	Measurement channel	Reference value
		TB success rate [%]
2	R.68-2 FDD	85
3	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC	85
4	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85
5	R.68-1 FDD	85
6	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
7	R.68 FDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.		
Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.1.1_H.2.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
2	2x10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3	10+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
4	10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
5	2x15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6	15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
7	2x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.									

Table 8.7.1.1_H.2.5-3: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 DL Cat. 11, 12	DL Cat. 13				
CA with 2CCs	2x10	2	2				
	10+15	3	3				
	10+20	4	4				
	2x15	5	5				
	15+20	6	6				
	20+20	7	7				
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.							
Note 2: Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Only one test point to be tested.							

8.7.1.1_H.3 FDD Sustained data rate performance for CA for 256QAM in DL (3DL CA)

8.7.1.1_H.3.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.1.1_H.3.2 Test applicability

This test case applies to all types of E-UTRA FDD UE release 12 and forward of UE DL category 11, 12 and 15 that support 3DL CA and 256QAM in DL.

This test case applies to all types of E-UTRA FDD UE release 12 and forward of UE DL category 13 that support 3DL CA and 256QAM in DL and at most 40MHz aggregated bandwidth.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.1.1_H.3.3 Minimum conformance requirements

For UE supporting 256QAM, the requirements are specified in Table 8.7.1.1_H.3.3-2, with the addition of the parameters in Table 8.7.1.1_H.3.3-1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.1.1_H.3.3-3, the TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.1.1_A.2.3-2 is not applicable.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.1.1_H.3.3-1: test parameters for sustained downlink data rate (FDD 256QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
8	3x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
9	15+20+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
10	10+20+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
11	15+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
12	10+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
13	10+10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
14	10+15+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
15	5+10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
15A	5+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.									

Table 8.7.1.1_H.3.3-2: Minimum requirement (FDD 256QAM)

Test	Measurement channel	Reference value
		TB success rate [%]
8	R.68 FDD	85
9	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
10	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85
11	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
12	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
13	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85
14	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC	85
15	R.68-3 FDD for 5MHz CC R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85
15A	R.68-3 FDD for 5MHz CC R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.		
Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.1.1_H.3.3-3: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 DL Cat. 11, 12	DL Cat. 13	DL Cat. 15				
CA with 3CCs	3x20	8	7	8				
	15+20+20	9	7	9				
	10+20+20	10	7	10				
	15+15+20	11	6	11				
	10+15+20	12	6	12				
	10+10+20	13	13	13				
	10+15+15	14	14	14				
	5+10+20	15	15	15				
	5+15+20	15A	15A	15A				

The normative reference for this requirement is TS 36.101 [2] clause 8.7.1.

8.7.1.1_H.3.4 Test description

Same test description as in clause 8.7.1.1_A.2.4 with the following exceptions:

- Instead of Table 8.7.1.1_A.2.4.1-1 -> use Table 8.7.1.1_H.3.4-1.
- Instead of Table 8.7.1.1_A.2.5-1 -> use Table 8.7.1.1_H.3.5-1.
- Instead of Table 8.7.1.1_A.2.5-2 -> use Table 8.7.1.1_H.3.5-2.
- Instead of Table 8.7.1.1_A.2.5-3 -> use Table 8.7.1.1_H.3.5-3.

Table 8.7.1.1_H.3.4-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
8	R.68 FDD for 20MHz CC	R.1-4 FDD	97896 (Note 3) for 20MHz CC	10 for 20MHz CC	FLOOR((TB_{size} - 352)/80) for 20MHz CC	1219 for 20MHz CC
9	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	75376 (Note 4) for 15MHz CC 97896 (Note 3) for 20MHz CC	7 for 15MHz CC 10 for 20MHz CC	FLOOR((TBsize – 264)/56) for 15MHz CC FLOOR((TB_{size} - 352)/80) for 20MHz CC	1341 for 15MHz CC 1219 for 20MHz CC
10	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	48936 (Note 5) for 10MHz CC 97896 (Note 3) for 20MHz CC	5 for 10MHz CC 10 for 20 MHz CC	FLOOR((TBsize – 208)/40) for 10MHz CC FLOOR((TB_{size} - 352)/80) for 20MHz CC	1218 for 10MHz CC 1219 for 20MHz CC
11	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	75376 (Note 4) for 15MHz CC 97896 (Note 3) for 20MHz CC	7 for 15MHz CC 10 for 20 MHz CC	FLOOR((TB_{size} – 264)/56) for 15MHz CC FLOOR((TB_{size} - 352)/80) for 20 MHz CC	1341 for 15MHz CC 1219 for 20MHz CC
12	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	48936 (Note 5) for 10MHz CC 75376 (Note 4) for 15MHz CC 97896(Note 3) for 20MHz CC	5 for 10MHz CC 7 for 15MHz CC 10 for 20 MHz CC	FLOOR((TBsize – 208)/40) for 10MHz CC FLOOR((TBsize – 264)/56) for 15MHz CC FLOOR((TB_{size} - 352)/80) for 20 MHz CC	1218 for 10MHz CC 1341 for 15MHz CC 1219 for 20MHz CC
13	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	48936 (Note 5) for 10MHz CC 97896 (Note 3) for 20MHz CC	5 for 10MHz CC 10 for 20MHz CC	FLOOR((TBsize – 208)/40) for 10MHz CC FLOOR((TB_{size} - 352)/80) for 20MHz CC	1218 for 10MHz CC 1219 for 20MHz CC
14	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC	R.1-4B FDD	48936 (Note 5) for 10MHz CC 75376 (Note 4) for 15MHz CC	5 for 10MHz CC 7 for 15MHz CC	FLOOR((TBsize – 208)/40) for 10MHz CC FLOOR((TBsize – 264)/56) for 15MHz CC	1218 for 10MHz CC 1341 for 15MHz CC
15	R.68-3 FDD for 5MHz CC R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	24496 (Note 6) for 5MHz CC 48936 (Note 5) for 10MHz CC 97896 (Note 3) for 20MHz CC	3 for 5MHz CC 5 for 10MHz CC 10 for 20MHz CC	FLOOR((TBsize – 152)/24) for 10MHz CC FLOOR((TBsize – 208)/40) for 10MHz CC FLOOR((TB_{size} - 352)/80) for 20MHz CC	1014 for 5MHz CC 1218 for 10MHz CC 1219 for 20MHz CC

15A	R.68-3 FDD for 5MHz CC R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	24496 (Note 6) for 5MHz CC 75376 (Note 4) for 15MHz CC 97896 (Note 3) for 20MHz CC	3 for 5MHz CC 7 for 15MHz CC 10 for 20MHz CC	FLOOR((TBsize – 152)/24) for 10MHz CC FLOOR((TBsize – 264)/56) for 15MHz CC FLOOR((TB$_{size}$ - 352)/80) for 20MHz CC	1014 for 5MHz CC 1341 for 15MHz CC 1219 for 20MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits).
This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 21384 bits for sub-frames 0,1,2,6,7 and 19848 bits for sub-frames 5.

8.7.1.1_H.3.5 Test requirement

The requirements are specified in Table 8.7.1.1_H.3.5-1 depending on the UE category according to Table 8.7.1.1_H.3.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_H.3.5-1: Minimum requirement

		TB success rate [%]

8	R.68 FDD	85
9	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
10	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85
11	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
12	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
13	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85
14	R.68-2 FDD for 10MHz CC R.68-1 FDD for 15MHz CC	85
15	R.68-3 FDD for 5MHz CC R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85
15A	R.68-3 FDD for 5MHz CC R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.1.1_H.3.5-2: test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ		
8	3x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
9	15+20+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
10	10+20+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
11	15+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
12	10+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
13	10+10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
14	10+15+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
15	5+10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
15A	5+15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.									

Table 8.7.1.1_H.3.5-3: Test points per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 / DL Cat. 11, 12	DL Cat. 13	DL Cat. 15			
CA with 3CCs	3x20	8	7	8			
	15+20+20	9	7	9			
	10+20+20	10	7	10			
	15+15+20	11	6	11			
	10+15+20	12	6	12			
	10+10+20	13	13	13			
	10+15+15	14	14	14			
	5+10+20	15	15	15			
	5+15+20	15A	15A	15A			

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.
Note 2: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.
Note 3: Test 6 and Test 7 are tested in 8.7.1.1_H.2.

8.7.2 TDD

The parameters specified in Table 8.7.2-1 are valid for all TDD tests unless otherwise stated.

Table 8.7.2-1: Common Test Parameters (TDD)

Parameter	Unit	Value
Special subframe configuration (Note 1)		4
Cyclic prefix		Normal
Cell ID		0 (Note 2)
Inter-TTI Distance		1
Maximum number of HARQ transmission		Downlink: 4 Uplink: 1
Redundancy version coding sequence		{0,0,1,2} for 64QAM and 256QAM
Scheduling of retransmissions		1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur. 3. Despite of 1) and 2) the number of RB-s to be allocated in each SF remains firm as specified in the RMC. Thus in case of RMC-s with SF dependent allocation, for retransmissions the TBS and the modulation scheme (MCS) are indicated implicitly ($29 \le I_{\mathrm{MCS}} \le 31$) according to TS 36.213 [10] subclause 7.1.7.2.
Number of OFDM symbols for PDCCH	OFDM symbols	1
Cross carrier scheduling		Not configured
Propagation conditions		Static propagation condition No external noise sources are applied
Note 1: as specified in Table 4.2-1 in TS 36.211 [4]. Note 2: For CA tests, Cell ID = 0 applies to P-Cell, Cell ID = n (where n is 1, 2, 3..) applies to S-Cells (where n is 1, 2, 3..), respectively.		

The normative reference for this requirement is TS 36.101[2] clause 8.7.2.

8.7.2.1 TDD sustained data rate performance

8.7.2.1.1 Test purpose

The purpose of the test is to verify that the Layer 1 and Layer 2 correctly process in a sustained manner the received packets corresponding to the maximum number of DL-SCH transport block bits received within a TTI for the UE category indicated. The sustained downlink data rate shall be verified in terms of the success rate of delivered PDCP SDU(s) by Layer 2. The test case below specifies the RF conditions and the required success rate of delivered TB by Layer 1 to meet the sustained data rate requirement. The size of the TB per TTI corresponds to the largest possible DL-SCH transport block for each UE category using the maximum number of layers for spatial multiplexing. Transmission modes 1 and 3 are used with radio conditions resembling a scenario where sustained maximum data rates are available. Test case is selected according to table 8.7.2.1.1-1 depending on UE capability for CA and EPDCCH.

Table 8.7.2.1.1-1: SDR test applicability

	Single carrier UE not supporting EPDCCH	CA UE not supporting EPDCCH	Single carrier UE supporting EPDCCH	CA UE supporting EPDCCH

TDD	8.7.2.1, 8.7.2.1_1	8.7.2.1_A	8.7.4.1	8.7.2.1_A, 8.7.4.1

8.7.2.1.2 Test applicability

This test applies to E-UTRA TDD UE release 9 and forward UEs of category 1 to 4 and not supporting 256QAM in DL.

8.7.2.1.3 Minimum requirements

Table 8.7.2.1.3-1: Void

For UE not supporting 256QAM, the requirements are specified in Table 8.7.2.1.3-3, with the addition of the parameters in Table 8.7.2.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category as specified in Table 8.7.2.1.3-4. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.2.1.3-2: Test parameters for sustained downlink data rate (TDD)

Test	Band-width (MHz)	Trans-mission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
1	10	1	1 x 2	N/A	0	0	0	-85	Bundling	OP.6 TDD
2	10	3	2 x 2	10	-3	-3	0	-85	Bundling	OP.1 TDD
3	20	3	2 x 2	10	-3	-3	0	-85	Bundling	OP.1 TDD
3A	15	3	2 x 2	10	-3	-3	0	-85	Multiplexing	OP.2 TDD
4,6	20	3	2 x 2	10	-3	-3	0	-85	Multiplexing	OP.1 TDD

Table 8.7.2.1.3-3: Minimum requirement (TDD)

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]
1	10296/0	R.31-1 TDD	95
2	25456/0	R.31-2 TDD	95
3	51024/0	R.31-3 TDD	95
3A	51024/0	R.31-3A TDD	85
4	75376/0 (Note 2)	R.31-4 TDD	85
6	75376/0 (Note 2)	R.31-4 TDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 71112 bits for sub-frame 5.
Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1.3-4: Test points for sustained data rate (FRC)

CA config	Bandwidth (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	-	-	-	-
	15	-	-	3A	3A	-	-
	20	-	-	3	4	6	6
Note 1: If UE can be tested for CA configuration, single carrier test is skipped.							
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.							

The normative reference for this requirement is TS 36.101[2] clause 8.7.2

8.7.2.1.4 Test description

8.7.2.1.4.1 Initial conditions

Table 8.7.2.1.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement Channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets] for normal/special sub-frame
1	R.31-1 TDD	R.1-1 TDD	10296	1/0	FLOOR((TB_{size} - 96)/8)	1275/0
2	R.31-2 TDD	R.1-2 TDD	25456	3/0	FLOOR((TB_{size} – 152)/24))	1054/0
3	R.31-3 TDD	R.1-3 TDD	51024	5/0	FLOOR((TB_{size} – 208)/40))	1270/0
3A	R.31-3B TDD	R.1-3B TDD	51024	5/0	FLOOR((TB_{size} – 208)/40))	1270/0
4	R.31-4 TDD	R.1-4 TDD	75376 (Note 3)	7/0	FLOOR((TB_{size} – 264)/56))	1341/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size – Size of Timing Advance - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 71112 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.2.1.5-2 depending on the UE category according to Table 8.7.2.1.5-3.

1. Connect the SS, to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.3 for test 1 and Figure A.10 for tests 2-5 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.2.1.5-2 and Table 8.7.2.1.5-1 depending on the UE category according to Table 8.7.2.1.5-3.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.2.1.4.3. PhysicalConfigDedicated-DEFAULT for transmission mode 3 is defined in Table 8.7.2.1.4.3-3.

8.7.2.1.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1. No external noise sources are applied.
2. The SS looks up TB_{size} in Table 8.7.2.1.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.2.1.5-3.
3. SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.2.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
6. Steps 4 to 5 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one.
8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
10. The UE passes the test if $A \geq$ "corresponding TB success rates according to Table 8.7.2.1.5-1" and $B = 0$.

NOTE 1 In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.2.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 101 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1.	
UE test loop mode B LB setup	Not present		

Table 8.7.2.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.2.1.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.8.2.1.6-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm1 for Test 1 tm3 for other Test 2, 3, 3B and 4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	Not present for Test 1 10 for other Test 2, 3, 3B and 4		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.2.1.5 Test requirement

The requirements are specified in Table 8.7.2.1.5-1 depending on the UE category according to Table 8.7.2.1.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.2.1.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value TB success rate [%]
1	10296/0	R.31-1 TDD	95
2	25456/0	R.31-2 TDD	95
3	51024/0	R.31-3 TDD	95
3A	51024/0	R.31-3A TDD	85
4	75376/0 (Note 2)	R.31-4 TDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 71112 bits for sub-frame 5. Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.			

Table 8.7.2.1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
1	10	1	1 x 2	N/A	0	0	0	-85	Bundling	OP.6 TDD
2	10	3	2 x 2	10	-3	-3	0	-85	Bundling	OP.1 TDD
3	20	3	2 x 2	10	-3	-3	0	-85	Bundling	OP.1 TDD
3A	15	3	2 x 2	10	-3	-3	0	-85	Muliplexing	OP.2 TDD
4	20	3	2 x 2	10	-3	-3	0	-85	Multiplexing	OP.1 TDD
Note 1: N/A.										

Table 8.7.2.1.5-3: Test applicability per UE category

CA config	Bandwidth (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	-	-	-	-
	15	-	-	3A	3A	-	-
	20	-	-	3	4	-	-
Note 1: If UE can be tested for CA configuration, single carrier test is skipped. Note 2: For non-CA UE, test is selected for maximum supported bandwidth.							

8.7.2.1_1 TDD sustained data rate performance (Rel-10 and forward)

8.7.2.1_1.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.2.1_1.2 Test applicability

This test case applies to E-UTRA TDD release 10 and forward of UEs category 6 and 7.

8.7.2.1_1.3 Minimum requirements

Table 8.7.2.1_1.3-1: Void

Same minimum conformance requirements as in clause 8.7.2.1.3.

8.7.2.1_1.4 Test description

Same test description as in clause 8.7.2.1.4 with the following exceptions:

- Connection diagram Figure A.10 (without using faders and AWGN generators).
- Instead of Table 8.7.2.1.4.1-1 -> use Table 8.7.2.1_1.4-1.
- Instead of Table 8.7.2.1.5-1 -> use Table 8.7.2.1_1.5-1.
- Instead of Table 8.7.2.1.5-2 -> use Table 8.7.2.1_1.5-2.
- Instead of Table 8.7.2.1.5-3 -> use Table 8.7.2.1_1.5-3.

Table 8.7.2.1_1.4-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement Channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets] for normal/special sub-frame
6	R31-4 TDD	R.1-4 TDD	75376 (Note 3)	7/0	FLOOR((TB_{size} – 264)/56)	1341/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size – Size of Timing Advance - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 71112 bits for sub-frame 5.

8.7.2.1_1.5 Test requirement

The requirements are specified in Table 8.7.2.1.5-1 depending on the UE category according to Table 8.7.2.1_1.5-3. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_1.5-1: Test requirements for sustained downlink data rate (TDD)

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]
6	75376/0 (Note 2)	R.31-4 TDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: 71112 bits for sub-frame 5.

Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1_1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
6	20	3	2 x 2	10	-3	-3	0	-85	Multiplexing	OP.1 TDD
Note 1: N/A.										

Table 8.7.2.1_1.5-3: Test applicability per UE category

CA config	Bandwidth/ Bandwidth combination (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	20	-	-	-	-	6	6
Note 1: If UE can be tested for CA configuration, single carrier test is skipped. Note 2: For non-CA UE, test is selected for maximum supported bandwidth.							

8.7.2.1_A TDD sustained data rate performance for CA

8.7.2.1_A.1 TDD sustained data rate performance for CA (2DL CA)

8.7.2.1_A.1.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.2.1_A.1.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UEs of category 6, 7, 9 and 10 which support inter-band DL CA OR intra-band contiguous DL CA and not support 256QAM in DL.

This test also applies to E-UTRA TDD release 11 and forward UEs of category6, 7, 9 and 10 which support intra band non-contiguous DL CA and not support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.2.1_A.1.3 Minimum requirements

For UE not supporting 256QAM, the requirements are specified in Table 8.7.2.1_A.1.3-3, with the addition of the parameters in Table 8.7.2.1_A.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.2.1_A.1.3-4. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_A.1.3-1: Void

Table 8.7.2.1_A.1.3-2: Test parameters for sustained downlink data rate for CA (TDD 64QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
3	20	3	2 x 2	10	-3	-3	0	-85	Bundling	OP.1 TDD
4	20	3	2 x 2	10	-3	-3	0	-85	Multiplexing	OP.1 TDD
6A	2x20	3	2 x 2	10	-3	-3	0	-85	- (Note 1)	OP.1 TDD
6B	20+15	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD

Note 1: PUCCH format 1b with channel selection is used to feedback ACK/NACK.

Table 8.7.2.1_A.1.3-3: Minimum requirement for CA (TDD 64QAM)

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]
3	51024/0	R31-3 TDD	95
4	75376/0 (Note 2)	R31-4 TDD	85
6A	75376/0 (Note 2)	R.31-4 TDD	85
6B	55056/0 for 15MHz CC 75376/0 for 20MHz CC (Note 2)	R.31-5 TDD for 15MHz CC R.31-4 TDD for 20MHz CC	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 71112 bits for sub-frame 5.
Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1_A.1.3-4: Test points for sustained data rate for CA (FRC 64QAM)

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9, 10	Cat 11, 12
CA with 2CCs	20+20	-	--	3(Note 4)	4 (Note 4)	6A	6A	-
	15+20	-	-	3(Note 4)	4 (Note 4)	6B	6B	-

Note 1: Void.
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.
Note 3: Void.
Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, single carrier test is selected.
Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

The normative reference for this requirement is TS 36.101[2] clause 8.7.2

8.7.2.1_A.1.4 Test description

8.7.2.1_A.1.4.1 Initial conditions

Table 8.7.2.1_A.1.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword per Component Carrier	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets] for normal/special sub-frame
6A	R.31-4 TDD	R.1-4 TDD	75376 (Note 3)	7/0	FLOOR((TB_{size} – 264)/56))	1341/0
6B	R.31-5 TDD for 15MHz CC R.31-4 TDD for 20MHz CC	R.1-4 TDD	55056/0 for 15MHz CC 75376/0 for 20MHz CC (Note 3)	6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1142 for 15MHz CC 1341 for 20MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 71112 bits for sub-frame 5

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: according to Table 8.7.2.1_A.1.5-2 depending on the UE category according to Table 8.7.2.1_A.1.5-3.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.2.1_A.1.5-2 and Table 8.7.2.1_A.1.5-1 depending on the UE category according to Table 8.7.2.1_A.1.5-3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3/4.5.4.5. Message contents are defined in clause 8.7.2.1_A.1.4.3.

8.7.2.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.2.1_A.1.4.3-1, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.2.1_A.1.4.3-1A.

3. The SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1. No external noise sources are applied.

5. The SS looks up TB_{size} in Table 8.7.2.1_A.1.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.2.1_A.1.5-3.

6. SS sets the counters N_{DL_newtx},N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.2.1_A.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

11. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

12. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.2.1_A.1.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.2.1_A.1.4.3 Message contents

Same message contents as in clause 8.7.2.1.4.3 with the following exceptions:

Table 8.7.2.1_A.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.8.2.1.6-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.2.1_A.1.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.2.1_A.1.5 Test requirement

The requirements are specified in Table 8.7.2.1_A.1.5-1 depending on the UE category according to Table 8.7.2.1_A.1.5-3. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_A.1.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]
6A	75376/0 (Note 2)	R.31-4 TDD	85
6B	55056/0 for 15MHz CC 75376/0 for 20MHz CC (Note 2)	R.31-5 TDD for 15MHz CC R.31-4 TDD for 20MHz CC	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 71112 bits for sub-frame 5.
Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1_A.1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
6A	2x20	3	2 x 2	10	-3	-3	0	-85	- (Note 1)	OP.1 TDD
6B	20+15	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
Note 1: PUCCH format 1b with channel selection is used to feedback ACK/NACK.										

Table 8.7.2.1_A.1.5-3: Test applicability per UE category

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9, 10	Cat 11, 12
CA with 2CCs	20+20	-	--	3(Note 4)	4 (Note 4)	6A	6A	-
	15+20	-	-	3(Note 4)	4 (Note 4)	6B	6B	-
Note 1: Void. Note 2: For non-CA UE, test is selected for maximum supported bandwidth. Note 3: Void. Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, single carrier test is selected. Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3. Note 6: Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Only one test point to be tested.								

8.7.2.1_A.2 TDD Sustained data rate performance for CA (3DL CA)

8.7.2.1_A.2.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.2.1_A.2.2 Test applicability

This test case applies to all types of E-UTRA TDD UE release 10 and forward of UE category 9, 10, 11 and 12 that support 3DL Intra-band contiguous CA or 3DL Inter-band CA or 3DL with Intra-band contiguous and Inter-band CA and not support 256QAM in DL.This test case also applies to all types of E-UTRA TDD UE release 11 and forward of UE category 9, 10, 11 and 12 that support 3DL with Intra-band non-contiguous and Inter-band CA or 3DL with Intra-band non-contiguous and Intra-band contiguous CA and not support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.2.1_A.2.3 Minimum conformance requirements

For UE not supporting 256QAM, the requirements are specified in Table 8.7.2.1_A.2.3-2, with the addition of the parameters in Table 8.7.2.1_A.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.2.1_A.2.3-3. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_A.2.3-1: test parameters for sustained downlink data rate (TDD 64QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
6A	2x20	3	2 x 2	10	-3	-3	0	-85	- (Note 1)	OP.1 TDD
7	3x20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD
7A	15+20+20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD
Note 1: PUCCH format 1b with channel selection is used to feedback ACK/NACK. Note 2: PUCCH format 3 is used to feedback ACK/NACK.										

Table 8.7.2.1_A.2.3-2: Minimum requirement (TDD 64QAM)

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]
6A	75376/0 (Note 2)	R.31-4 TDD	85
7	75376/0 (Note 2)	R.31-4 TDD	85
7A	55056/0 for 15MHz CC 75376/0 for 20MHz CC (Note 2)	R.31-5 TDD for 15MHz CC R.31-4 TDD for 20MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 71112 bits for sub-frame 5. Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.			

Table 8.7.2.1_A.2.3-3: Test points for sustained data rate (FRC 64QAM)

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9, 10	Cat 11, 12
CA with 3 CCs	3x20	-	-	-	-	6A	7	7
	15+20+20	-	-	-	-	6A	7A	7A
Note 1: Void. Note 2: For non-CA UE, test is selected for maximum supported bandwidth. Note 3: Void. Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, single carrier test is selected. Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.								

The normative reference for this requirement is TS 36.101 [2] clause 8.7.2.

8.7.2.1_A.2.4 Test description

8.7.2.1_A.2.4.1 Initial conditions

Table 8.7.2.1_A.2.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
6A	R.31-4 TDD for two 20MHz CCs	R.1-4 TDD	75376 (Note 3)	7 for two 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for two 20MHz CCs
7	R.31-4 TDD for three 20MHz CCs	R.1-4 TDD	75376 (Note 3)	7 for three 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for three 20MHz CCs
7A	R.31-5 TDD for 15MHz CC R.31-4 TDD for 20MHz CC	R.1-4 TDD	55056 for 15MHz CC 75376 (Note 3) for 20MHz CC	6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB$_{size}$ – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1142 for 15MHz CC 1341 for 20MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits).
This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 71112 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: according to Table 8.7.2.1_A.5-2 depending on the UE category according to Table 8.7.2.1_A.2.5-3.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.2-1 and Table 8.7.2.1_A.2.5-1 depending on the UE category according to Table 8.7.2.1_A.2.5-3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.2.1_A.2.4.3.

8.7.2.1_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.2 with two SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.2.1_A.2.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.2.1_A.2.4.3-3A.

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. The SS looks up TB_{size} in Table 8.7.2.1_A.2.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.2.1_A.2.5-3.

6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.2.1_A.2.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.2.1_A.2.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.2.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.2.1_A.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.2.1_A.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.2.1_A.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.2.1_A.2.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.2.1_A.2.5 Test requirement

The requirements are specified in Table 8.7.2.1_A.2.5-1 depending on the UE category according to Table 8.7.2.1_A.2.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_A.2.5-1: Test requirements per test

Test	**Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame**	**Measurement channel**	**Reference value**
			TB success rate [%]
7	75376/0 (Note 2)	R.31-4 TDD	85
7A	55056/0 for 15MHz CC 75376/0 for 20MHz CC (Note 2)	R.31-5 TDD for 15MHz CC R.31-4 TDD for 20MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 71112 bits for sub-frame 5. Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.			

Table 8.7.2.1_A.2.5-2: test parameters per test

Test	**Bandwidth (MHz)**	**Transmission mode**	**Antenna configuration**	**Codebook subset restriction**	**Downlink power allocation (dB)**			$\hat{E}_s$ **at antenna port (dBm/15 kHz)**	**ACK/NACK feedback mode**	**Symbols for unused PRBs**
					ρ_A	ρ_B	**σ**			
7	3x20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD
7A	15+20+20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD
Note 1: PUCCH format 1b with channel selection is used to feedback ACK/NACK. Note 2: PUCCH format 3 is used to feedback ACK/NACK.										

Table 8.7.2.1_A.2.5-3: Test points per UE category

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9, 10	Cat 11, 12
CA with 3 CCs	3x20	-	-	-	-	6A	7	7
	15+20+20	-	-	-	-	6A	7A	7A

Note 1: Void.
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.
Note 3: Void.
Note 4: Void.
Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.
Note 6: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.
Note 7: Test 6A is tested in 8.7.2.1_A.1.

8.7.2.1_A.3 TDD Sustained data rate performance for CA (4DL CA)

Editor's notes: This test case is incomplete. The following items are missing or are incomplete:

- UL RMC for 4-DL CA in loopback mode needs to be further investigated

8.7.2.1_A.3.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.2.1_A.3.2 Test applicability

This test case applies to all types of E-UTRA TDD UE release 11 and forward of UE DL category 11, 12 and 15 that support 4DL Intra-band contiguous CA or 4DL Inter-band CA or 4DL with Intra-band contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Intra-band contiguous CA or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA.

8.7.2.1_A.3.3 Minimum conformance requirements

For UE not supporting 256QAM, the requirements are specified in Table 8.7.2.1_A.3.3-2, with the addition of the parameters in Table 8.7.2.1_A.3.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.2.1_A.3.3-3. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_A.3.3-1: test parameters for sustained downlink data rate (TDD 64QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
7	3x20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD
8	4x20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD
9	15+3x20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD

Note 1: PUCCH format 1b with channel selection is used to feedback ACK/NACK.
Note 2: PUCCH format 3 is used to feedback ACK/NACK.

Table 8.7.2.1_A.3.3-2: Minimum requirement (TDD 64QAM)

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]

7	75376/0 (Note 2)	R.31-4 TDD	85
8	75376/0 (Note 2)	R.31-4 TDD	85
9	55056/0 for 15MHz CC 75376/0 for 20MHz CC (Note 2)	R.31-5 TDD for 15MHz CC R.31-4 TDD for 20MHz CC	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 71112 bits for sub-frame 5.
Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1_A.3.3-3: Test points for sustained data rate (FRC 64QAM)

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9, 10	Cat. 11, 12 DL Cat. 11, 12	DL Cat. 15
CA with 4 CCs	4x20	-	-	-	-	-	7	8	8
	15+3x20	-	-	-	-	-	7	9	9

Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.
Note 3: Void.
Note 4: If the intra-band contiguous CA is the only CA configuration supported by category 3 or 4 UE, single carrier test is selected.
Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.

The normative reference for this requirement is TS 36.101 [2] clause 8.7.2.

8.7.2.1_A.3.4 Test description

8.7.2.1_A.3.4.1 Initial conditions

Table 8.7.2.1_A.3.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
7	R.31-4 TDD for three 20MHz CCs	R.1-4 TDD	75376 (Note 3)	7 for three 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for three 20MHz CCs
8	R.31-4 TDD for four 20MHz CCs	R.1-4 TDD	75376 (Note 3)	7 for four 20MHz CCs	FLOOR((TBsize – 264)/56)	1341 for four 20MHz CCs
9	R.31-5 TDD for 15MHz CC R.31-4 TDD for three 20MHz CC	R.1-4 TDD	55056 for 15MHz CC 75376 (Note 3) for 20MHz CC	6 for 15MHz CC 7 for three 20 MHz CC	FLOOR((TB$_{size}$ – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1142 for 15MHz CC 1341 for three 20MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 71112 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.2.1_A.3.5-2 depending on the UE category according to Table 8.7.2.1_A.3.5-3.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators).

2. The parameter settings for the cell are set up according to Table 8.7.1-1 and Table 8.7.2.1_A.3.5-1 depending on the UE category according to Table 8.7.2.1_A.3.5-3.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.2.1_A.3.4.3.

8.7.2.1_A.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with five SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.2.1_A.3.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.2.1_A.3.4.3-3A.

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13,6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. The SS looks up TB_{size} in Table 8.7.2.1_A.3.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.2.1_A.3.5-3.

6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.2.1_A.3.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.2.1_A.3.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.2.1_A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.2.1_A.3.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.2.1_A.3.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.2.1_A.3.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.2.1_A.3.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.2.1_A.3.5 Test requirement

The requirements are specified in Table 8.7.2.1_A.3.5-1 depending on the UE category according to Table 8.7.2.1_A.3.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_A.3.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]
7	75376/0 (Note 2)	R.31-4 TDD	85
8	75376/0 (Note 2)	R.31-4 TDD	85
9	55056/0 for 15MHz CC 75376/0 for 20MHz CC (Note 2)	R.31-5 TDD for 15MHz CC R.31-4 TDD for 20MHz CC	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 71112 bits for sub-frame 5.
Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1_A.3.5-2: test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
7	3x20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD
8	4x20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD
9	15+3x20	3	2 x 2	10	-3	-3	0	-85	(Note 2)	OP.1 TDD

Note 1: PUCCH format 1b with channel selection is used to feedback ACK/NACK.
Note 2: PUCCH format 3 is used to feedback ACK/NACK.

Table 8.7.2.1_A.3.5-3: Test points per UE category

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6,7	Cat. 9, 10	Cat. 11, 12	DL Cat. 15
								DL Cat. 11, 12	
CA with 4 CCs	4x20	-	-	-	-	-	7	8	8
	15+3x20	-	-	-	-	-	7	9	9

Note 1: Void.
Note 2: For non-CA UE, test is selected for maximum supported bandwidth.
Note 3: Void.
Note 4: Void.
Note 5: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.
Note 6: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.
Note 7: Test 7 is tested in 8.7.2.1_A.2.

8.7.2.1_A.4 Void

8.7.2.1_H TDD sustained data rate performance for 256QAM in DL

Editor's notes:

- Discussion on DL EVM for 256QAM demodulation test as per R5-155895 is still ongoing

- Whether UL modulation mode QPSK is suitable to use is FFS

8.7.2.1_H.1 TDD sustained data rate performance for 256QAM in DL (Single Carrier)

8.7.2.1_H.1.1 Test purpose

The purpose of the test is to verify that the Layer 1 and Layer 2 correctly process in a sustained manner the received packets corresponding to the maximum number of DL-SCH transport block bits received within a TTI for the UE category indicated. The sustained downlink data rate shall be verified in terms of the success rate of delivered PDCP SDU(s) by Layer 2. The test case below specifies the RF conditions and the required success rate of delivered TB by Layer 1 to meet the sustained data rate requirement. The size of the TB per TTI corresponds to the largest possible DL-SCH transport block for each UE category using the maximum number of layers for spatial multiplexing. Transmission mode 3 is used with radio conditions resembling a scenario where sustained maximum data rates are available.

8.7.2.1_H.1.2 Test applicability

This test applies to E-UTRA TDD UE release 12 and forward UE DL category 13 that support 256QAM in DL.

8.7.2.1_H.1.3 Minimum requirements

For UE supporting 256QAM, the requirements are specified in Table 8.7.2-2, with the addition of the parameters in Table 8.7.2-1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.2-3. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.2.1_A.4.3-2 is not applicable.

Table 8.7.2.1_H.1.3-1: test parameters for sustained downlink data rate (TDD 256QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
1	20	3	2 x 2	10	-3	-3	0	-85	Bundling	OP.1 TDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.										

Table 8.7.2.1_H.1.3-2: Minimum requirement (TDD 256QAM)

Test	Measurement channel	Reference value
		TB success rate [%]
1	R.68 TDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.		
Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.2.1_H.1.3-3: Test points for sustained data rate (FRC 256QAM)

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 / DL Cat. 11, 12	DL Cat. 13				
Single carrier	20	-	1				

The normative reference for this requirement is TS 36.101[2] clause 8.7.2

8.7.2.1_H.1.4 Test description

Same test description as in clause 8.7.2.1.4 with the following exceptions:

- Connection diagram Figure A.10 (without using faders and AWGN generators).
- Instead of Table 8.7.2.1.4.1-1 -> use Table 8.7.2.1_H.1.4-1.
- Instead of Table 8.7.2.1.5-1 -> use Table 8.7.2.1_H.1.5-1.
- Instead of Table 8.7.2.1.5-2 -> use Table 8.7.2.1_H.1.5-2.
- Instead of Table 8.7.2.1.5-3 -> use Table 8.7.2.1_H.1.5-3.

Table 8.7.2.1_H.1.4-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement Channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets] for normal/special sub-frame
1	R.68 TDD	R.1-4 TDD	97896(Note 3)	10/0	FLOOR((TB_{size} - 352)/80)	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size – Size of Timing Advance - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

8.7.2.1_H.1.5 Test requirement

The requirements are specified in Table 8.7.2.1_H.1.5-1 depending on the UE category according to Table 8.7.2.1_H.1.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_H.1.5-1: Test requirements per test

Test	Measurement channel	Reference value
		TB success rate [%]
1	R.68 TDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1_H.1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
1	20	3	2 x 2	10	-3	-3	0	-85	Bundling	OP.1 TDD

Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.

Table 8.7.2.1_H.1.5-3: Test applicability per UE category

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 / DL Cat. 11, 12	DL Cat. 13				
Single carrier	20	-	1				

8.7.2.1_H.2 TDD sustained data rate performance for CA (2DL CA) for 256QAM in DL

8.7.2.1_H.2.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.2.1_H.2.2 Test applicability

This test applies to E-UTRA TDD UE release 12 and forward and UE DL category 11, 12 and 13 that support 256QAM in DL and 2DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.2.1_H.2.3 Minimum requirements

For UE supporting 256QAM, the requirements are specified in Table 8.7.2.1_H.2.3-2, with the addition of the parameters in Table 8.7.2.1_H.2.3-1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.2.1_H.2.3-3. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.2.1_A.1.3-3 is not applicable.

Table 8.7.2.1_H.2.3-1: test parameters for sustained downlink data rate (TDD 256QAM)

Test	Band width (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
2	15+20	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
3	2x20	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.										

Table 8.7.2.1_H.2.3-2: Minimum requirement (TDD 256QAM)

Test	Measurement channel	Reference value
		TB success rate [%]
2	R.68-1 TDD for 15MHz CC R.68 TDD for 20MHz CC	85
3	R.68 TDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.2.1_H.2.3-3: Test points for sustained data rate (FRC 256QAM)

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 / DL Cat. 11, 12	DL Cat. 13				
CA with 2CCs	15+20	2	2				
	2x20	3	3				

The normative reference for this requirement is TS 36.101[2] clause 8.7.2

8.7.2.1_H.2.4 Test description

Same test description as in clause 8.7.2.1_A.1.4 with the following exceptions:

- Instead of Table 8.7.2.1_A.1.4.1-1 -> use Table 8.7.2.1_H.2.4-1.
- Instead of Table 8.7.2.1_A.1.5-1 -> use Table 8.7.2.1_H.2.5-1.
- Instead of Table 8.7.2.1_A.1.5-2 -> use Table 8.7.2.1_H.2.5-2.
- Instead of Table 8.7.2.1_A.1.5-3 -> use Table 8.7.2.1_H.2.5-3.

Table 8.7.2.1_H.2.4-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword per Component Carrier	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets] for normal/special sub-frame
2	R.68-1 TDD for 15MHz CC R.68 TDD for 20MHz CC	R.1-4 TDD	75376 (Note 4) for 15MHz CC 97896(Note 3) for 20MHz CC	7/0 for 15MHz CC 10/0 for 20MHz CC	FLOOR((TB_{size} – 264)/56)) for 15MHz CC FLOOR((TB_{size} - 352)/80) for 20MHz CC	1341/0 for 15MHz CC 1219/0 for 20MHz CC
3	R.68 TDD	R.1-4 TDD	97896(Note 3)	10/0	FLOOR((TB_{size} - 352)/80)	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

Note 4: 63776 bits for sub-frame 0, 4 and 61664 bits for sub-frame 5.

8.7.2.1_H.2.5 Test requirement

The requirements are specified in Table 8.7.2.1_H.2.5-1 depending on the UE category according to Table 8.7.2.1_H.2.5-3. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_H.2.5-1: Test requirements per test

Test	Measurement channel	Reference value
		TB success rate [%]
2	R.68-1 TDD for 15MHz CC R.68 TDD for 20MHz CC	85
3	R.68 TDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.2.1_H.2.5-2: Test parameters per test

Test	Band width (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
2	15+20	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
3	2x20	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.										

Table 8.7.2.1_H.2.5-3: Test applicability per UE category

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 DL Cat. 11, 12	DL Cat. 13				
CA with 2CCs	15+20	2	2				
	2x20	3	3				
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3. Note 2: Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Only one test point to be tested.							

8.7.2.1_H.3 TDD Sustained data rate performance for CA (3DL CA) for 256QAM in DL

8.7.2.1_H.3.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.2.1_H.3.2 Test applicability

This test case applies to all types of E-UTRA TDD UE release 12 and forward of UE DL category 11, 12 and 15 that support 256QAM in DL and 3DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.2.1_H.3.3 Minimum conformance requirements

For UE supporting 256QAM, the requirements are specified in Table 8.7.2.1_H.3.3-2, with the addition of the parameters in Table 8.7.2.1_H.3.3-1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.2.1_H.3.3-3. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.2.1_A.2.3-2 is not applicable.

Table 8.7.2.1_H.3.3-1: test parameters for sustained downlink data rate (TDD 256QAM)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
4	3x20	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
5	15+20+20	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.										

Table 8.7.2.1_H.3.3-2: Minimum requirement (TDD 256QAM)

Test	Measurement channel	Reference value
		TB success rate [%]
4	R.68 TDD	85
5	R.68-1 TDD for 15MHz CC R.68 TDD for 20MHz CC	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.		

Table 8.7.2.1_H.3.3-3: Test points for sustained data rate (FRC 256QAM)

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 DL Cat. 11, 12	DL Cat. 13	DL Cat. 15			
CA with 3 CCs	3x20	4	3	4			
	15+20+20	5	3	5			

The normative reference for this requirement is TS 36.101 [2] clause 8.7.2.

8.7.2.1_H.3.4 Test description

Same test description as in clause 8.7.2.1_A.1.4 with the following exceptions:

- Instead of Table 8.7.2.1_A.2.4.1-1 -> use Table 8.7.2.1_H.3.4-1.
- Instead of Table 8.7.2.1_A.2.5-1 -> use Table 8.7.2.1_H.3.5-1.
- Instead of Table 8.7.2.1_A.2.5-2 -> use Table 8.7.2.1_H.3.5-2.
- Instead of Table 8.7.2.1_A.2.5-3 -> use Table 8.7.2.1_H.3.5-3.

Table 8.7.2.1_H.3.4-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
4	R.68 TDD	R.1-4 TDD	97896(Note 3)	10/0	FLOOR((TB_{size} - 352)/80)	1219/0
5	R.68-1 TDD for 15MHz CC R.68 TDD for 20MHz CC	R.1-4 TDD	75376 (Note 4) for 15MHz CC 97896(Note 3) for 20MHz CC	7/0 for 15MHz CC 10/0 for 20MHz CC	FLOOR((TB_{size} – 264)/56)) for 15MHz CC FLOOR((TB_{size} - 352)/80) for 20MHz CC	1341/0 for 15MHz CC 1219/0 for 20MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits).
This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

Note 4: 63776 bits for sub-frame 0, 4 and 61664 bits for sub-frame 5.

8.7.2.1_H.3.5 Test requirement

The requirements are specified in Table 8.7.2.1_H.3.5-1 depending on the UE category according to Table 8.7.2.1_H.3.5-3. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.2.1_H.3.5-1: Minimum requirement

Test	Measurement channel	Reference value
		TB success rate [%]
4	R.68 TDD	85
5	R.68-1 TDD for 15MHz CC R.68 TDD for 20MHz CC	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1_H.3.5-2: test parameters per test

Test	Band width (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)			$\hat{E}_s$ at antenna port (dBm/15 kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					ρ_A	ρ_B	σ			
4	3x20	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
5	15+20 +20	3	2 x 2	10	-3	-3	0	-85	(Note 1)	OP.1 TDD
Note 1: For CA test cases, PUCCH format 3 is used to feedback ACK/NACK.										

Table 8.7.2.1_H.3.5-3: Test points per UE category

CA config	Bandwidth/ Bandwidth combination (MHz)	Cat. 11, 12 / DL Cat. 11, 12	DL Cat. 13	DL Cat. 15			
CA with 3 CCs	3x20	4	3	4			
	15+20+20	5	3	5			
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.3.							
Note 2: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.							
Note 3: Test 3 is tested in 8.7.2.1_H.2.							

8.7.3 FDD (EPDCCH scheduling)

The parameters specified in Table 8.7.3-1 are valid for all FDD tests unless otherwise stated.

Table 8.7.3-1: Common test parameters (FDD)

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured
Number of EPDCCH sets		1
EPDCCH transmission type		Localized
Number of PRB per EPDCCH set and EPDCCH PRB pair allocation		2 PRB pairs 10MHz BW: Resource blocks n_{PRB} = 48, 49 15MHz BW: Resource blocks n_{PRB} = 70, 71 20MHz BW: Resource blocks n_{PRB} = 98, 99
EPDCCH Starting Symbol		Derived from CFI (i.e. default behaviour)
ECCE Aggregation Level		2 ECCEs
Number of EREGs per ECCE		4
EPDCCH scheduling		EPDCCH candidate is randomly assigned in each subframe
EPDCCH precoder (Note 1)		Fixed PMI 0
EPDCCH monitoring SF pattern		1111111111 0000000000 1111111111 0000000000
Timing advance	μs	100
Propagation condition		Static propagation condition No external noise sources are applied
Note 1: EPDCCH precoder parameters are defined for tests with 2 x 2 antenna configuration		

The normative reference for this requirement is TS 36.101[2] clause 8.7.3

8.7.3.1 FDD sustained data rate performance for EPDCCH scheduling

8.7.3.1.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 11 and forward supporting EPDCCH.

8.7.3.1.3 Minimum requirements

Table 8.7.3.1.3-1: Void

The requirements are specified in Table 8.7.3.1.3-3, with the addition of the parameters in Table 8.7.3.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category, CA capability and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.3.1.3-4. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.3.1.3-2: Test parameters for SDR test for PDSCH scheduled by EPDCCH (FDD)

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)				$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ	δ		
1	10	1	1 x 2	N/A	0	0	0	0	-85	OP.6 FDD
2	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
3,4,6	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
3A	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
3C, 4B	15	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD

Table 8.7.3.1.3-3: Minimum requirement (FDD)

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
1	10296	R.31E-1 FDD	95
2	25456	R.31E-2 FDD	95
3	51024	R.31E-3 FDD	95
3A	36696 (Note 2)	R.31E-3A FDD	85
3C	51024	R.31E-3C FDD	85
4	75376 (Note 3)	R.31E-4 FDD	85
4B	55056 (Note 5)	R.31E-4B FDD	85
6	75376 (Note 3)	R.31E-4 FDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 35160 bits for sub-frame 5.
Note 3: 71112 bits for sub-frame 5.
Note 4: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.
Note 5: 52752 bits for sub-frame 5.

Table 8.7.3.1.3-4: Test points for sustained data rate (FRC)

CA config	Bandwidth (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	3A	3A	-	-
	15	-	-	3C	4B	-	-
	20	-	-	3	4	6	6
Note 1: The test is selected for maximum supported bandwidth.							

The normative reference for this requirement is TS 36.101[2] clause 8.7.3

8.7.3.1.4 Test description

8.7.3.1.4.1 Initial conditions

Table 8.7.3.1.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	R31E-1 FDD	R.1-1 FDD	10296	1	FLOOR((TB_{size} - 96)/8)	
2	R31E-2 FDD	R.1-2 FDD	25456	3	FLOOR((TB_{size} – 152)/24))	
3	R31E-3 FDD	R.1-3 FDD	51024	5	FLOOR((TB_{size} -– 208)/40))	
3A	R31E-3A FDD	R.1-3A FDD	36696 (Note 3)	4	FLOOR((TB_{size} – 184)/32))"	
3C	R31E-3C FDD	R.1-3C FDD	51024	5	FLOOR((TB_{size} -– 208)/40))	
4	R31E-4 FDD	R.1-4 FDD	75376 (Note 4)	7	FLOOR((TB_{size} – 264)/56))	
4B	R31E-4B FDD	R.1-4 FDD	55056 (Note 5)	5	FLOOR((TB_{size} – 208)/40))	
6	R31E-4 FDD	R.1-4 FDD	75376 (Note 4)	7	FLOOR((TB_{size} – 264)/56))	

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 35160 bits for sub-frame 5

Note 4: 71112 bits for sub-frame 5

Note 5: 52752 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to table 8.7.3.1.3-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.3 for test 1 and Figure A.10 for tests 2-6.

2. The parameter settings for the cell are set up according to Table 8.7.3.1.5-1 and Table 8.7.3.1.5-2.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4 (Loopback activated) according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.3.1.4.3.
6. SS sends Timing Advance Command MAC CE with timing advance 100us to UE.

8.7.3.1.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1. No external noise sources are applied.
2. The SS looks up TB_{size} in table 8.7.3.1.4.1-1 according to the UE category under test.
3. SS sets the counters N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and N_{DL_PDCP} to 0.
4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.3.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
6. Steps 5 to 6 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (NDL_newtx and NDL_retx) in order to validate HARQ feedback received from the UE.
9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
10. The UE passes the test if $A \geq$ "corresponding TB success rates according to Table 8.7.3.1.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.3.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.3.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.3.1.4.3-3: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
EPDCCH-Config-r11 ::= SEQUENCE{			
config-r11 CHOICE {			
setup SEQUENCE {			
subframePatternConfig-r11	1111111111 0000000000 1111111111 0000000000		
startSymbol-r11	Not present	Derived from CFI	
setConfigToReleaseList-r11	Null		
setConfigToAddModList-r11 SEQUENCE {	1 entry		
setConfigId-r11[1]	0		
transmissionType-r11[1]	localized		
resourceBlockAssignment-r11[1] SEQUENCE{			
numberPRB-Pairs-r11	n2		
resourceBlockAssignment-r11	0000 or 1001	0000 for Bandwidth 10MHz and 20MHz; 1001 only for Bandwidth 15MHz	
}			
}			
}			
}			
}			

8.7.3.1.5 Test requirement

The requirements are specified in Table 8.7.3.1.5-1. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.3.1.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
			TB success rate [%]
1	10296	R.31E-1 FDD	95
2	25456	R.31E-2 FDD	95
3	51024	R.31E-3 FDD	95
3A	36696 (Note 2)	R.31E-3A FDD	85
3C	51024	R.31E-3C FDD	85
4	75376 (Note 3)	R.31E-4 FDD	85
4B	55056 (Note 5)	R.31E-4B FDD	85
6	75376 (Note 3)	R.31E-4 FDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 35160 bits for sub-frame 5.
Note 3: 71112 bits for sub-frame 5.
Note 4: The TB success rate is defined as TB success rate = $100\%*N_{DL_correct_rx}/ (N_{DL_newtx} + N_{DL_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.
Note 5: 52752 bits for sub-frame 5.

Table 8.7.3.1.5-2: Test parameters per test

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)				$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs
					ρ_A	ρ_B	σ	δ		
1	10	1	1 x 2	N/A	0	0	0	0	-85	OP.6 FDD
2	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
3,4,6	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
3A	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
3C, 4B	15	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD

Table 8.7.3.1.5-3: Test applicability per UE category

CA config	Bandwidth (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	3A	3A	-	-
	15	-	-	3C	4B	-	-
	20	-	-	3	4	6	6
Note 1: The test is selected for maximum supported bandwidth.							

8.7.4 TDD (EPDCCH scheduling)

The parameters specified in Table 8.7.4- 1 are valid for all TDD tests unless otherwise stated.

Table 8.7.4-1: Common test parameters (TDD)

Parameter	Unit	Value
Special subframe configuration (Note 1)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured
Number of EPDCCH sets		1
EPDCCH transmission type		Localized
Number of PRB per EPDCCH set and EPDCCH PRB pair allocation		2 PRB pairs 10MHz BW: Resource blocks n_{PRB} = 48, 49 15MHz BW: Resource blocks n_{PRB} = 70, 71 20MHz BW: Resource blocks n_{PRB} = 98, 99
EPDCCH Starting Symbol		Derived from CFI (i.e. default behaviour)
ECCE Aggregation Level		2 ECCEs
Number of EREGs per ECCE		4 for normal subframe and for special subframe
EPDCCH scheduling		EPDCCH candidate is randomly assigned in each subframe
EPDCCH precoder (Note 2)		Fixed PMI 0
EPDCCH monitoring SF pattern		UL-DL configuration 1: 1101111111 0000000000 UL-DL configuration 5: 1100111001 0000000000
Timing advance	μs	100
Propagation condition		Static propagation condition No external noise sources are applied
Note 1: As specified in Table 4.2-1 in TS 36.211 [4]. Note 2: EPDCCH precoder parameters are defined for tests with 2 x 2 antenna configuration		

The normative reference for this requirement is TS 36.101[2] clause 8.7.4.

8.7.4.1 TDD sustained data rate performance for EPDCCH scheduling

8.7.4.1.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.4.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 11 and forward supporting EPDCCH.

8.7.4.1.3 Minimum requirements

Table 8.7.4.1.3-1: Void

The requirements are specified in Table 8.7.4.1.3-3, with the addition of the parameters in Table 8.7.4.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category, CA capability and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.4.1.3-4. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.4.1.3-2: Test parameters for SDR test for PDSCH scheduled by EPDCCH (TDD)

	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)				$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs	ACK/NACK feedback mode
					ρ_A	ρ_B	σ	δ			
1	10	1	1 x 2	N/A	0	0	0	0	-85	OP.6 TDD	Bundling
2	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Bundling
3	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Bundling
3A	15	3	2 x 2	10	-3	-3	0	3	-85	OP.2 TDD	Multiplexing
4,6	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Multiplexing

Table 8.7.4.1.3-3: Minimum requirement (TDD)

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]
1	10296/0	R.31E-1 TDD	95
2	25456/0	R.31E-2 TDD	95
3	51024/0	R.31E-3 TDD	95
3A	51024/0	R.31E-3A TDD	85
4	75376/0 (Note 2)	R.31E-4 TDD	85
6	75376/0 (Note 2)	R.31E-4 TDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: 71112 bits for sub-frame 5.
Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.4.1.3-4: Test points for sustained data rate (FRC)

CA config	Bandwidth/ Bandwidth combination (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	-	-	-	-
	15	-	-	3A	3A	-	-
	20	-	-	3	4	6	6
Note 1: The test is selected for maximum supported bandwidth.							

The normative reference for this requirement is TS 36.101[2] clause 8.7.4

8.7.4.1.4 Test description

8.7.4.1.4.1 Initial conditions

Table 8.7.4.1.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	R.31E-1 TDD	R.1-1 TDD	10296	1/0	FLOOR((TB_{size} - 96)/8)	
2	R.31E-2 TDD	R.1-2 TDD	25456	3/0	FLOOR((TB_{size} – 152)/24))	
3	R.31E-3 TDD	R.1-3 TDD	51024	5/0	FLOOR((TB_{size} – 208)/40))	
3A	R.31E-3A TDD	R.1-3B TDD	51024	4/0	FLOOR((TB_{size} – 184)/32))"	
4	R.31E-4 TDD	R.1-4 TDD	75376 (Note 3)	7/0	FLOOR((TB_{size} – 264)/56))	
6	R.31E-4 TDD	R.1-4 TDD	75376 (Note 3)	7/0	FLOOR((TB_{size} – 264)/56))	

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 71112 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to table 8.7.4.1.3-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.3 for test 1 and Figure A.10 for tests 2-6.
2. The parameter settings for the cell are set up according to Table 8.7.4.1.5-1 and Table 8.7.4.1.5-2.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4 (Loopback activated) according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.4.1.4.3.
6. SS sends Timing Advance Command MAC CE with timing advance 100us to UE.

8.7.4.1.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1. No external noise sources are applied.
2. The SS looks up TB_{size} in table 8.7.4.1.4.1-1 according to the UE category under test.
3. SS sets the counters N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and N_{DL_PDCP} to 0.
4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.4.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
6. Steps 5 to 6 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
10. The UE passes the test if $A \geq$ "corresponding TB success rates according to Table 8.7.4.1.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.4.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 101 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1.	
UE test loop mode B LB setup	Not present		

Table 8.7.4.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.4.1.4.3-3: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
EPDCCH-Config-r11 ::= SEQUENCE{			
config-r11 CHOICE {			
setup SEQUENCE {			
subframePatternConfig-r11	1101111111 000000000 or 1100111001 000000000	1101111111 000000000 for UL-DL configuration 1 and 1100111001 000000000 for UL-DL configuration 5	
startSymbol-r11	Not present	Derived from CFI	
setConfigToReleaseList-r11	Null		
setConfigToAddModList-r11 SEQUENCE {	1 entry		
setConfigId-r11[1]	0		
transmissionType-r11[1]	localized		
resourceBlockAssignment-r11[1] SEQUENCE{			
numberPRB-Pairs-r11	n2		
resourceBlockAssignment-r11	0000 or 1001	0000 for Bandwidth 10MHz and 20MHz; 1001 only for Bandwidth 15MHz	
}			
}			
}			
}			
}			

Table 8.7.4.1.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1 or sa5	The two cases will be configured for each test	
specialSubframePatterns	Ssp4		
}			

8.7.4.1.5 Test requirement

The requirements are specified in Table 8.7.4.1.5-1. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.4.1.5-1: Test requirements per test

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value TB success rate [%]
1	10296/0	R.31E-1 TDD	95
2	25456/0	R.31E-2 TDD	95
3	51024/0	R.31E-3 TDD	95
3A	51024/0	R.31E-3A TDD	85
4	75376/0 (Note 2)	R.31E-4 TDD	85
6	75376/0 (Note 2)	R.31E-4 TDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 71112 bits for sub-frame 5. Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.			

Table 8.7.4.1.5-2: Test parameters per test

	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction	Downlink power allocation (dB)				$\hat{E}_s$ at antenna port (dBm/15kHz)	Symbols for unused PRBs	ACK/NACK feedback mode
					ρ_A	ρ_B	σ	δ			
1	10	1	1 x 2	N/A	0	0	0	0	-85	OP.6 TDD	Bundling
2	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Bundling
3	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Bundling
3A	15	3	2 x 2	10	-3	-3	0	3	-85	OP.2 TDD	Multiplexing
4,6	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Multiplexing

Table 8.7.4.1.5-3: Test applicability per UE category

CA config	Bandwidth/ Bandwidth combination (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	-	-	-	-
	15	-	-	3A	3A	-	-
	20	-	-	3	4	6	6
Note 1: The test is selected for maximum supported bandwidth.							

8.7.5 TDD FDD CA Sustained data rate performance

The parameters specified in Table 8.7.5-1 are valid for all TDD FDD CA tests unless otherwise stated.

Table 8.7.5-1: Common Test Parameters (TDD FDD CA)

Parameter		Unit	Value
Uplink downlink configuration (Note 1) for TDD CC			1
Special subframe configuration (Note 2) for TDD CC			4
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
Cyclic prefix			Normal
Cell ID			0
Inter-TTI Distance			1
Maximum number of HARQ processes per component carrier	FDD PCell	Processes	8 for FDD and TDD CCs
	TDD PCell	Processes	11 for FDD CC; 7 for TDD CC
Maximum number of HARQ transmission			4
Scheduling of retransmissions			1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur. 3. Despite of 1) and 2) the number of RB-s to be allocated in each SF remains firm as specified in the RMC. Thus in case of RMC-s with SF dependent allocation, for retransmissions the TBS and the modulation scheme (MCS) are indicated implicitly ($29 \le I_{\text{MCS}} \le 31$) according to TS 36.213 [10] subclause 7.1.7.2.
Redundancy version coding sequence			{0,0,1,2} for 64QAM, 256QAM
Number of OFDM symbols for PDCCH per component carrier		OFDM symbols	1
Cross carrier scheduling			Not configured
Propagation condition			Static propagation condition No external noise sources are applied
Transmission mode			TM3
Codebook subset restriction			10
Antenna configuration			2 x 2
$\hat{E}_s$ at antenna port (dBm/15kHz)			-85
Symbols for unused PRBs			OP.1 FDD for FDD CC, OP.1 TDD for TDD CC
ACK/NACK feedback mode			PUCCH format 3
Downlink HARQ-ACK timing	FDD PCell		As specified in Clause 7.3.3 in TS36.213 [6]
	TDD PCell		As specified in Clause 7.3.4 in TS36.213 [6]
Note 1: as specified in Table 4.2-2 in TS 36.211 [4]. Note 2: as specified in Table 4.2-1 in TS 36.211 [4].			

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.

8.7.5.1 TDD FDD CA Sustained data rate performance for FDD PCell

8.7.5.1.1 TDD FDD CA Sustained data rate performance for FDD PCell (2DL CA)

8.7.5.1.1.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.5.1.1.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE category 3, 4, 6, 7, 9 and 10, and UE DL category 6, 7, 9 and 10 that support E-UTRA FDD and TDD, 2DL TDD-FDD CA with FDD as PCell and not support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.1.1.3 Minimum requirements

For UE not supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.1.1.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.1.1.3-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.1.1.3-1: test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
2	10+20	10	20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
2A	15+20	15	20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
3	10+10	10	10	36696	36696/0	R.31-3A FDD	R.31-6 TDD	85

Table 8.7.5.1.1.3-2: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12
	Total	FDD CC	TDD CC					DL Cat. 6,7	DL Cat. 9, 10	DL Cat. 11, 12
CA with 2CCs	2x20	20	20	-	-	3	3	1	1	-
	10+20	10	20	-	-	3	3	2	2	-
	15+20	15	20	-	-	3	3	2A	2A	-
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled. Note 2: Void.										

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.1

8.7.5.1.1.4 Test description

8.7.5.1.1.4.1 Initial conditions

Table 8.7.5.1.1.4.1-1: Further test parameters per test

Test number		1	2	2A	**3**
Bandwidth	**FDD CC**	20	10	15	10
	TDD CC	20	20	20	10
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-3A FDD	R.31-5 FDD	R.31-3A FDD
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-6 TDD
UL channel	**FDD CC**	R.1-4 FDD	R.1-1 FDD	R.1-4B FDD	R.1-1 FDD
	TDD CC	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	75376	36696	55056	36696
	TDD CC	75376/0	75376/0	75376/0	36696/0
Number of PDCP SDU per Codeword	**FDD CC**	7	4	6	4
	TDD CC	7	7	7	4
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56)	FLOOR((TB$_{size}$ – 184)/32)	FLOOR((TB$_{size}$ – 240)/48)	FLOOR((TB$_{size}$ – 184)/32)
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TB$_{size}$ – 184)/32)
PDCP SDU size [Octets]	**FDD CC**	1341	1141	1142	1141
	TDD CC	1341	1341	1341	1141

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16-8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to Table 8.7.5.1.1.5-1 depending on the UE category according to Table 8.7.5.1.1.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.5-1 and Table 8.7.5.1.1.5-1 depending on the UE category according to Table 8.7.5.1.1.5-2.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.5.1.1.4.3.

8.7.5.1.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4 with SCC configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.5.1.1.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.5.1.1.4.3-3A.

3. The SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13,6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. The SS looks up TB_{size} in Table 8.7.5.1.1.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.5.1.1.5-2.

6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.5.1.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.5.1.1.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.5.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.5.1.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.5.1.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.5.1.1.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.1.1.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.1.1.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	Ssp4		
}			

8.7.5.1.1.5 Test requirement

The requirements are specified in Table 8.7.5.1.1.5-1 depending on the UE category according to Table 8.7.5.1.1.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.1.1.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
2	10+20	10	20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
2A	15+20	15	20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
3	10+10	10	10	36696	36696/0	R.31-3A FDD	R.31-6 TDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: The TB success rate is defined as TB success rate = $100\%*N_{DL_correct_rx}/ (N_{DL_newtx} + N_{DL_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.5.1.1.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12
	Total	FDD CC	TDD CC					DL Cat. 6,7	DL Cat. 9, 10	DL Cat. 11, 12
CA with 2CCs	2x20	20	20	-	-	3	3	1	1	-
	10+20	10	20	-	-	3	3	2	2	-
	15+20	15	20	-	-	3	3	2A	2A	-
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.										
Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate.										

8.7.5.1.2 TDD FDD CA Sustained data rate performance for FDD PCell (3DL CA)

8.7.5.1.2.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.5.1.2.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE category 9, 10, 11 and 12, and UE DL category 9, 10, 11 and 12 that support E-UTRA FDD and TDD, 3DL TDD-FDD CA with FDD as PCell and not support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.1.2.3 Minimum requirements

For UE not supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.1.2.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.1.2.3-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.1.2.3-1: test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
2	10+20	10	20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
2A	15+20	15	20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
4	3x20	20	2x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
5	15+20+20	15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
6	10+20+20	10	2x20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
7	3x20	2x20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
8	20+20+15	20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
9	20+20+10	20+10	20	75376 for 20MHz CC 36696 for 10MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 TDD	85

Table 8.7.5.1.2.3-2: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12
	Total	FDD CC	TDD CC					DL Cat. 6,7	DL Cat. 9, 10	DL Cat. 11, 12
CA with 3CCs	3x20	20	2x20	-	-	-	-	1	4	4
	15+20+20	15	2x20	-	-	-	-	2A	5	5
	10+20+20	10	2x20	-	-	-	-	2	6	6
	3x20	2x20	20	-	-	-	-	1	7	7
	20+20+15	20+15	20	-	-	-	-	1	8	8
	20+20+10	20+10	20	-	-	-	-	1	9	9
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled. Note 2: Void.										

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.1

8.7.5.1.2.4 Test description

8.7.5.1.2.4.1 Initial conditions

Table 8.7.5.1.2.4.1-1: Further test parameters per test

Test number		1	2	2A	4	5	6	7	8	9
Bandwidth	**FDD CC**	20	10	15	20	15	20	2x20	20+15	20+10
	TDD CC	20	20	20	2x20	2x20	2x20	20	20	20
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-3A FDD	R.31-5 FDD	R.31-4 FDD	R.31-5 FDD	R.31-4 FDD	R.31-4 FDD	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	R.1-4 FDD	R.1-1 FDD	R.1-4B FDD	R.1-4 FDD	R.1-4B FDD	R.1-4 FDD	R.1-4 FDD	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4 FDD for 20MHz CC, R.1-1 FDD for 10MHz CC
	TDD CC	NA	NA	NA	NA	NA	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	75376	36696	55056	75376	55056	75376	75376	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 36696 for 10MHz CC
	TDD CC	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7	4	6	7	6	7	7	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 4 for 10MHz CC
	TDD CC	7	7	7	7	7	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR ((TBsize – 264)/56)	FLOOR ((TB$_{size}$ – 184)/32)	FLOOR ((TB$_{size}$ – 240)/48)	FLOOR ((TBsize – 264)/56)	FLOOR ((TB$_{size}$ – 240)/48)	FLOOR ((TBsize – 264)/56)	FLOOR ((TBsize – 264)/56)	FLOOR ((TBsize – 264)/56) for 20MHz CC, FLOOR ((TB$_{size}$ – 240)/48) for 15MHz CC	FLOOR ((TBsize – 264)/56) for 20MHz CC, FLOOR ((TB$_{size}$ – 184)/32) for 10MHz CC
	TDD CC	FLOOR ((TBsize – 264)/56	FLOOR ((TBsize – 264)/56	FLOOR ((TBsize – 264)/56	FLOOR ((TBsize – 264)/56	FLOOR ((TBsize – 264)/56	FLOOR ((TBsize – 264)/56	FLOOR ((TBsize – 264)/56	FLOOR ((TBsize – 264)/56	FLOOR ((TBsize – 264)/56

		)	)	)	)	)	)	)	)	)
PDCP SDU size [Octets]	**FDD CC**	1341	1141	1142	1341	1142	1341	1341	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1141 for 10MHz CC
	TDD CC	1341	1341	1341	1341	1341	1341	1341	1341	1341

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives:
PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to Table 8.7.5.1.2.5-1 depending on the UE category according to Table 8.7.5.1.2.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.5-1 and Table 8.7.5.1.2.5-1 depending on the UE category according to Table 8.7.5.1.2.5-2.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.5.1.2.4.3.

8.7.5.1.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.5.1.2.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.5.1.2.4.3-3A.

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. The SS looks up TB_{size} in Table 8.7.5.1.2.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.5.1.2.5-2.

6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.5.1.2.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.5.1.2.5-1" and B = 0.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.5.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.5.1.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.5.1.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.5.1.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.1.2.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.1.2.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	Ssp4		
}			

8.7.5.1.2.5 Test requirement

The requirements are specified in Table 8.7.5.1.2.5-1 depending on the UE category according to Table 8.7.5.1.2.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.1.2.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
2	10+20	10	20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
2A	15+20	15	20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
4	3x20	20	2x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
5	15+20+20	15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
6	10+20+20	10	2x20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
7	3x20	2x20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
8	20+20+15	20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
9	20+20+10	20+10	20	75376 for 20MHz CC 36696 for 10MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 TDD	85

Table 8.7.5.1.2.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12
	Total	FDD CC	TDD CC					DL Cat. 6,7	DL Cat. 9, 10	DL Cat. 11, 12
CA with 3CCs	3x20	20	2x20	-	-	-	-	1	4	4
	15+20+20	15	2x20	-	-	-	-	2A	5	5
	10+20+20	10	2x20	-	-	-	-	2	6	6
	3x20	2x20	20	-	-	-	-	1	7	7
	20+20+15	20+15	20	-	-	-	-	1	8	8
	20+20+10	20+10	20	-	-	-	-	1	9	9
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate. Note 3: Test 1, Test 2 and Test 2A are tested in 8.7.5.1.1.										

8.7.5.1.3 TDD FDD CA Sustained data rate performance for FDD PCell (4DL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- UL RMC for 4-DL CA or 5-DL CA in loopback mode needs to be further investigated

8.7.5.1.3.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.5.1.3.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE category 11 and 12, and UE DL category 11, 12 and 15 that support E-UTRA FDD and TDD, 4DL TDD-FDD CA with FDD as PCell and not support 256QAM in DL.

8.7.5.1.3.3 Minimum requirements

For UE not supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.1.3.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.1.3.3-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.1.3.3-1: test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
4	3x20	20	2x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
5	15+20+20	15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
7	3x20	2x20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
8	20+20+15	20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
10	4x20	20	3x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
13	2×15+2x20	2×15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
14	3x20+15	2×20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
15	2×15+2x20	2x15+20	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
15A	3x20+10	2x20+10	20	75376 for 20MHz CC 36696 for 10MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 TDD	85
15B	2x15+2x20	2x15+20	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

Table 8.7.5.1.3.3-2: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12	DL Cat. 15
	Total	FDD CC	TDD CC					DL Cat. 6, 7	DL Cat. 9, 10	DL Cat. 11, 12	
CA with 4CCs	4x20	20	3x20	-	-	-	-	-	4	10	10
	4x20	2×20	2×20	-	-	-	-	-	4 or 7	11	11
	3x20+15	20+15	2×20	-	-	-	-	-	4	12	12
	2×15+2x20	2×15	2x20	-	-	-	-	-	5	13	13
	3x20+15	2×20+15	20	-	-	-	-	-	7	14	14
	2×15+2x20	2x15+20	20	-	-	-	-	-	8	15	15
	3x20+10	2x20+10	20	-	-	-	-	-	7	15A	15A
	2x15+2x20	2x15+20	20	-	-	-	-	-	8	15B	15B

Note 1: Void.
Note 2: Void.
Note 3: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.1

8.7.5.1.3.4 Test description

8.7.5.1.3.4.1 Initial conditions

Table 8.7.5.1.3.4.1-1: Further test parameters per test (Test number #4 - #11)

Test number		4	5	7	8	10	11
Bandwidth	**FDD CC**	20	15	2x20	20+15	20	2x20
	TDD CC	2x20	2x20	20	20	3x20	2x20
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-5 FDD	R.31-4 FDD	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD	R.31-4 FDD
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	R.1-4 FDD	R.1-4B FDD	R.1-4 FDD	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4 FDD	R.1-4 FDD
	TDD CC	NA	NA	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	75376	55056	75376	75376 for 20MHz CC, 55056 for 15MHz CC	75376	75376
	TDD CC	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7	6	7	7 for 20MHz CC, 6 for 15MHz CC	7	7
	TDD CC	7	7	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56)	FLOOR((TB$_{size}$ – 240)/48)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
PDCP SDU size [Octets]	**FDD CC**	1341	1142	1341	1341 for 20MHz CC, 1142 for 15MHz CC	1341	1341
	TDD CC	1341	1341	1341	1341	1341	1341

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS

	24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is: PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Table 8.7.5.1.3.4.1-2: Further test parameters per test (Test number #12 - #15B)

Test number		12	13	14	15	15A	15B
Bandwidth	**FDD CC**	20+15	2x15	2x20+15	2x15+20	2x20+10	2x15+20
	TDD CC	2x20	2x20	20	20	20	20
DL Measurement channel	**FDD CC**	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-5 FDD	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4B FDD	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4 FDD for 20MHz CC, R.1-1 FDD for 10MHz CC	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC
	TDD CC	NA	NA	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	75376 for 20MHz CC, 55056 for 15MHz CC	55056	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 36696 for 10MHz CC	75376 for 20MHz CC, 55056 for 15MHz CC
	TDD CC	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7 for 20MHz CC, 6 for 15MHz CC	6	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 4 for 10MHz CC	7 for 20MHz CC, 6 for 15MHz CC
	TDD CC	7	7	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC	FLOOR((TB$_{size}$ – 240)/48)	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 184)/32) for 10MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
PDCP SDU size [Octets]	**FDD CC**	1341 for 20MHz CC, 1142 for 15MHz CC	1142	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1141 for 10MHz CC	1341 for 20MHz CC, 1142 for 15MHz CC
	TDD CC	1341	1341	1341	1341	1341	1341

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is

CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to Table 8.7.5.1.3.5-1 depending on the UE category according to Table 8.7.5.1.3.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.5-1 and Table 8.7.5.1.3.5-1 depending on the UE category according to Table 8.7.5.1.3.5-2.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.5.1.3.4.3.

8.7.5.1.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.5.1.3.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.5.1.3.4.3-3A.
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. The SS looks up TB_{size} in Table 8.7.5.1.3.4.1-1 and Table 8.7.5.1.3.4.1-2 for the tests to be performed depending on the UE category according to Table 8.7.5.1.3.5-2.
6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.5.1.3.4.1-1 and Table 8.7.5.1.3.4.1-2 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as A = 100%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx}). Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as B = N_{DL_PDCP} - N_{UL_PDCP}

13. The UE passes the test if A ≥ "corresponding TB success rate according to Table 8.7.5.1.3.5-1" and B = 0.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.5.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.5.1.3.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.5.1.3.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.5.1.3.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.1.3.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.1.3.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	Ssp4		
}			

8.7.5.1.3.5 Test requirement

The requirements are specified in Table 8.7.5.1.3.5-1 depending on the UE category according to Table 8.7.5.1.3.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.1.3.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
4	3x20	20	2x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
5	15+20+20	15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
7	3x20	2x20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
8	20+20+15	20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
10	4x20	20	3x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
13	2×15+2x20	2×15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
14	3x20+15	2×20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
15	2×15+2x20	2x15+20	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
15A	3x20+10	2x20+10	20	75376 for 20MHz CC 36696 for 10MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 TDD	85
15B	2x15+2x20	2x15+20	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

Table 8.7.5.1.3.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12	DL Cat. 15
	Total	FDD CC	TDD CC					DL Cat. 6, 7	DL Cat. 9, 10	DL Cat. 11, 12	
CA with 4CCs	4x20	20	3x20	-	-	-	-	-	4	10	10
	4x20	2×20	2×20	-	-	-	-	-	4 or 7	11	11
	3x20+15	20+15	2×20	-	-	-	-	-	4	12	12
	2×15+2x20	2×15	2x20	-	-	-	-	-	5	13	13
	3x20+15	2×20+15	20	-	-	-	-	-	7	14	14
	2×15+2x20	2x15+20	20	-	-	-	-	-	8	15	15
	3x20+10	2x20+10	20	-	-	-	-	-	7	15A	15A
	2x15+2x20	2x15+20	20	-	-	-	-	-	8	15B	15B

Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.
Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate.
Note 3: Test 4, Test 5, Test 7, and Test 8 are tested in 8.7.5.1.2.

8.7.5.1.4 TDD FDD CA Sustained data rate performance for FDD PCell (5DL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- UL RMC for 5-DL CA in loopback mode needs to be further investigated

8.7.5.1.4.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.5.1.4.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE DL category 15 that support E-UTRA FDD and TDD, 5DL TDD-FDD CA with FDD as PCell and not support 256QAM in DL.

8.7.5.1.4.3 Minimum requirements

For UE not supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.1.4.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.1.4.3-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.1.4.3-1: test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
16	4x20+15	2x20+15	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
17	2x15+3x20	2x15+20	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

Table 8.7.5.1.4.3-2: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12	DL Cat. 15
	Total	FDD CC	TDD CC					DL Cat. 6, 7	DL Cat. 9, 10	DL Cat. 11, 12	
CA with 5 CCs	4x20+15	2x20+15	2x20	-	-	-	-	-	-	11	16
	2x15+3x20	2x15+20	2x20	-	-	-	-	-	-	12	17
Note 1: Void. Note 2: Void. Note 3: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.											

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.1

8.7.5.1.4.4 Test description

8.7.5.1.4.4.1 Initial conditions

Table 8.7.5.1.4.4.1-1: Further test parameters per test

Test number		11	12	16	17
Bandwidth	**FDD CC**	2x20	20+15	2x20+15	2x15+20
	TDD CC	2x20	2x20	2x20	2x20
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	R.1-4 FDD	R.1-4 FDD for 20MHz CC	R.1-4 FDD for 20MHz CC	R.1-4 FDD for 20MHz CC
	TDD CC	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	75376	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 55056 for 15MHz CC
	TDD CC	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 6 for 15MHz CC
	TDD CC	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 240)/48) for 15MHz CC
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
PDCP SDU size [Octets]	**FDD CC**	1341	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1142 for 15MHz CC
	TDD CC	1341	1341	1341	1341

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to Table 8.7.5.1.4.5-1 depending on the UE category according to Table 8.7.5.1.4.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.5-1 and Table 8.7.5.1.4.5-1 depending on the UE category according to Table 8.7.5.1.4.5-2.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.5.1.4.4.3.

8.7.5.1.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.5.1.4.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.5.1.4.4.3-3A.
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. The SS looks up TB_{size} in Table 8.7.5.1.4.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.5.1.4.5-2.
6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.5.1.4.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.5.1.4.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.5.1.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.5.1.4.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.5.1.4.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.5.1.4.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.1.4.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.1.4.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

8.7.5.1.4.5 Test requirement

The requirements are specified in Table 8.7.5.1.4.5-1 depending on the UE category according to Table 8.7.5.1.4.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.1.4.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
16	4x20+15	2x20+15	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
17	2x15+3x20	2x15+20	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

Table 8.7.5.1.4.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12	DL Cat. 15
	Total	FDD CC	TDD CC					DL Cat. 6, 7	DL Cat. 9, 10	DL Cat. 11, 12	
CA with 5 CCs	4x20+15	2x20+15	2x20	-	-	-	-	-	-	11	16
	2x15+3x20	2x15+20	2x20	-	-	-	-	-	-	12	17
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate. Note 3: Test 11 and 12 are tested in clause 8.7.5.1.3											

8.7.5.1_H TDD FDD CA Sustained data rate performance for FDD PCell for 256QAM in DL

Editor's notes:

- Discussion on DL EVM for 256QAM demodulation test as per R5-155895 is still ongoing

- Whether UL modulation mode QPSK is suitable to use is FFS

8.7.5.1_H.1 TDD FDD CA Sustained data rate performance for FDD PCell (2DL CA) for 256QAM in DL

8.7.5.1_H.1.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.5.1_H.1.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE DL category 11, 12 and 13 that support 256QAM in DL and support E-UTRA FDD and TDD, 2DL TDD-FDD CA with FDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.1_H.1.3 Minimum requirements

For UE supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.1_H.1.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category or UE DL category, and bandwidth combination with the maximum aggregated bandwidth as specified in Table 8.7.5.1_H.1.3-2. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.5.1.1.3-1 is not applicable.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.1_H.1.3-1: Minimum requirement (TDD FDD CA 256QAM)

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	R.68 FDD	R.68 TDD	85
2	10+20	10	20	R.68-2 FDD	R.68 TDD	85
3	15+20	15	20	R.68-1 FDD	R.68 TDD	85

Table 8.7.5.1_H.1.3-2: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13				
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 2CCs	2x20	20	20	1	1				
	10+20	10	20	2	2				
	15+20	15	20	3	3				
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.1

8.7.5.1_H.1.4 Test description

Same test description as in clause 8.7.5.1.1.4 with the following exceptions:

- Instead of Table 8.7.5.1.1.4.1-1 -> use Table 8.7.5.1_H.1.4-1.
- Instead of Table 8.7.5.1.1.5-1 -> use Table 8.7.5.1_H.1.5-1.
- Instead of Table 8.7.5.1.1.5-2 -> use Table 8.7.5.1_H.1.5-2.

Table 8.7.5.1_H.1.4-1: Further test parameters per test

Test number		1	2	3
Bandwidth	FDD CC	20	10	15
	TDD CC	20	20	20
DL Measurement channel	FDD CC	R.68 FDD	R.68-2 FDD	R.68-1 FDD
	TDD CC	R.68 FDD	R.68 FDD	R.68 FDD
UL channel	FDD CC	R.1-4 FDD	R.1-1 FDD	R.1-4B FDD
	TDD CC	NA	NA	NA
TBsize per Codeword	FDD CC	97896(Note 3)	48936(Note 5)	75376(Note 4)
	TDD CC	97896/0(Note 6)	97896/0(Note 6)	97896/0(Note 6)
Number of PDCP SDU per Codeword	FDD CC	10	5	7
	TDD CC	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	FDD CC	FLOOR((TB_{size} - 352)/80)	FLOOR((TBsize – 208)/40)	FLOOR((TBsize – 264)/56)
	TDD CC	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)
PDCP SDU size [Octets]	FDD CC	1219	1218	1341
	TDD CC	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16-8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

8.7.5.1_H.1.5 Test requirement

The requirements are specified in Table 8.7.5.1_H.1.5-1 depending on the UE category according to Table 8.7.5.1_H.1.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.1_H.1.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	R.68 FDD	R.68 TDD	85
2	10+20	10	20	R.68-2 FDD	R.68 TDD	85
3	15+20	15	20	R.68-1 FDD	R.68 TDD	[85]

Table 8.7.5.1_H.1.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13				
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 2CCs	2x20	20	20	1	1				
	10+20	10	20	2	2				
	15+20	15	20	3	3				
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.									
Note 2: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

8.7.5.1_H.2 TDD FDD CA Sustained data rate performance for FDD PCell (3DL CA) for 256QAM in DL

8.7.5.1_H.2.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.5.1_H.2.2 Test applicability

This test applies to Release 12 and forward of UE DL category 11, 12 and 15 UE that support 256QAM in DL and E-UTRA FDD and TDD, 3DL TDD-FDD CA with FDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.1_H.2.3 Minimum requirements

For UE supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.1_H.2.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category or UE DL category, and bandwidth combination with the maximum aggregated bandwidth as specified in Table 8.7.5.1_H.2.3-2. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.5.1.2.3-1 is not applicable.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.1_H.2.3-1: Minimum requirement (TDD FDD CA 256QAM)

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	R.68 FDD	R.68 TDD	85
2	10+20	10	20	R.68-2 FDD	R.68 TDD	85
3	15+20	15	20	R.68-1 FDD	R.68 TDD	85
4	3x20	20	2x20	R.68 FDD	R.68 TDD	85
5	15+20+20	15	2x20	R.68-1 FDD	R.68 TDD	85
6	10+20+20	10	2x20	R.68-2 FDD	R.68TDD	85
7	3x20	2x20	20	R.68 FDD	R.68 TDD	85
8	20+20+15	20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
9	20+20+10	20+10	20	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 TDD	85
9A	20+10+10	2x10	20	R.68-2 FDD	R.68 TDD	85

Table 8.7.5.1_H.2.3-2: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16		
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 3CCs	3x20	20	2x20	4	1	4	-		
	15+20+20	15	2x20	5	3	5	-		
	10+20+20	10	2x20	6	2	6	-		
	3x20	2x20	20	7	1	7	-		
	20+20+15	20+15	20	8	1	8	-		
	20+20+10	20+10	20	9	1	9	-		
	20+10+10	2x10	20	9A	2	9A			
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.1

8.7.5.1_H.2.4 Test description

Same test description as in clause 8.7.5.1.2.4 with the following exceptions:

- Instead of Table 8.7.5.1.2.4.1-1 -> use Table 8.7.5.1_H.2.4-1 and Table 8.7.5.1_H.2.4-2.
- Instead of Table 8.7.5.1.2.5-1 -> use Table 8.7.5.1_H.2.5-1.
- Instead of Table 8.7.5.1.2.5-2 -> use Table 8.7.5.1_H.2.5-2.

Table 8.7.5.1_H.2.4-1: Further test parameters per test (Test number #1 - #5)

Test number		1	2	3	4	5
Bandwidth	**FDD CC**	20	10	15	20	15
	TDD CC	20	20	20	2x20	2x20
DL Measurement channel	**FDD CC**	R.68 FDD	R.68-2 FDD	R.68-1 FDD	R.68 FDD	R.68-1 FDD
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	R.1-4 FDD	R.1-1 FDD	R.1-4B FDD	R.1-4 FDD	R.1-4B FDD
	TDD CC	NA	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	97896(Note 3)	48936(Note 5)	75376(Note 4)	97896(Note 3)	75376(Note 4)
	TDD CC	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	10	5	7	10	7
	TDD CC	10/0	10/0	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB_{size} - 352)/80)	FLOOR((TBsize – 208)/40)	FLOOR((TBsize – 264)/56)	FLOOR((TB_{size} - 352)/80)	FLOOR((TBsize – 264)/56)
	TDD CC	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1219	1218	1341	1219	1341
	TDD CC	1219/0	1219/0	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

Table 8.7.5.1_H.2.4-2: Further test parameters per test (Test number #6 - #9A)

Test number		6	7	8	9	9A
Bandwidth	**FDD CC**	10	2x20	20+15	20+10	2x10
	TDD CC	2x20	20	20	20	20
DL Measurement channel	**FDD CC**	R.68-2 FDD	R.68 FDD	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68-2 FDD
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	R.1-1 FDD	R.1-4 FDD	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4 FDD for 20MHz CC, R.1-1 FDD for 10MHz CC	R.1-1 FDD
	TDD CC	NA	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	48936(Note 5)	97896(Note 3)	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3) for 20MHz CC, 48936(Note 5) for 10MHz CC	48936(Note 5)
	TDD CC	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	5	10	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 5 for 10MHz CC	5
	TDD CC	10/0	10/0	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 208)/40)	FLOOR((TB$_{size}$ - 352)/80)	FLOOR((TB$_{size}$ - 352)/80) for 20MHz CC, FLOOR((TBsize – 264)/56) for 15MHz CC	FLOOR((TB$_{size}$ - 352)/80) for 20MHz CC, FLOOR((TBsize – 208)/40) for 10MHz CC	FLOOR((TBsize – 208)/40)
	TDD CC	FLOOR((TB$_{size}$ - 352)/80)	FLOOR((TB$_{size}$ - 352)/80)	FLOOR((TB$_{size}$ - 352)/80)	FLOOR((TB$_{size}$ - 352)/80)	FLOOR((TB$_{size}$ - 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1218	1219	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1218 for 10MHz CC	1218
	TDD CC	1219/0	1219/0	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

8.7.5.1_H.2.5 Test requirement

The requirements are specified in Table 8.7.5.1_H.2.5-1 depending on the UE category according to Table 8.7.5.1_H.2.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.1_H.2.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	R.68 FDD	R.68 TDD	85
2	10+20	10	20	R.68-2 FDD	R.68 TDD	85
3	15+20	15	20	R.68-1 FDD	R.68 TDD	85
4	3x20	20	2x20	R.68 FDD	R.68 TDD	85
5	15+20+20	15	2x20	R.68-1 FDD	R.68 TDD	85
6	10+20+20	10	2x20	R.68-2 FDD	R.68TDD	85
7	3x20	2x20	20	R.68 FDD	R.68 TDD	85
8	20+20+15	20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
9	20+20+10	20+10	20	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 TDD	85
9A	20+10+10	2x10	20	R.68-2 FDD	R.68 TDD	85

Table 8.7.5.1_H.2.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16		
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 3CCs	3x20	20	2x20	4	1	4	-		
	15+20+20	15	2x20	5	3	5	-		
	10+20+20	10	2x20	6	2	6	-		
	3x20	2x20	20	7	1	7	-		
	20+20+15	20+15	20	8	1	8	-		
	20+20+10	20+10	20	9	1	9	-		
	20+10+10	2x10	20	9A	2	9A			
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate. Note 3: Test 1, 2, and 3 are tested in 8.7.5.1_H.1.									

8.7.5.1_H.3 TDD FDD CA Sustained data rate performance for FDD PCell (4DL CA) for 256QAM in DL

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test tolerances are undefined.

- UL RMC for 4-DL CA or 5-DL CA in loopback mode needs to be further investigated

8.7.5.1_H.3.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.5.1_H.3.2 Test applicability

This test applies to Release 12 and forward of UE DL category 15 and 16 that support 256QAM in DL and E-UTRA FDD and TDD, 4DL TDD-FDD CA with FDD as PCell.

8.7.5.1_H.3.3 Minimum requirements

For UE supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.1_H.3.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category or UE DL category, and bandwidth combination with the maximum aggregated bandwidth as specified in Table 8.7.5.1_H.3.3-2. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.5.1.3.3-1 is not applicable.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.1_H.3.3-1: Minimum requirement (TDD FDD CA 256QAM)

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
4	3x20	20	2x20	R.68 FDD	R.68 TDD	85
5	15+20+20	15	2x20	R.68-1 FDD	R.68 TDD	85
7	3x20	2x20	20	R.68 FDD	R.68 TDD	85
8	20+20+15	20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
10	4x20	20	3x20	R.68-2 FDD	R.68TDD	85
11	4x20	2×20	2×20	R.68 FDD	R.68 TDD	85
12	3x20+15	20+15	2×20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
13	2×15+2x20	2×15	2x20	R.68-1 FDD	R.68 TDD	85
14	3x20+15	2×20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15	2×15+2x20	2x15+20	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15A	3x20+10	2x20+10	20	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 TDD	85

Table 8.7.5.1_H.3.3-2: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16		
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 4CCs	4x20	20	3x20	4	-	10	10		
	4x20	2×20	2×20	4 or 7	-	11	11		
	3x20+15	20+15	2×20	8	-	12	12		
	2×15+2x20	2×15	2x20	5	-	13	13		
	3x20+15	2×20+15	20	7	-	14	14		
	2×15+2x20	2x15+20	20	8	-	15	15		
	3x20+10	2x20+10	20	7	-	15A	15A		
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.1

8.7.5.1_H.3.4 Test description

Same test description as in clause 8.7.5.1.3.4 with the following exceptions:

- Instead of Table 8.7.5.1.3.4.1-1 -> use Table 8.7.5.1_H.3.4-1 and Table 8.7.5.1_H.3.4-2.
- Instead of Table 8.7.5.1.3.5-1 -> use Table 8.7.5.1_H.3.5-1.
- Instead of Table 8.7.5.1.3.5-2 -> use Table 8.7.5.1_H.3.5-2.

Table 8.7.5.1_H.3.4-1: Further test parameters per test (Test number #4 - #10)

Test number		4	5	7	8	10
Bandwidth	**FDD CC**	20	15	2x20	20+15	20
	TDD CC	2x20	2x20	20	20	3x20
DL Measurement channel	**FDD CC**	R.68 FDD	R.68-1 FDD	R.68 FDD	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	R.1-4 FDD	R.1-4B FDD	R.1-4 FDD	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4 FDD
	TDD CC	NA	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	97896(Note 3)	75376(Note 4)	97896(Note 3)	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3)
	TDD CC	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	10	7	10	10 for 20MHz CC, 7 for 15MHz CC	10
	TDD CC	10/0	10/0	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB_{size} - 352)/80)	FLOOR((TBsize – 264)/56)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TBsize – 264)/56) for 15MHz CC	FLOOR((TB_{size} - 352)/80)
	TDD CC	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1219	1341	1219	1219 for 20MHz CC, 1341 for 15MHz CC	1219
	TDD CC	1219/0	1219/0	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

Table 8.7.5.1_H.3.4-2: Further test parameters per test (Test number #11 - #15A)

Test number		11	12	13	14	15	15A
Bandwidth	**FDD CC**	2x20	20+15	2x15	2x20+15	2x15+20	2x20+10
	TDD CC	2x20	2x20	2x20	20	20	20
DL Measurement channel	**FDD CC**	R.68 FDD	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68-1 FDD	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	R.1-4 FDD	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4B FDD	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4 FDD for 20MHz CC, R.1-4B FDD for 15MHz CC	R.1-4 FDD for 20MHz CC, R.1-1 FDD for 10MHz CC
	TDD CC	NA	NA	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	97896(Note 3)	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	75376(Note 4)	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3) for 20MHz CC, 48936(Note 5) for 10MHz CC
	TDD CC	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	10	10 for 20MHz CC, 7 for 15MHz CC	7	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 5 for 10MHz CC
	TDD CC	10/0	10/0	10/0	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB_{size} – 352)/80)	FLOOR((TB_{size} – 352)/80) for 20MHz CC, FLOOR((Tbsize – 264)/56) for 15MHz CC	FLOOR((Tbsize – 264)/56)	FLOOR((TB_{size} – 352)/80) for 20MHz CC, FLOOR((Tbsize – 264)/56) for 15MHz CC	FLOOR((TB_{size} – 352)/80) for 20MHz CC, FLOOR((Tbsize – 264)/56) for 15MHz CC	FLOOR((TB_{size} – 352)/80) for 20MHz CC, FLOOR((Tbsize – 208)/40) for 10MHz CC
	TDD CC	FLOOR((TB_{size} – 352)/80)	FLOOR((TB_{size} – 352)/80)	FLOOR((TB_{size} – 352)/80)	FLOOR((TB_{size} – 352)/80)	FLOOR((TB_{size} – 352)/80)	FLOOR((TB_{size} – 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1219	1219 for 20MHz CC, 1341 for 15MHz CC	1341	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1218 for 10MHz CC
	TDD CC	1219/0	1219/0	1219/0	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (Tbsize – N*PDCP header size – AMD PDU header size - MAC header size – Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((Tbsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

8.7.5.1_H.3.5 Test requirement

The requirements are specified in Table 8.7.5.1_H.3.5-1 depending on the UE category according to Table 8.7.5.1_H.3.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.1_H.3.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
4	3x20	20	2x20	R.68 FDD	R.68 TDD	85
5	15+20+20	15	2x20	R.68-1 FDD	R.68 TDD	85
7	3x20	2x20	20	R.68 FDD	R.68 TDD	85
8	20+20+15	20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
10	4x20	20	3x20	R.68-2 FDD	R.68TDD	85
11	4x20	2×20	2×20	R.68 FDD	R.68 TDD	85
12	3x20+15	20+15	2×20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
13	2×15+2x20	2×15	2x20	R.68-1 FDD	R.68 TDD	85
14	3x20+15	2×20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15	2×15+2x20	2x15+20	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15A	3x20+10	2×20+10	20	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 TDD	85

Table 8.7.5.1_H.3.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16		
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 4CCs	4x20	20	3x20	4	-	10	10		
	4x20	2×20	2×20	4 or 7	-	11	11		
	3x20+15	20+15	2×20	8	-	12	12		
	2×15+2x20	2×15	2x20	5	-	13	13		
	3x20+15	2×20+15	20	7	-	14	14		
	2×15+2x20	2x15+20	20	8	-	15	15		
	3x20+10	2x20+10	20	7	-	15A	15A		
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate. Note 3: Test 4, 5, 7, and 8 are tested in 8.7.5.1_H.2.									

8.7.5.1_H.4 TDD FDD CA Sustained data rate performance for FDD PCell (5DL CA) for 256QAM in DL

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test tolerances are undefined.

- UL RMC for 4-DL CA or 5-DL CA in loopback mode needs to be further investigated

8.7.5.1_H.4.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.5.1_H.4.2 Test applicability

This test applies to Release 12 and forward of UE DL category 16 that support 256QAM in DL and E-UTRA FDD and TDD, 5DL TDD-FDD CA with FDD as PCell.

8.7.5.1_H.4.3 Minimum requirements

For UE supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.1_H.4.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category or UE DL category, and bandwidth combination with the maximum aggregated bandwidth as specified in Table 8.7.5.1_H.4.3-2. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirement in Table 8.7.5.1.4.3-1 is not applicable.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.1_H.4.3-1: Minimum requirement (TDD FDD CA 256QAM)

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
12	3x20+15	20+15	2x20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
14	3x20+15	2x20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15	2x15+2x20	2x15+20	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
16	4x20+15	2x20+15	2x20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
17	2x15+3x20	2x15+20	2x20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85

Table 8.7.5.1_H.4.3-2: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16		
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 5CCs	4x20+15	2x20+15	2x20	-	-	14 or 12	16		
	2x15+3x20	2x15+20	2x20	-	-	15 or 12	17		
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.1

8.7.5.1_H.4.4 Test description

Same test description as in clause 8.7.5.1.4.4 with the following exceptions:

- Instead of Table 8.7.5.1.4.4.1-1 -> use Table 8.7.5.1_H.4.4-1.
- Instead of Table 8.7.5.1.4.5-1 -> use Table 8.7.5.1_H.4.5-1.
- Instead of Table 8.7.5.1.4.5-2 -> use Table 8.7.5.1_H.4.5-2.

Table 8.7.5.1_H.4.4-1: Further test parameters per test

Test number		12	14	15	16	17
Bandwidth	**FDD CC**	20+15	2x20+15	2x15+20	2x20+15	2x15+20
	TDD CC	2x20	20	20	2x20	2x20
DL Measurement channel	**FDD CC**	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	R.1-4 FDD for 20MHz CC	R.1-4 FDD for 20MHz CC	R.1-4 FDD for 20MHz CC	R.1-4 FDD for 20MHz CC	R.1-4 FDD for 20MHz CC
	TDD CC	NA	NA	NA	NA	NA
TBsize per Codeword	**FDD CC**	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC
	TDD CC	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 7 for 15MHz CC
	TDD CC	10/0	10/0	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TBsize – 264)/56) for 15MHz CC	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TBsize – 264)/56) for 15MHz CC	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TBsize – 264)/56) for 15MHz CC	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TBsize – 264)/56) for 15MHz CC	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TBsize – 264)/56) for 15MHz CC
	TDD CC	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1341 for 15MHz CC
	TDD CC	1219/0	1219/0	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

8.7.5.1_H.4.5 Test requirement

The requirements are specified in Table 8.7.5.1_H.4.5-1 depending on the UE category according to Table 8.7.5.1_H.4.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.1_H.4.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
16	4x20+15	2x20+15	2x20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
17	2x15+3x20	2x15+20	2x20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85

Table 8.7.5.1_H.4.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16		
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 5CCs	4x20+15	2x20+15	2x20	-	-	14 or 12	16		
	2x15+3x20	2x15+20	2x20	-	-	15 or 12	17		
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: The test point is selected according to the UE DL Category. Note 3: Test 12, 14, and 15 are tested in clause 8.7.5.1_H.3.									

8.7.5.2 TDD FDD CA Sustained data rate performance for TDD PCell

8.7.5.2.1 TDD FDD CA Sustained data rate performance for TDD PCell (2DL CA)

8.7.5.2.1.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.5.2.1.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE category 3, 4, 6, 7, 9 and 10 and UE DL category 6, 7, 9 and 10 that support E-UTRA FDD and TDD, 2DL TDD-FDD CA with TDD as PCell and not support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.2.1.3 Minimum requirements

For UE not supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.2.1.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.2.1.3-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.2.1.3-1: test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
2	10+20	10	20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
2A	15+20	15	20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
3	10+10	10	10	36696	36696/0	R.31-3A FDD	R.31-6 TDD	85

Table 8.7.5.2.1.3-2: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12
	Total	FDD CC	TDD CC					DL Cat. 6,7	DL Cat. 9, 10	DL Cat. 11, 12
CA with 2CCs	2x20	20	20	-	-	3	3	1	1	-
	10+20	10	20	-	-	3	3	2	2	-
	15+20	15	20	-	-	3	3	2A	2A	-
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled. Note 2: Void										

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.2

8.7.5.2.1.4 Test description

8.7.5.2.1.4.1 Initial conditions

Table 8.7.5.2.1.4.1-1: Further test parameters per test

Test number		1	2	2A	3
Bandwidth	**FDD CC**	20	10	15	10
	TDD CC	20	20	20	10
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-3A FDD	R.31-5 FDD	R.31-3A FDD
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-6 TDD
UL channel	**FDD CC**	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-5 TDD
TBsize per Codeword	**FDD CC**	75376	36696	55056	36696
	TDD CC	75376/0	75376/0	75376/0	36696/0
Number of PDCP SDU per Codeword	**FDD CC**	7	4	6	4
	TDD CC	7	7	7	4
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56)	FLOOR((TB$_{size}$ – 184)/32)	FLOOR((TB$_{size}$ – 240)/48)	FLOOR((TB$_{size}$ – 184)/32)
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TB$_{size}$ – 184)/32)
PDCP SDU size [Octets]	**FDD CC**	1341	1141	1142	1141
	TDD CC	1341	1341	1341	1141

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives:
PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to Table 8.7.5.2.1.5-1 depending on the UE category according to Table 8.7.5.2.1.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

).

2. The parameter settings for the cell are set up according to Table 8.7.5-1 and Table 8.7.5.2.1.5-1 depending on the UE category according to Table 8.7.5.2.1.5-2.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.5.2.1.4.3.

8.7.5.2.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4 with SCC configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.5.2.1.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.5.2.1.4.3-3A.

3. The SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. The SS looks up TB_{size} in Table 8.7.5.2.1.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.5.2.1.5-2.

6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.5.2.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.5.2.1.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.5.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.5.2.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.5.2.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.5.2.1.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.2.1.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.2.1.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	Ssp4		
}			

8.7.5.2.1.5 Test requirement

The requirements are specified in Table 8.7.5.2.1.5-1 depending on the UE category according to Table 8.7.5.2.1.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.2.1.5-1: Test requirements per test

Test number	**Bandwidth (MHz)**			**Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)**		**Measurement channel**		**Reference value**
	Total	**FDD CC**	**TDD CC**	**FDD CC**	**TDD CC**	**FDD CC**	**TDD CC**	**TB success rate [%]**
1	2x20	20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
2	10+20	10	20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
2A	15+20	15	20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
3	10+10	10	10	36696	36696/0	R.31-3A FDD	R.31-6 TDD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 2: The TB success rate is defined as TB success rate = 100%*NDL_correct_rx/ (NDL_newtx + NDL_retx), where NDL_newtx is the number of newly transmitted DL transport blocks, NDL_retx is the number of retransmitted DL transport blocks, and NDL_correct_rx is the number of correctly received DL transport blocks.

Table 8.7.5.2.1.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12
								DL Cat. 6,7	DL Cat. 9, 10	DL Cat. 11, 12
	Total	FDD CC	TDD CC							
CA with 2CCs	2x20	20	20	-	-	3	3	1	1	-
	10+20	10	20	-	-	3	3	2	2	-
	15+20	15	20	-	-	3	3	2A	2A	-
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate.										

8.7.5.2.2 TDD FDD CA Sustained data rate performance for TDD PCell (3DL CA)

8.7.5.2.2.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.5.2.2.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE category 9, 10, 11 and 12, and UE DL category 9, 10,11 and 12 that support E-UTRA FDD and TDD, 3DL TDD-FDD CA with TDD as PCell and not support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.2.2.3 Minimum requirements

For UE not supporting 256QAM, the requirements for TDD FDD CA with TDD PCell are specified in Table 8.7.5.2-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.2-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.2-1: test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
2	10+20	10	20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
2A	15+20	15	20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
3	10+10	10	10	36696	36696/0	R.31-3A FDD	R.31-6 TDD	85
4	3x20	20	2x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
5	15+20+20	15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
6	10+20+20	10	2x20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
7	3x20	2x20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
8	20+20+15	20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
9	20+20+10	20+10	20	75376 for 20MHz CC 36696 for 10MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 TDD	85
9A	20+10+10	2x10	20	36696	75376/0	R.31-3A	R.31-4 TDD	85

Table 8.7.5.2-2: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12
	Total	FDD CC	TDD CC					DL Cat. 6,7	DL Cat. 9, 10	DL Cat. 11, 12
CA with 3CCs	3x20	20	2x20	-	-	-	-	1	4	4
	15+20+20	15	2x20	-	-	-	-	2A	5	5
	10+20+20	10	2x20	-	-	-	-	2	6	6
	3x20	2x20	20	-	-	-	-	1	7	7
	20+20+15	20+15	20	-	-	-	-	1	8	8
	20+20+10	20+10	20	-	-	-	-	1	9	9
	20+10+10	2x10	20	-	-	-	-	2	9A	9A
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.										
Note 2: Void.										

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.2

8.7.5.2.2.4 Test description

8.7.5.2.2.4.1 Initial conditions

Table 8.7.5.2.2.4.1-1: Further test parameters per test (Test number #1 - #6)

Test number		1	2	2A	4	5	6
Bandwidth	**FDD CC**	20	10	15	20	15	10
	TDD CC	20	20	20	2x20	2x20	2x20
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-3A FDD	R.31-5 FDD	R.31-4 FDD	R.31-5 FDD	R.31-3A FDD
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	NA	NA	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	75376	36696	55056	75376	55056	36696
	TDD CC	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7	4	6	7	6	4
	TDD CC	7	7	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56)	FLOOR((TB$_{size}$ – 184)/32)	FLOOR((TB$_{size}$ – 240)/48)	FLOOR((TBsize – 264)/56)	FLOOR((TB$_{size}$ – 240)/48)	FLOOR((TB$_{size}$ – 184)/32)
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
PDCP SDU size [Octets]	**FDD CC**	1341	1141	1142	1341	1142	1141
	TDD CC	1341	1341	1341	1341	1341	1341

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives:
PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Table 8.7.5.2.2.4.1-2: Further test parameters per test (Test number #7 - #9A)

Test number		7	8	9	9A
Bandwidth	**FDD CC**	2x20	20+15	20+10	2x10
	TDD CC	20	20	20	20
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-3A
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	75376	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 36696 for 10MHz CC	36696
	TDD CC	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 4 for 10MHz CC	7
	TDD CC	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB_{size} – 264)/56)	FLOOR((TB_{size} – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 240)/48) for 15MHz CC	FLOOR((TB_{size} – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 184)/32) for 10MHz CC	FLOOR((TB_{size} – 184)/32)
	TDD CC	FLOOR((TB_{size} – 264)/56)	FLOOR((TB_{size} – 264)/56)	FLOOR((TB_{size} – 264)/56)	FLOOR((TB_{size} – 264)/56)
PDCP SDU size [Octets]	**FDD CC**	1341	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1141 for 10MHz CC	1141
	TDD CC	1341	1341	1341	1341

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits).
This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to Table 8.7.5.2.2.5-1 depending on the UE category according to Table 8.7.5.2.2.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.5-1 and Table 8.7.5.2.2.5-1 depending on the UE category according to Table 8.7.5.2.2.5-2.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.5.2.2.4.3.

8.7.5.2.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.5.2.2.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.5.2.2.4.3-3A.

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. The SS looks up TB_{size} in Table 8.7.5.2.2.4.1-1 and Table 8.7.5.2.2.4.1-2 for the tests to be performed depending on the UE category according to Table 8.7.5.2.2.5-2.

6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.5.2.2.4.1-1 (Note 1) and Table 8.7.5.2.2.4.1-2 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.5.2.2.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.5.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.5.2.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.5.2.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.5.2.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.2.2.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.2.2.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	Ssp4		
}			

8.7.5.2.2.5 Test requirement

The requirements are specified in Table 8.7.5.2.2.5-1 depending on the UE category according to Table 8.7.5.2.2.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.2.2.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
4	3x20	20	2x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
5	15+20+20	15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
6	10+20+20	10	2x20	36696	75376/0	R.31-3A FDD	R.31-4 TDD	85
7	3x20	2x20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
8	20+20+15	20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
9	20+20+10	20+10	20	75376 for 20MHz CC 36696 for 10MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 TDD	85
9A	20+10+10	2x10	20	36696	75376/0	R.31-3A	R.31-4 TDD	85

Table 8.7.5.2.2.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12
	Total	FDD CC	TDD CC					DL Cat. 6,7	DL Cat. 9, 10	DL Cat. 11, 12
CA with 3CCs	3x20	20	2x20	-	-	-	-	1	4	4
	15+20+20	15	2x20	-	-	-	-	2A	5	5
	10+20+20	10	2x20	-	-	-	-	2	6	6
	3x20	2x20	20	-	-	-	-	1	7	7
	20+20+15	20+15	20	-	-	-	-	1	8	8
	20+20+10	20+10	20	-	-	-	-	1	9	9
	20+10+10	2x10	20	-	-	-	-	2	9A	9A
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate. Note 3: Test 1, 2, and 2A are tested in clause 8.7.5.2.1.										

8.7.5.2.3 TDD FDD CA Sustained data rate performance for TDD PCell (4DL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- UL RMC for 4-DL CA or 5-DL CA in loopback mode needs to be further investigated

8.7.5.2.3.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.5.2.3.2 Test applicability

This test applies to all types of UE Release 13 and forward of UE category 11 and 12, and UE DL category 11, 12 and 15 that support E-UTRA FDD and TDD, 4DL TDD-FDD CA with TDD as PCell and not support 256QAM in DL.

8.7.5.2.3.3 Minimum requirements

For UE not supporting 256QAM, the requirements for TDD FDD CA with TDD PCell are specified in Table 8.7.5.2.3.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.2.3.3-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.2.3.3-1: test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
4	3x20	20	2x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
5	15+20+20	15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
7	3x20	2x20	20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
8	20+20+15	20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
10	4x20	20	3x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
13	2×15+2x20	2×15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
14	3x20+15	2×20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
15	2×15+2x20	2x15+20	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
15A	3x20+10	2x20+10	20	75376 for 20MHz CC 36696 for 10MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 TDD	85
15B	2x15+2x20	2x15+20	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

Table 8.7.5.2.3.3-2: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12	DL Cat. 15
	Total	FDD CC	TDD CC					DL Cat. 6, 7	DL Cat. 9, 10	DL Cat. 11, 12	
CA with 4CCs	4x20	20	3x20	-	-	-	-	-	4	10	10
	4x20	2×20	2×20	-	-	-	-	-	4 or 7	11	11
	3x20+15	20+15	2×20	-	-	-	-	-	4	12	12
	2×15+2x20	2×15	2x20	-	-	-	-	-	5	13	13
	3x20+15	2×20+15	20	-	-	-	-	-	7	14	14
	2×15+2x20	2x15+20	20	-	-	-	-	-	8	15	15
	3x20+10	2x20+10	20	-	-	-	-	-	7	15A	15A
	2x15+2x20	2x15+20	20	-	-	-	-	-	8	15B	15B
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.											

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.2

8.7.5.2.3.4 Test description

8.7.5.2.3.4.1 Initial conditions

Table 8.7.5.2.3.4.1-1: Further test parameters per test (Test number #4 - #11)

Test number		4	5	7	8	10	11
Bandwidth	**FDD CC**	20	15	2x20	20+15	20	2x20
	TDD CC	2x20	2x20	20	20	3x20	2x20
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-5 FDD	R.31-4 FDD	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD	R.31-4 FDD
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	NA	NA	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	75376	55056	75376	75376 for 20MHz CC, 55056 for 15MHz CC	75376	75376
	TDD CC	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7	6	7	7 for 20MHz CC, 6 for 15MHz CC	7	7
	TDD CC	7	7	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56)	FLOOR((TB$_{size}$ – 240)/48)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
PDCP SDU size [Octets]	**FDD CC**	1341	1142	1341	1341 for 20MHz CC, 1142 for 15MHz CC	1341	1341
	TDD CC	1341	1341	1341	1341	1341	1341

Note 1:	Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.
Note 2:	Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is: PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Table 8.7.5.2.3.4.1-2: Further test parameters per test (Test number #12 - #15B)

Test number		12	13	14	15	15A	15B
Bandwidth	**FDD CC**	20+15	2x15	2x20+15	2x15+20	2x20+10	2x15+20
	TDD CC	2x20	2x20	20	20	20	20
DL Measurement channel	**FDD CC**	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-5 FDD	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	NA	NA	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	75376 for 20MHz CC, 55056 for 15MHz CC	55056	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 36696 for 10MHz CC	75376 for 20MHz CC, 55056 for 15MHz CC
	TDD CC	75376/0	75376/0	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7 for 20MHz CC, 6 for 15MHz CC	6	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 4 for 10MHz CC	7 for 20MHz CC, 6 for 15MHz CC
	TDD CC	7	7	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 240)/48) for 15MHz CC	FLOOR((TB_{size} – 240)/48)	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 184)/32) for 10MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB_{size} – 240)/48) for 15MHz CC
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
PDCP SDU size [Octets]	**FDD CC**	1341 for 20MHz CC, 1142 for 15MHz CC	1142	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1141 for 10MHz CC	1341 for 20MHz CC, 1142 for 15MHz CC
	TDD CC	1341	1341	1341	1341	1341	1341

Note 1:	Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.
Note 2:	Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is: PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to Table 8.7.5.2.3.5-1 depending on the UE category according to Table 8.7.5.2.3.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.5-1 and Table 8.7.5.2.3.5-1 depending on the UE category according to Table 8.7.5.2.3.5-2.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.5.2.3.4.3.

8.7.5.2.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.5.2.3.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.5.2.3.4.3-3A.
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. The SS looks up TB_{size} in Table 8.7.5.2.3.4.1-1 and Table 8.7.5.2.3.4.1-2 for the tests to be performed depending on the UE category according to Table 8.7.5.2.3.5-2.
6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.5.2.3.4.1-1 and Table 8.7.5.2.3.4.1-2 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS

increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.5.2.3.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.5.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.5.2.3.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.5.2.3.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.5.2.3.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.2.3.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.2.3.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	Ssp4		
}			

8.7.5.2.3.5 Test requirement

The requirements are specified in Table 8.7.5.2.3.5-1 depending on the UE category according to Table 8.7.5.2.3.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.2.3.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
10	4x20	20	3x20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
13	2×15+2x20	2×15	2x20	55056	75376/0	R.31-5 FDD	R.31-4 TDD	85
14	3x20+15	2×20+15	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
15	2×15+2x20	2x15+20	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
15A	3x20+10	2x20+10	20	75376 for 20MHz CC 36696 for 10MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-3A FDD for 10MHz CC	R.31-4 TDD	85
15B	2x15+2x20	2x15+20	20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

Table 8.7.5.2.3.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12	DL Cat. 15
	Total	FDD CC	TDD CC					DL Cat. 6, 7	DL Cat. 9, 10	DL Cat. 11, 12	
CA with 4CCs	4x20	20	3x20	-	-	-	-	-	4	10	10
	4x20	2×20	2×20	-	-	-	-	-	4 or 7	11	11
	3x20+15	20+15	2×20	-	-	-	-	-	4	12	12
	2×15+2x20	2×15	2x20	-	-	-	-	-	5	13	13
	3x20+15	2×20+15	20	-	-	-	-	-	7	14	14
	2×15+2x20	2x15+20	20	-	-	-	-	-	8	15	15
	3x20+10	2x20+10	20	-	-	-	-	-	7	15A	15A
	2x15+2x20	2x15+20	20	-	-	-	-	-	8	15B	15B

Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.
Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate.
Note 3: Test 4, Test 5, Test 7 and Test 8 are tested in clause 8.7.5.2.2.

8.7.5.2_H TDD FDD CA Sustained data rate performance for TDD PCell for 256QAM in DL

Editor's notes:

- How to consider 3% Tx EVM for 256QAM demodulation test cases discussed in R5-155895 is FFS

- Whether UL modulation mode QPSK is suitable to use is FFS

8.7.5.2_H.1 TDD FDD CA Sustained data rate performance for TDD PCell (2DL CA) for 256QAM in DL

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Discussion on DL EVM for 256QAM demodulation test as per R5-155895 is still ongoing

8.7.5.2_H.1.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.5.2_H.1.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE DL category 11, 12 and 13 that support 256QAM in DL and E-UTRA FDD and TDD, 2DL TDD-FDD CA with TDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.2_H.1.3 Minimum requirements

For UE supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.2_H.1.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category or UE DL category, and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.2_H.1.3-2. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirements in Table 8.7.5.2.1.3-1 is not applicable.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.2_H.1.3-1-1: Minimum requirement (TDD FDD CA 256QAM)

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	R.68 FDD	R.68 TDD	85
2	10+20	10	20	R.68-2 FDD	R.68 TDD	85
3	15+20	15	20	R.68-1 FDD	R.68 TDD	85

Table 8.7.5.2_H.1.3-1-2: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13				
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 2CCs	2x20	20	20	1	1				
	10+20	10	20	2	2				
	15+20	15	20	3	3				
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.2

8.7.5.2_H.1.4 Test description

Same test description as in clause 8.7.5.2.1.4 with the following exceptions:

- Instead of Table 8.7.5.2.1.4.1-1 -> use Table 8.7.5.2_H.1.4-1.
- Instead of Table 8.7.5.2.1.5-1 -> use Table 8.7.5.2_H.1.5-1.
- Instead of Table 8.7.5.2.1.5-2 -> use Table 8.7.5.2_H.1.5-2.

Table 8.7.5.2_H.1.4-1: Further test parameters per test

Test number		1	2	3
Bandwidth	**FDD CC**	20	10	15
	TDD CC	20	20	20
DL Measurement channel	**FDD CC**	R.68 FDD	R.68-2 FDD	R.68-1 FDD
	TDD CC	R.68 FDD	R.68 FDD	R.68 FDD
UL channel	**FDD CC**	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	97896(Note 3)	48936(Note 5)	75376(Note 4)
	TDD CC	97896/0(Note 6)	97896/0(Note 6)	97896/0(Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	10	5	7
	TDD CC	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB$_{size}$ - 352)/80)	FLOOR((TBsize – 208)/40)	FLOOR((TBsize – 264)/56)
	TDD CC	FLOOR((TB$_{size}$ - 352)/80)	FLOOR((TB$_{size}$ - 352)/80)	FLOOR((TB$_{size}$ - 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1219	1218	1341
	TDD CC	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16-8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

8.7.5.2_H.1.5 Test requirement

The requirements are specified in Table 8.7.5.2_H.1.5-1 depending on the UE category according to Table 8.7.5.2_H.1.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.2_H.1.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	R.68 FDD	R.68 TDD	85
2	10+20	10	20	R.68-2 FDD	R.68 TDD	85
3	15+20	15	20	R.68-1 FDD	R.68 TDD	85

Table 8.7.5.2_H.1.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13				
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 2CCs	2x20	20	20	1	1				
	10+20	10	20	2	2				
	15+20	15	20	3	3				
Note 1: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate. Note 2: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.									

8.7.5.2_H.2 TDD FDD CA Sustained data rate performance for TDD PCell (3DL CA) for 256QAM in DL

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Discussion on DL EVM for 256QAM demodulation test as per R5-155895 is still ongoing

8.7.5.2_H.2.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.5.2_H.2.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE DL category 11, 12, and15 that support 256QAM in DL and support E-UTRA FDD and TDD, 3DL TDD-FDD CA with TDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.2_H.2.3 Minimum requirements

For UE supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.2_H.2.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category or UE DL category, and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.2_H.2.3-2. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirements in Table 8.7.5.2-1 is not applicable.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.2_H.2.3-1: Minimum requirement (TDD FDD CA 256QAM)

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	R.68 FDD	R.68 TDD	85
2	10+20	10	20	R.68-2 FDD	R.68 TDD	85
3	15+20	15	20	R.68-1 FDD	R.68 TDD	85
4	3x20	20	2x20	R.68 FDD	R.68 TDD	85
5	15+20+20	15	2x20	R.68-1 FDD	R.68 TDD	85
6	10+20+20	10	2x20	R.68-2 FDD	R.68TDD	85
7	3x20	2x20	20	R.68 FDD	R.68 TDD	85
8	20+20+15	20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
9	20+20+10	20+10	20	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 TDD	85
9A	20+10+10	2x10	20	R.68-2 FDD	R.68 TDD	85

Table 8.7.5.2_H2.3-2: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15			
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 3CCs	3x20	20	2x20	4	1	4			
	15+20+20	15	2x20	5	3	5			
	10+20+20	10	2x20	6	2	6			
	3x20	2x20	20	7	1	7	-		
	20+20+15	20+15	20	8	1	8	-		
	20+20+10	20+10	20	9	1	9	-		
	20+10+10	2x10	20	9A	2	9A			
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.2

8.7.5.2_H.2.4 Test description

Same test description as in clause 8.7.5.2.2.4 with the following exceptions:

- Instead of Table 8.7.5.2.2.4.1-1 and Table 8.7.5.2.2.4.1-2 -> use Table 8.7.5.2_H.2.4-1 and Table 8.7.5.2_H.2.4-2.
- Instead of Table 8.7.5.2.2.5-1 -> use Table 8.7.5.2_H.2.5-1.
- Instead of Table 8.7.5.2.2.5-2 -> use Table 8.7.5.2_H.2.5-2.

Table 8.7.5.2_H.2.4-1: Further test parameters per test (Test number #1 - #5)

Test number		1	2	3	4	5
Bandwidth	**FDD CC**	20	10	15	20	15
	TDD CC	20	20	20	2x20	2x20
DL Measurement channel	**FDD CC**	R.68 TDD	R.68-2 FDD	R.68-1 FDD	R.68 TDD	R.68-1 FDD
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	NA	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	97896(Note 3)	48936(Note 5)	75376(Note 4)	97896(Note 3)	75376(Note 4)
	TDD CC	97896/0(Note 6)	97896/0(Note 6)	97896/0(Note 6)	97896/0(Note 6)	97896/0(Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	10	5	7	10	7
	TDD CC	10/0	10/0	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} – 208)/40)	FLOOR((TB_{size} – 264)/56)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} – 264)/56)
	TDD CC	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1219	1218	1341	1219	1341
	TDD CC	1219/0	1219/0	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives:
PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

Table 8.7.5.2_H.2.4-2: Further test parameters per test (Test number #6 - #9A)

Test number		6	7	8	9	9A
Bandwidth	**FDD CC**	10	2x20	20+15	20+10	2x10
	TDD CC	2x20	20	20	20	20
DL Measurement channel	**FDD CC**	R.68-2 FDD	R.68 TDD	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68-2 FDD
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	NA	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	48936(Note 5)	97896(Note 3)	97896(Note 3) for 20MHz CC, 75376(Note 4) for 15MHz CC	97896(Note 3) for 20MHz CC, 48936(Note 5) for 10MHz CC	48936(Note 5)
	TDD CC	97896/0(Note 6)	97896/0(Note 6)	97896/0(Note 6)	97896/0(Note 6)	97896/0(Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	5	10	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 5 for 10MHz CC	5
	TDD CC	10/0	10/0	10/0	10/0	10/0
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB_{size} – 208)/40)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TB_{size} – 264)/56) for 15MHz CC	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TB_{size} – 208)/40) for 10MHz CC	FLOOR((TB_{size} – 208)/40)
	TDD CC	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1218	1219	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1218 for 10MHz CC	1218
	TDD CC	1219/0	1219/0	1219/0	1219/0	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives:
PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

8.7.5.2_H.2.5 Test requirement

The requirements are specified in Table 8.7.5.2_H.2.5-1 depending on the UE category according to Table 8.7.5.2_H.2.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.2_H.2.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
1	2x20	20	20	R.68 FDD	R.68 TDD	85
2	10+20	10	20	R.68-2 FDD	R.68 TDD	85
3	15+20	15	20	R.68-1 FDD	R.68 TDD	85
4	3x20	20	2x20	R.68 FDD	R.68 TDD	85
5	15+20+20	15	2x20	R.68-1 FDD	R.68 TDD	85
6	10+20+20	10	2x20	R.68-2 FDD	R.68TDD	85
7	3x20	2x20	20	R.68 FDD	R.68 TDD	85
8	20+20+15	20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
9	20+20+10	20+10	20	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 TDD	85
9A	20+10+10	2x10	20	R.68-2 FDD	R.68 TDD	85

Table 8.7.5.2_H.2.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15			
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 3CCs	3x20	20	2x20	4	1	4			
	15+20+20	15	2x20	5	3	5			
	10+20+20	10	2x20	6	2	6			
	3x20	2x20	20	7	1	7			
	20+20+15	20+15	20	8	1	8			
	20+20+10	20+10	20	9	1	9			
	20+10+10	2x10	20	9A	2	9A			
Note 1: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate. Note 2: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 3: Test 1, Test 2 and Test 3 are defined in 8.7.5.2.2.									

8.7.5.2_H.3 TDD FDD CA Sustained data rate performance for TDD PCell (4DL CA) for 256QAM in DL

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Discussion on DL EVM for 256QAM demodulation test as per R5-155895 is still ongoing

8.7.5.2_H.3.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.5.2_H.3.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE DL category 15 and 16 that support 256QAM in DL and support E-UTRA FDD and TDD, 4DL TDD-FDD CA with TDD as PCell.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.5.2_H.3.3 Minimum requirements

For UE supporting 256QAM, the requirements for TDD FDD CA with FDD PCell are specified in Table 8.7.5.2_H.3.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category or UE DL category, and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.2_H.3.3-2. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirements in Table 8.7.5.2-1 is not applicable.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.2_H.3.3-1: Minimum requirement (TDD FDD CA 256QAM)

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
4	3x20	20	2x20	R.68 FDD	R.68 TDD	85
5	15+20+20	15	2x20	R.68-1 FDD	R.68 TDD	85
7	3x20	2x20	20	R.68 FDD	R.68 TDD	85
8	20+20+15	20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
10	4x20	20	3x20	R.68-2 FDD	R.68TDD	85
11	4x20	2×20	2×20	R.68 FDD	R.68 TDD	85
12	3x20+15	20+15	2×20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
13	2×15+2x20	2×15	2x20	R.68-1 FDD	R.68 TDD	85
14	3x20+15	2×20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15	2×15+2x20	2x15+20	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15A	3x20+10	2x20+10	20	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 TDD	85
15B	2x15+2x20	2x15+20	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85

Table 8.7.5.2_H.3.3-2: Test points for sustained data rate (FRC 256QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16		
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 4CCs	4x20	20	3x20	4	-	10	10		
	4x20	2×20	2×20	4 or 7	-	11	11		
	3x20+15	20+15	2×20	8	-	12	12		
	2×15+2x20	2×15	2x20	5	-	13	13		
	3x20+15	2×20+15	20	7	-	14	14		
	2×15+2x20	2x15+20	20	8	-	15	15		
	3x20+10	2x20+10	20	7	-	15A	15A		
	2x15+2x20	2x15+20	20	8	-	15B	15B		
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.									

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.2

8.7.5.2_H.3.4 Test description

Same test description as in clause 8.7.5.2.3.4 with the following exceptions:

- Instead of Table 8.7.5.2.3.4.1-1 and Table 8.7.5.2.2.4.1-2 -> use Table 8.7.5.2_H.3.4-1 and Table 8.7.5.2_H.3.4-2.
- Instead of Table 8.7.5.2.3.5-1 -> use Table 8.7.5.2_H.3.5-1.
- Instead of Table 8.7.5.2.3.5-2 -> use Table 8.7.5.2_H.3.5-2.

Table 8.7.5.2_H.3.4-1: Further test parameters per test (Test number #4 - #11)

Test number		4	5	7	8	10	11
Bandwidth	**FDD CC**	20	15	2x20	20+15	20	2x20
	TDD CC	2x20	2x20	20	20	3x20	2x20
DL Measurement channel	**FDD CC**	R.68 FDD	R.68-1 FDD	R.68 FDD	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68-2 FDD	R.68 FDD
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	NA	NA	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	97896 (Note 3)	75376 (Note 4)	97896 (Note 3)	97896 (Note 3) for 20MHz CC, 75376 (Note 4) for 15MHz CC	97896 (Note 3)	97896 (Note 3)
	TDD CC	97896/0 (Note 5)	97896/0 (Note 5)	97896/0 (Note 5)	97896/0 (Note 5)	97896/0 (Note 5)	97896/0 (Note 5)
Number of PDCP SDU per Codeword	**FDD CC**	10	7	10	10 for 20MHz CC, 7 for 15MHz CC	10	10
	TDD CC	10	10	10	10	10	10
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} – 264)/56)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80) for 20MHz CC, FLOOR((TB_{size} - 264)/56) for 15MHz CC,	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)
	TDD CC	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)	FLOOR((TB_{size} - 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1219	1341	1219	1219 for 20MHz CC, 1341 for 15MHz CC	1219	1219
	TDD CC	1219	1219	1219	1219	1219	1219

Note 1:	Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.
Note 2:	Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is: PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.
Note 3:	84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.
Note 4:	63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.
Note 5:	84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

Table 8.7.5.2_H.3.4-2: Further test parameters per test (Test number #12 - #15B)

Test number		12	13	14	15	15A	15B
Bandwidth	**FDD CC**	20+15	2x15	2x20+15	2x15+20	2x20+10	2x15+20
	TDD CC	2x20	2x20	20	20	20	20
DL Measurement channel	**FDD CC**	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68-1 FDD	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC
	TDD CC	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD	R.68 TDD
UL channel	**FDD CC**	NA	NA	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	97896 (Note 3) for 20MHz CC, 75376 (Note 4) for 15MHz CC	75376 (Note 4)	97896 (Note 3) for 20MHz CC, 75376 (Note 4) for 15MHz CC	97896 (Note 3) for 20MHz CC, 75376 (Note 4) for 15MHz CC	97896 (Note 3) for 20MHz CC, 48936 (Note 5) for 10MHz CC	97896 (Note 3) for 20MHz CC, 75376 (Note 4) for 15MHz CC
	TDD CC	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)	97896/0 (Note 6)
Number of PDCP SDU per Codeword	**FDD CC**	10 for 20MHz CC, 7 for 15MHz CC	7	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 7 for 15MHz CC	10 for 20MHz CC, 5 for 10MHz CC	10 for 20MHz CC, 7 for 15MHz CC
	TDD CC	10	10	10	10	10	10
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 352)/80) for 20MHz CC, FLOOR((TB$_{size}$ – 264)/56) for 15MHz CC	FLOOR((TB$_{size}$ – 264)/56)	FLOOR((TBsize – 352)/80) for 20MHz CC, FLOOR((TB$_{size}$ – 264)/56) for 15MHz CC	FLOOR((TBsize – 352)/80) for 20MHz CC, FLOOR((TB$_{size}$ – 264)/56) for 15MHz CC	FLOOR((TBsize – 352)/80) for 20MHz CC, FLOOR((TB$_{size}$ – 208)/40) for 10MHz CC	FLOOR((TBsize – 352)/80) for 20MHz CC, FLOOR((TB$_{size}$ – 264)/56) for 15MHz CC
	TDD CC	FLOOR((TBsize – 352)/80)	FLOOR((TBsize – 352)/80)	FLOOR((TBsize – 352)/80)	FLOOR((TBsize – 352)/80)	FLOOR((TBsize – 352)/80)	FLOOR((TBsize – 352)/80)
PDCP SDU size [Octets]	**FDD CC**	1219 for 20MHz CC, 1341 for 15MHz CC	1341	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1341 for 15MHz CC	1219 for 20MHz CC, 1218 for 10MHz CC	1219 for 20MHz CC, 1341 for 15MHz CC
	TDD CC	1219	1219	1219	1219	1219	1219

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size

	of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.
Note 3:	84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.
Note 4:	63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.
Note 5:	42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.
Note 6:	84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

8.7.5.2_H.3.5 Test requirement

The requirements are specified in Table 8.7.5.2_H.3.5-1 depending on the UE category according to Table 8.7.5.2_H.3.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.2_H.3.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
4	3x20	20	2x20	R.68 FDD	R.68 TDD	85
5	15+20+20	15	2x20	R.68-1 FDD	R.68 TDD	85
7	3x20	2x20	20	R.68 FDD	R.68 TDD	85
8	20+20+15	20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
10	4x20	20	3x20	R.68-2 FDD	R.68TDD	85
11	4x20	2×20	2×20	R.68 FDD	R.68 TDD	85
12	3x20+15	20+15	2×20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
13	2×15+2x20	2×15	2x20	R.68-1 FDD	R.68 TDD	85
14	3x20+15	2×20+15	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15	2×15+2x20	2x15+20	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85
15A	3x20+10	2x20+10	20	R.68 FDD for 20MHz CC, R.68-2 FDD for 10MHz CC	R.68 TDD	85
15B	2x15+2x20	2x15+20	20	R.68 FDD for 20MHz CC, R.68-1 FDD for 15MHz CC	R.68 TDD	85

Table 8.7.5.2_H.3.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16		
	Total	FDD CC	TDD CC	DL Cat. 11, 12					
CA with 4CCs	4x20	20	3x20	4	-	10	10		
	4x20	2×20	2×20	4 or 7	-	11	11		
	3x20+15	20+15	2×20	8	-	12	12		
	2×15+2x20	2×15	2x20	5	-	13	13		
	3x20+15	2×20+15	20	7	-	14	14		
	2×15+2x20	2x15+20	20	8	-	15	15		
	3x20+10	2x20+10	20	7	-	15A	15A		
	2x15+2x20	2x15+20	20	8	-	15B	15B		
Note 1: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled. Note 2: Test 4, Test 5, Test 7 and Test 8 are tested in clause 8.7.5.2_H.2.									

8.7.5.2.4 TDD FDD CA Sustained data rate performance for TDD PCell (5DL CA)

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- UL RMC for 5-DL CA in loopback mode needs to be further investigated

8.7.5.2.4.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.5.2.4.2 Test applicability

This test applies to all types of UE Release 12 and forward of UE DL category 15 that support E-UTRA FDD and TDD, 5DL TDD-FDD CA with TDD as PCell and not support 256QAM in DL.

8.7.5.2.4.3 Minimum requirements

For UE not supporting 256QAM, the requirements for TDD FDD CA with TDD PCell are specified in Table 8.7.5.2.4.3-1 with the additional parameters specified in Table 8.7.5-1, and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.5.2.4.3-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements are specified in Clause 8.1.2.3B. The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.7.5.2.4.3-1: test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
16	4x20+15	2x20+15	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
17	2x15+3x20	2x15+20	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

test parameters for sustained downlink data rate (TDD FDD CA 64QAM)

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
16	4x20+15	2x20+15	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
17	2x15+3x20	2x15+20	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

Table 8.7.5.2.4.3-2: Test points for sustained data rate (FRC 64QAM)

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12	DL Cat. 15
	Total	FDD CC	TDD CC					DL Cat. 6, 7	DL Cat. 9, 10	DL Cat. 11, 12	
CA with 5 CCs	4x20+15	2x20+15	2x20	-	-	-	-	-	-	11	16
	2x15+3x20	2x15+20	2x20	-	-	-	-	-	-	12	17
Note 3: If DL category is signalled by the UE under test, then select the test point according to UE DL Category. Otherwise, select the test point according to the UE category signalled.											

The normative reference for this requirement is TS 36.101[2] clause 8.7.5.2

8.7.5.2.4.4 Test description

8.7.5.2.4.4.1 Initial conditions

Table 8.7.5.2.4.4.1-1: Further test parameters per test

Test number		11	12	16	17
Bandwidth	**FDD CC**	2x20	20+15	2x20+15	2x15+20
	TDD CC	2x20	2x20	2x20	2x20
DL Measurement channel	**FDD CC**	R.31-4 FDD	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC
	TDD CC	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD	R.31-4 TDD
UL channel	**FDD CC**	NA	NA	NA	NA
	TDD CC	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD	R.1-4 TDD
TBsize per Codeword	**FDD CC**	75376	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 55056 for 15MHz CC	75376 for 20MHz CC, 55056 for 15MHz CC
	TDD CC	75376/0	75376/0	75376/0	75376/0
Number of PDCP SDU per Codeword	**FDD CC**	7	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 6 for 15MHz CC	7 for 20MHz CC, 6 for 15MHz CC
	TDD CC	7	7	7	7
PDCP SDU size [Octets] Calculation (Note 1)	**FDD CC**	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC	FLOOR((TBsize – 264)/56) for 20MHz CC, FLOOR((TB$_{size}$ – 240)/48) for 15MHz CC
	TDD CC	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)	FLOOR((TBsize – 264)/56)
PDCP SDU size [Octets]	**FDD CC**	1341	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1142 for 15MHz CC	1341 for 20MHz CC, 1142 for 15MHz CC
	TDD CC	1341	1341	1341	1341

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to Table 8.7.5.2.4.5-1 depending on the UE category according to Table 8.7.5.2.4.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.60 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.5-1 and Table 8.7.5.2.4.5-1 depending on the UE category according to Table 8.7.5.2.4.5-2.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.5.2.4.4.3.

8.7.5.2.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.5.2.4.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.5.2.4.4.3-3A.
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. The SS looks up TB_{size} in Table 8.7.5.2.4.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.5.2.4.5-2.
6. The SS sets the counters, N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.5.2.4.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
13. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.5.2.4.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.5.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.5.2.4.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 clause 4.7A table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.5.2.4.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.5.2.4.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.2.4.4.3-3A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3		Transmission mode 3
codebookSubsetRestriction-r10	10		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.7.5.2.4.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

8.7.5.2.4.5 Test requirement

The requirements are specified in Table 8.7.5.2.4.5-1 depending on the UE category according to Table 8.7.5.2.4.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.5.2.4.5-1: Test requirements per test

Test number	Bandwidth (MHz)			Number of bits of a DL-SCH transport block received within a TTI (for normal/special subframe for TDD, except for subframe #5)		Measurement channel		Reference value
	Total	FDD CC	TDD CC	FDD CC	TDD CC	FDD CC	TDD CC	TB success rate [%]
11	4x20	2×20	2×20	75376	75376/0	R.31-4 FDD	R.31-4 TDD	85
12	3x20+15	20+15	2×20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
16	4x20+15	2x20+15	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85
17	2x15+3x20	2x15+20	2x20	75376 for 20MHz CC 55056 for 15MHz CC	75376/0	R.31-4 FDD for 20MHz CC, R.31-5 FDD for 15MHz CC	R.31-4 TDD	85

Table 8.7.5.2.4.5-2: Test applicability per UE category

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)			Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9,10	Cat 11, 12	DL Cat. 15
	Total	FDD CC	TDD CC					DL Cat. 6, 7	DL Cat. 9, 10	DL Cat. 11, 12	
CA with 5 CCs	4x20+15	2x20+15	2x20	-	-	-	-	-	-	11	16
	2x15+3x20	2x15+20	2x20	-	-	-	-	-	-	12	17
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities. Note 2: The test point is selected according to the UE DL Category, or UE Category (only if UE DL Category not available) as appropriate. Note 3: Test 11 and 12 are tested in clause 8.7.5.2.3											

8.7.6 FDD (Dual Connectivity)

The parameters specified in Table 8.7.6-1 are valid for all FDD DC tests unless otherwise stated.

Table 8.7.6-1: Common Test Parameters (FDD)

Parameter		Unit	Value
Cyclic prefix			Normal
Cell ID			0
Inter-TTI Distance			1
Number of HARQ processes per component carrier		Processes	8
Maximum number of HARQ transmission			4
Redundancy version coding sequence			{0,0,1,2} for 64QAM and 256QAM
Number of OFDM symbols for PDCCH per component carrier		OFDM symbols	1
Cross carrier scheduling			Not configured
Propagation condition			Static propagation condition No external noise sources are applied
Transmission mode			TM3
Codebook subset restriction			10
Antenna configuration			2x2
$\hat{E}_s$ at antenna port (dBm/15kHz)			-85
Symbols for unused PRBs			OP.1 FDD
ACK/NACK feedback mode			Separate ACK/NACK feedbacks with PUCCH format 3 on the MCG and SCG
Time offset between MCG CC and SCG CC		µs	0 for UE under test supporting synchronous dual connectivity; 500 for UE under test supporting both asynchronous and synchronous dual connectivity (Note 1)
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
Note 1: Asynchronous and synchronous dual connectivity are defined in TS36.300 [18]. Note 2: If the UE supports both SCG bearer and Split bearer, the Split bearer is configured.			

8.7.6.1 FDD sustained data rate performance for Dual Connectivity 64QAM

8.7.6.1.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.6.1.2 Test applicability

This test case applies to all types of E-UTRA FDD release 12 and forward UE of category 3, 4, 6, 7, 9, and 10 that support Dual Connectivity and not supporting 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.6.1.3 Minimum conformance requirements

For UE not supporting 256QAM, the requirements are specified in Table 8.7.6.1.3-1, with the addition of the parameters in Table 8.7.6-1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.6.1.3-2. The TB success rate across CGs shall be sustained during at least 300 frames.

The applicability of the requirements is specified in Clause 8.1.2.3A.

Table 8.7.6.1.3-1: Minimum requirement (DC 64QAM)

Test number	Bandwidth combination (MHz)	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value TB success rate(%)		
				DRB type of Split bearer (Note 2)	DRB type of SCG bearer (Note 3)	
					MCG	SCG
1	2x10	25456	R.31-2 FDD	95	95	95
2	2x10	36696 (Note 4)	R.31-3A FDD	85	85	85
3	10+20	36696 (Note 4) for 10MHz CC 75376 (Note 5) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85	85	85
4	2x15	55056 (Note 6)	R.31-4B FDD	85	85	85
5	15+20	55056 for 15MHz CC 75376 (Note 5) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85	85	85
6	2x20	75376 (Note 5)	R.31-4 FDD	85	85	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: For the configuration of DRB type of Split bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks , N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks across all the CGs used for DC transmission or reception.

Note 3: For the configuration of DRB type of SCG bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks per CG used for DC transmission or reception, separately.

Note 4: 35160 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 52752 bits for sub-frame 5.

Table 8.7.6.1.3-2: Test points for sustained data rate (FRC DC 64QAM)

DC config	Maximum supported Bandwidth combination (MHz)	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9, 10	Cat. 11, 12	
DC with 2CCs	2x10	1	2	2	2	-	
	10+20	1	2	3	3	-	
	2x15	1	2	4	4	-	
	15+20	1	2	5	5	-	
	2x20	1	2	6	6	-	

The normative reference for this requirement is TS 36.101 [2] clause 8.7.6.

8.7.6.1.4 Test description

8.7.6.1.4.1 Initial conditions

Table 8.7.6.1.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	R.31-2 FDD	R.1-2 FDD	25456	3	FLOOR((TBsize – 152)/24)	1054
2	R.31-3A FDD	R.1-3A FDD	36696 (Note 3)	4	FLOOR((TBsize – 184)/32)	1141
3	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	36696 (Note 3) for 10MHz CC 75376 (Note 4) for 20MHz CC	4 for 10MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 184)/32) for 10MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1141 for 10MHz CC 1341 for 20MHz CC
4	R.31-4B FDD for two 15MHz CCs	R.1-4B FDD	55056 (Note 5) for two 15MHz CCs	6 for two 15MHz CCs	FLOOR((TB_{size} – 240)/48) for two 15 MHz CCs	1142 for two 15MHz CCs
5	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	R.1-4 FDD	55056 for 15MHz CC 75376 (Note 4) for 20MHz CC	6 for 15MHz CC 7 for 20 MHz CC	FLOOR((TB_{size} – 240)/48) for 15 MHz CC FLOOR((TBsize – 264)/56) for 20 MHz CC	1142 for 15MHz CC 1341 for 20MHz CC
6	R.31-4 FDD for two 20MHz CCs	R.1-4 FDD	75376 (Note 4) for two 20MHz CCs	7 for two 20 MHz CCs	FLOOR((TBsize – 264)/56) for two 20 MHz CCs	1341 for two 20MHz CCs

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 35160 bits for sub-frame 5.

Note 4: 71112 bits for sub-frame 5.

Note 5: 52752 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Tables 8.1.2.3A-1 and 8.7.6.1.5-1 depending on the UE category according to Table 8.7.6.1.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.6-1 and Table 8.7.6.1.5-1 depending on the UE category according to Table 8.7.6.1.5-2.

3. Downlink signals for MCG CC (PCell) and SCG CC (PSCell) are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. If the SCG bearer is only supported, ensure the UE is in State 4A-RF-DC1 according to TS 36.508 [7] clause 5.2A.3A. Otherwise, ensure that the UE is in State 4A-RF-DC2 according to TS 36.508 [7] clause 5.2A.3B. Message contents are defined in clause 8.7.6.1.4.3.

8.7.6.1.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

2. The SS looks up TB_{size} in Table 8.7.6.1.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.6.1.5-2.

3. SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP}, and N_{DL_PDCP} to 0 on PCell and PSCell respectively.

4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.6.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU on PCell and PSCell respectively.

5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one on PCell and PSCell respectively.

6. Steps 4 to 5 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one on PCell and PSCell respectively.

8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$ on PCell and PSCell respectively. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE on PCell and PSCell respectively. The total TB success rate is calculated as A_{total} = PCell's A + PSCell's A.

9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$ on PCell and PSCell respectively. The total PDCP SDU loss is calculated as B_{total} = PCell's B + PSCell's B.

10. The UE passes the test if $A_{total} \geq$ "corresponding TB success rates according to Table 8.7.6.1.5-1" and $B_{total} = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.6.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.6.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 [7] clause 4.7A Table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.6.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 [7] clause 4.6.1 Table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfigSMC SEQUENCE {			
securityAlgorithmConfig SEQUENCE {			
cipheringAlgorithm	eea2		
}			
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.6.1.4.3-2A: MobilityControlInfoSCG-r12

Derivation Path: TS 36.331 [5] clause 6.3.4 MobilityControlInfoSCG-r12			
Information Element	**Value/remark**	**Comment**	**Condition**
MobilityControlInfoSCG-r12 ::= SEQUENCE {			
t307-r12	ms2000		
ue-IdentitySCG-r12	C-RNTI	PSCell's C-RNTI	
rach-ConfigDedicated-r12	Rach-ConfigDedicated-DEFAULT		
cipheringAlgorithmSCG-r12	eea2		
}			

Table 8.7.6.1.4.3-3: *PhysicalConfigDedicated-DEFAULT (PCell and PSCell)*

Derivation Path: 36.508 [7] clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.6.1.5 Test requirement

The requirements are specified in Table 8.7.6. 1.5-1 depending on the UE category according to Table 8.7.6.1.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.6.1.5-1: Test requirement (DC 64QAM)

Test number	Bandwidth combination (MHz)	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value TB success rate(%)		
				DRB type of Split bearer (Note 2)	DRB type of SCG bearer (Note 3)	
					MCG	SCG
1	2x10	25456	R.31-2 FDD	95	95	95
2	2x10	36696 (Note 4)	R.31-3A FDD	85	85	85
3	10+20	36696 (Note 4) for 10MHz CC 75376 (Note 5) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	85	85	85
4	2x15	55056 (Note 6)	R.31-4B FDD	85	85	85
5	15+20	55056 for 15MHz CC 75376 (Note 5) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	85	85	85
6	2x20	75376 (Note 5)	R.31-4 FDD	85	85	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: For the configuration of DRB type of Split bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks , N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks across all the CGs used for DC transmission or reception.

Note 3: For the configuration of DRB type of SCG bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks per CG used for DC transmission or reception, separately.

Note 4: 35160 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 52752 bits for sub-frame 5.

Table 8.7.6.1.5-2: Test points for sustained data rate (FRC DC 64QAM)

DC config	Maximum supported Bandwidth combination (MHz)	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9, 10	Cat. 11, 12	
DC with 2CCs	2x10	1	2	2	2	-	
	10+20	1	2	3	3	-	
	2x15	1	2	4	4	-	
	15+20	1	2	5	5	-	
	2x20	1	2	6	6	-	
Note 1: The applicability and test rules for different dual connectivity configuration and bandwidth combination set are defined in 8.1.2.3A. Note 2: Only one test point is tested. Select the largest aggregated dual connectivity bandwidth combination supported by the UE among the UE supported dual connectivity capabilities.							

8.7.6.2 FDD sustained data rate performance for Dual Connectivity 256QAM

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Discussion on DL EVM for 256QAM demodulation test as per R5-155895 is still ongoing

- Check whether MCG/SCG should be mentioned in Annex C.

- Check how to measure the throughput using two uplink component carriers.

8.7.6.2.1 Test purpose

Same test purpose as in clause 8.7.1.1.

8.7.6.2.2 Test applicability

This test case applies to all types of E-UTRA FDD release 12 and forward UEs that support Dual Connectivity and 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.6.2.3 Minimum conformance requirements

For UE supporting 256QAM, the requirements are specified in Table 8.7.6.2.3-1, with the addition of the parameters in Table 8.7.6 -1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.6.2.3-2. The TB success rate across CGs shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirements in Table 8.7.6.1.3-1 are not applicable.

The applicability of the requirements is specified in Clause 8.1.2.3A.

Table 8.7.6.2.3-1: Minimum requirement (DC 256QAM)

Test number	Bandwidth combination (MHz)	Measurement channel	Reference value TB success rate (%)		
			DRB type of Split bearer (Note 2)	DRB type of SCG bearer (Note 3)	
				MCG	SCG
1	2x10	R.68-2 FDD	85	85	85
2	10+20	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85	85	85
3	2x15	R.68-1 FDD	85	85	85
4	15+20	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85	85	85
5	2x20	R.68 FDD	85	85	85
6	15+5	R.68-1 FDD for 15MHz CC R.68-3 FDD for 5MHz CC	85	85	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: For the configuration of DRB type of Split bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks across all the CGs used for DC transmission or reception.

Note 3: For the configuration of DRB type of SCG bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks per CG used for DC transmission or reception, separately.

Table 8.7.6.2.3-2: Test points for sustained data rate (FRC DC 256QAM)

DC config	Maximum supported Bandwidth combination (MHz)	Cat. 11, 12	DL Cat. 13				
		DL Cat. 11,12					
DC with 2CCs	2x10	1	1				
	10+20	2	2				
	2x15	3	3				
	15+20	4	4				
	2x20	5	5				
	15+5	6	6				

The normative reference for this requirement is TS 36.101 [2] clause 8.7.6.

8.7.6.2.4 Test description

8.7.6.2.4.1 Initial conditions

Table 8.7.6.2.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TBsize per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	R.68-2 FDD	R.1-2 FDD	48936(Note 5)	5	FLOOR((TBsize – 208)/40)	1218
2	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	48936 (Note 5) for 10MHz CC 97896 (Note 3) for 20MHz CC	5 for 10MHz CC 10 for 20MHz CC	FLOOR((TBsize – 208)/40) for 10MHz CC FLOOR((TBsize - 352)/80) for 20MHz CC	1218 for 10MHz CC 1219 for 20MHz CC
3	R.68-1 FDD	R.1-4B FDD	75376(Note 4)	7	FLOOR((TBsize – 264)/64)	1341
4	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	R.1-4 FDD	75376 (Note 4) for 15MHz CC 97896(Note 3) for 20MHz CC	7 for 15MHz CC 10 for 20 MHz CC	FLOOR((TBsize – 264)/64) for 15MHz CC FLOOR((TBsize - 352)/80) for 20 MHz CC	1341 for 15MHz CC 1219 for 20MHz CC
5	R.68 FDD	R.1-4 FDD	97896(Note 3)	10	FLOOR((TBsize - 352)/80)	1219
6	R.68-1 FDD for 15MHz CC R.68-3 FDD for 5MHz CC	R.1-4B FDD	75376 (Note 4) for 15MHz CC 24496(Note 6) for 5MHz CC	7 for 15MHz CC 3 for 5 MHz CC	FLOOR((TBsize – 264)/64) for 15MHz CC FLOOR((TBsize – 152)/24) for 10MHz CC	1341 for 15MHz CC 1014 for 5MHz CC

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits).
This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frames 0,1,2,6,7 and 81176 bits for sub-frames 5.

Note 4: 63776 bits for sub-frames 0,1,2,6,7 and 61664 bits for sub-frames 5.

Note 5: 42368 bits for sub-frames 0,1,2,6,7 and 40576 bits for sub-frames 5.

Note 6: 21384 bits for sub-frames 0,1,2,6,7 and 19848 bits for sub-frames 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Tables 8.1.2.3A-1 and 8.7.6.2.5-1 depending on the UE category according to Table 8.7.6.2.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.6-1 and Table 8.7.6.2.5-1 depending on the UE category according to Table 8.7.6.2.5-2.

3. Downlink signals for MCG CC and SCG CC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. If the SCG bearer is only supported, ensure the UE is in State 4A-RF-DC1 according to TS 36.508 [7] clause 5.2A.3A. Otherwise, ensure that the UE is in State 4A-RF-DC2 according to TS 36.508 [7] clause 5.2A.3B. Message contents are defined in clause 8.7.6.2.4.3.

8.7.6.2.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

2. The SS looks up TB_{size} in Table 8.7.6.2.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.6.2.5-2.

3. SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP}, and N_{DL_PDCP} to 0.

4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.6.2.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

6. Steps 4 to 5 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

10. The UE passes the test if $A \geq$ "corresponding TB success rates according to Table 8.7.6.2.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.6.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.6.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 [7] clause 4.7A Table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.6.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 [7] clause 4.6.1 Table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE {			
securityModeCommand-r8 SEQUENCE {			
securityConfigSMC SEQUENCE {			
securityAlgorithmConfig SEQUENCE {			
cipheringAlgorithm	eea2		
}			
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.6.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 [7] clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.6.2.5 Test requirement

The requirements are specified in Table 8.7.6.2.5-1 depending on the UE category according to Table 8.7.6.2.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.6.2.5-1: Test requirement (DC 256QAM)

Test number	Bandwidth combination (MHz)	Measurement channel	Reference value TB success rate (%)		
			DRB type of Split bearer (Note 2)	DRB type of SCG bearer (Note 3)	
				MCG	SCG
1	2x10	R.68-2 FDD	85	85	85
2	10+20	R.68-2 FDD for 10MHz CC R.68 FDD for 20MHz CC	85	85	85
3	2x15	R.68-1 FDD	85	85	85
4	15+20	R.68-1 FDD for 15MHz CC R.68 FDD for 20MHz CC	85	85	85
5	2x20	R.68 FDD	85	85	85
6	15+5	R.68-1 FDD for 15MHz CC R.68-3 FDD for 5MHz CC	85	85	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: For the configuration of DRB type of Split bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks across all the CGs used for DC transmission or reception.

Note 3: For the configuration of DRB type of SCG bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks per CG used for DC transmission or reception, separately.

Table 8.7.6.2.5-2: Test points for sustained data rate (FRC DC 256QAM)

DC config	Maximum supported Bandwidth combination (MHz)	Cat. 11, 12 DL Cat. 11,12	DL Cat. 13				
DC with 2CCs	2x10	1	1				
	10+20	2	2				
	2x15	3	3				
	15+20	4	4				
	2x20	5	5				
	15+5	6	6				

Note 1: The applicability and test rules for different dual connectivity configuration and bandwidth combination set are defined in 8.1.2.3A.

Note 2: Only one test point is tested. Select the largest aggregated dual connectivity bandwidth combination supported by the UE among the UE supported dual connectivity capabilities.

8.7.7 TDD (Dual Connectivity)

The parameters specified in Table 8.7.7-1 are valid for all TDD DC tests unless otherwise stated.

Table 8.7.7-1: Common Test Parameters (TDD)

Parameter	Unit		Value
Uplink downlink configuration			2 (Note 2)
Special subframe configuration			4
Cyclic prefix			Normal
Cell ID			0
Inter-TTI Distance			1
Number of HARQ processes per component carrier	Processes		7
Maximum number of HARQ transmission			4
Redundancy version coding sequence			{0,0,1,2} for 64QAM and 256QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols		1
Cross carrier scheduling			Not configured
Propagation condition			Static propagation condition No external noise sources are applied
Transmission mode			TM3
Codebook subset restriction			10
Antenna configuration			2x2
$\hat{E}_s$ at antenna port (dBm/15kHz)			-85
Symbols for unused PRBs			OP.1 TDD
ACK/NACK feedback mode			Separate ACK/NACK feedbacks with PUCCH format 3 on the MCG and SCG
Time offset between MCG CC and SCG CC	μs		0 for UE under test supporting synchronous dual connectivity; 500 for UE under test supporting both asynchronous and synchronous dual connectivity (Note 1)
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
Note 1: Asynchronous and synchronous dual connectivity are defined in TS36.300 [18]. Note 2: If the UE supports both SCG bearer and Split bearer, the Split bearer is configured.			

8.7.7.1 TDD sustained data rate performance for Dual Connectivity 64QAM

8.7.7.1.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.7.1.2 Test applicability

This test case applies to all types of E-UTRA TDD release 12 and forward UE of category 6, 7, 9, and 10 that support Dual Connectivity and not supporting 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.7.1.3 Minimum conformance requirements

For UE not supporting 256QAM, the requirements are specified in Table 8.7.7.1.3-12, with the addition of the parameters in Table 8.7.7-1 and the downlink physical channel setup according to Annex C.3.2. The test points are

applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.7.1.3-2. The TB success rate shall be sustained during at least 300 frames.

The applicability of the requirements is specified in Clause 8.1.2.3A.

Table 8.7.7.1.3-1: Minimum requirement (DC 64QAM)

Test number	Bandwidth combination (MHz)	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value TB success rate across CGs(%)		
				DRB type of Split bearer (Note 2)	DRB type of SCG bearer (Note 3)	
					MCG	SCG
1	2x20	75376/0 (Note 4)	R.31-4A TDD	85	85	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.						
Note 2: For the configuration of DRB type of Split bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks across all the CGs used for DC transmission or reception.						
Note 3: For the configuration of DRB type of SCG bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks per CG used for DC transmission or reception, separately.						
Note 4: 71112 bits for sub-frame 5.						

Table 8.7.7.1.3-2: Test points for sustained data rate (FRC DC 64QAM)

DC config	Maximum supported Bandwidth combination (MHz)	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9, 10	Cat. 11, 12	
DC with 2CCs	2x20	-	-	1	1	-	

The normative reference for this requirement is TS 36.101 [2] clause 8.7.7.

8.7.7.1.4 Test description

8.7.7.1.4.1 Initial conditions

Table 8.7.7.1.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword per Component Carrier	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets] for normal/special sub-frame
1	R.31-4A TDD	R.1-4 TDD	75376 (Note 3)	7/0	FLOOR((TB_{size} – 264)/56))	1341/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives:
PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 71112 bits for sub-frame 5

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Tables 8.1.2.3A-1 and 8.7.7.1.5-1 depending on the UE category according to Table 8.7.7.1.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure Group A.36 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.7-1 and Table 8.7.7.1.5-1 depending on the UE category according to Table 8.7.7.1.5-2.

3. Downlink signals for MCG CC (PCell) and SCG CC (PSCell) are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. If the SCG bearer is only supported, ensure the UE is in State 4A-RF-DC1 according to TS 36.508 [7] clause 5.2A.3A. Otherwise, ensure that the UE is in State 4A-RF-DC2 according to TS 36.508 [7] clause 5.2A.3B. Message contents are defined in clause 8.7.7.1.4.3.

8.7.7.1.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

2. The SS looks up TB_{size} in Table 8.7.7.1.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.7.1.5-2.

3. SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP}, and N_{DL_PDCP} to 0 on PCell and PSCell respectively.

4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.7.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU on PCell and PSCell respectively.

5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one on PCell and PSCell respectively.

6. Steps 4 to 5 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one on PCell and PSCell respectively.

8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$ on PCell and PSCell respectively. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE on PCell and PSCell respectively. The total TB success rate is calculated as A_{total} = PCell's A + PSCell's A.

9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$ on PCell and PSCell respectively. The total PDCP SDU loss is calculated as B_{total} = PCell's B + PSCell's B.

10. The UE passes the test if $A_{total} \geq$ "corresponding TB success rates according to Table 8.7.7.1.5-1" and $B_{total} = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.7.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.7.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 [7] clause 4.7A Table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.7.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 [7] clause 4.6.1 Table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfigSMC SEQUENCE {			
securityAlgorithmConfig SEQUENCE {			
cipheringAlgorithm	eea2		
}			
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.7.1.4.3-2A: MobilityControlInfoSCG-r12

Derivation Path: TS 36.331 [5] clause 6.3.4 MobilityControlInfoSCG-r12			
Information Element	**Value/remark**	**Comment**	**Condition**
MobilityControlInfoSCG-r12 ::= SEQUENCE {			
t307-r12	ms2000		
ue-IdentitySCG-r12	C-RNTI	PSCell's C-RNTI	
rach-ConfigDedicated-r12	Rach-ConfigDedicated-DEFAULT		
cipheringAlgorithmSCG-r12	eea2		
}			

Table 8.7.7.1.4.3-3: *PhysicalConfigDedicated-DEFAULT (PCell and PSCell)*

Derivation Path: 36.508 [7] clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.7.1.5 Test requirement

The requirements are specified in Table 8.7.7.1.5-1 depending on the UE category according to Table 8.7.7.1.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.7.1.5-1: Test requirement (DC 64QAM)

Test number	Bandwidth combination (MHz)	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value TB success rate across CGs(%)		
				DRB type of Split bearer (Note 2)	DRB type of SCG bearer (Note 3)	
					MCG	SCG
1	2x20	75376/0 (Note 4)	R.31-4A TDD	85	85	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: For the configuration of DRB type of Split bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks across all the CGs used for DC transmission or reception.

Note 3: For the configuration of DRB type of SCG bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks per CG used for DC transmission or reception, separately.

Note 4: 71112 bits for sub-frame 5.

Table 8.7.7.1.5-2: Test points for sustained data rate (FRC DC 64QAM)

DC config	Maximum supported Bandwidth combination (MHz)	Cat. 3	Cat. 4	Cat. 6, 7	Cat. 9, 10	Cat. 11, 12	
DC with 2CCs	2x20	-	-	1	1	-	

8.7.7.2 TDD sustained data rate performance for Dual Connectivity 256QAM

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Discussion on DL EVM for 256QAM demodulation test as per R5-155895 is still ongoing

- Check whether MCG/SCG should be mentioned in Annex C.

- Check how to measure the throughput using two uplink component carriers.

8.7.7.2.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.7.2.2 Test applicability

This test case applies to all types of E-UTRA TDD release 12 and forward UEs that support Dual Connectivity and 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports.

8.7.7.2.3 Minimum conformance requirements

For UE supporting 256QAM, the requirements are specified in Table 8.7.7.2.3-1, with the addition of the parameters in Table 8.7.7-1 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.7.2.3-2. The TB success rate shall be sustained during at least 300 frames. For UE supporting 256QAM, the requirements in Table 8.7.7.1.3-1 are not applicable.

The applicability of the requirements is specified in Clause 8.1.2.3A.

Table 8.7.7.2.3-1: Minimum requirement (DC 256QAM)

Test number	Bandwidth combination (MHz)	Measurement channel	Reference value TB success rate (%)		
			DRB type of Split bearer (Note 2)	DRB type of SCG bearer (Note 3)	
				MCG	SCG
1	2x20	R.68-3 TDD	85	85	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.					
Note 2: For the configuration of DRB type of Split bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks across all the CGs used for DC transmission or reception.					
Note 3: For the configuration of DRB type of SCG bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks per CG used for DC transmission or reception, separately.					

Table 8.7.7.2.3-2: Test points for sustained data rate (FRC DC 256QAM)

DC config	Maximum supported Bandwidth combination (MHz)	Cat. 11, 12	DL Cat. 13				
		DL Cat. 11, 12					
DC with 2CCs	2x20	1	1				

The normative reference for this requirement is TS 36.101 [2] clause 8.7.7.

8.7.7.2.4 Test description

8.7.7.2.4.1 Initial conditions

Table 8.7.7.2.4.1-1: Further test parameters per test

Test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword per Component Carrier	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets] for normal/special sub-frame
1	R.68-3 TDD	R.1-4 TDD	97896(Note 3)	10/0	FLOOR((TB_{size} - 352)/80)	1219/0

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives:
PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 84760 bits for sub-frame 0, 4 and 81176 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Tables 8.1.2.3A-1 and 8.7.7.2.5-1 depending on the UE category according to Table 8.7.7.2.5-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators) for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.85 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 8.7.7-1 and Table 8.7.7.1.5-1 depending on the UE category according to Table 8.7.7.1.5-2.

3. Downlink signals for MCG CC and SCG CC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. If the SCG bearer is only supported, ensure the UE is in State 4A-RF-DC1 according to TS 36.508 [7] clause 5.2A.3A. Otherwise, ensure that the UE is in State 4A-RF-DC2 according to TS 36.508 [7] clause 5.2A.3B. Message contents are defined in clause 8.7.7.2.4.3.

8.7.7.2.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

2. The SS looks up TB_{size} in Table 8.7.7.2.4.1-1 for the tests to be performed depending on the UE category according to Table 8.7.7.2.5-2.

3. SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP}, and N_{DL_PDCP} to 0.

4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.7.2.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

6. Steps 4 to 5 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx}/ (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and $_{NDL_retx}$) in order to validate HARQ feedback received from the UE.

9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

10. The UE passes the test if $A \geq$ "corresponding TB success rates according to Table 8.7.7.2.5-1" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.7.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.7.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.508 [7] clause 4.7A Table 4.7A-3 with condition UE TEST LOOP MODE A			
Information Element	**Value/remark**	**Comment**	**Condition**
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	

Table 8.7.7.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 [7] clause 4.6.1 Table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE {			
securityModeCommand-r8 SEQUENCE {			
securityConfigSMC SEQUENCE {			
securityAlgorithmConfig SEQUENCE {			
cipheringAlgorithm	eea2		
}			
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.7.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 [7] clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		Transmission mode 3
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.7.7.2.5 Test requirement

The requirements are specified in Table 8.7.7.2.5-1 depending on the UE category according to Table 8.7.7.2.5-2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.7.2.5-1: Test requirement (DC 256QAM)

Test number	Bandwidth combination (MHz)	Measurement channel	Reference value TB success rate (%)		
			DRB type of Split bearer (Note 2)	DRB type of SCG bearer (Note 3)	
				MCG	SCG
1	2x20	R.68-3 TDD	85	85	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.					
Note 2: For the configuration of DRB type of Split bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks across all the CGs used for DC transmission or reception.					
Note 3: For the configuration of DRB type of SCG bearer, the TB success rate across CGs is defined as TB success rate = 100%*$N_{DL_correct_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. All the above numbers of transmitted, retransmitted or correctly received DL transport blocks are calculated as the sum of the numbers of DL transport blocks per CG used for DC transmission or reception, separately.					

Table 8.7.7.2.5-2: Test points for sustained data rate (FRC DC 256QAM)

DC config	Maximum supported Bandwidth combination (MHz)	Cat. 11, 12	DL Cat. 13				
		DL Cat. 11, 12					
DC with 2CCs	2x20	1	1				

8.7.8

8.7.9 FDD sustained data rate performance (4 layer MIMO)

8.7.9.1 Minimum conformance requirements

The parameters specified in Table 8.7.9.1-1 are valid for all FDD tests unless otherwise stated.

Table 8.7.9.1-1: Common Test Parameters (FDD)

Parameter	Unit	Value
Transmission mode		3
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,0,1,2} for 64QAM and 256QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured
Propagation condition		Static propagation condition No external noise sources are applied
$\hat{E}_s$ at antenna port	dBm/15kHz	-85
Antenna configuration	2 layer CC	2x2 or 2x4
	4 layer CC	4x4
Codebook subset restriction	2 layer CC	10
	4 layer CC	1000
Downlink power allocation	2 layer CC	ρ_A = -3dB, ρ_B = -3dB, σ = 0dB
	4 layer CC	ρ_A = -6dB, ρ_B = -6dB, σ = 3dB
Symbols for unused PRBs		OP.1 FDD

For UE not supporting 256QAM, the TB success rate shall be higher than 85% when PDSCH are scheduled with FRC in Table 8.7.9.1-2 with the downlink physical channel setup according to Annex C.3.2.

For UE supporting 256QAM, the TB success rate shall be higher than 85% when PDSCH are scheduled with FRC in Table 8.7.9.1-3 with the downlink physical channel setup according to Annex C.3.2. For UE supporting 256QAM, the requirement with 64QAM is not applicable.

The TB success rate is defined as $100\%*N_{DL_correct_rx}/ (N_{DL_newtx} + N_{DL_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.9.1-2: Per-CC FRC for SDR test (FDD 64QAM)

MIMO layer	Bandwidth	Reference channel
2 layer	5	R.31-6 FDD
	10	R.31-3A FDD
	15	R.31-5 FDD
	20	R.31-4 FDD
4 layer	5	R.31-10 FDD
	10	R.31-7 FDD
	15	R.31-8 FDD
	20	R.31-9 FDD

Table 8.7.9.1-3: Per-CC FRC for SDR test (FDD 256QAM)

MIMO layer	Bandwidth	Reference channel
2 layer	5	R.68-3 FDD
	10	R.68-2 FDD
	15	R.68-1 FDD
	20	R.68 FDD
4 layer	5	R.68-7 FDD
	10	R.68-4 FDD
	15	R.68-5 FDD
	20	R.68-6 FDD

CA configuration, bandwidth combination and MIMO layer on each CC is determined by following procedure.

- Select one CA bandwidth combination among all supported CA configurations with bandwidth combination and MIMO layer on each CC that leads to largest equivalent aggregated bandwidth among all CA bandwidth combinations supported by UE. Equivalent aggregated bandwidth is defined as

$$B_{agg} = \sum_{i=0}^{N-1} R_i B_i$$

  where N is number of CCs, $R_i \in \{2,4\}$ and $B_i \in \{5,10,15,20\}$ is MIMO layer and bandwidth of CC i.

- When there are multiple sets of {CA configuration, bandwidth combination, MIMO layer} with same largest aggregated bandwidth, select one among sets with largest number of 4 layer CCs.

8.7.9.2 FDD sustained data rate performance for 4 layer MIMO (single carrier)

8.7.9.2.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.9.2.2 Test applicability

This test applies to E-UTRA FDD release 10 and forward UE of category 6 and 7 and DL category 13 that supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any FDD RF band.

8.7.9.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.9.1.

8.7.9.2.4 Test description

8.7.9.2.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.9.1-2, with the addition of the parameters in Table 8.7.9.2.4.1-1 and Table 8.7.9.2.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.2.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.9.1-3, with the addition of the parameters in Table 8.7.9.2.4.1-1 and Table 8.7.9.2.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.2.4.1-4.

Table 8.7.9.2.4.1-1: Test parameters for sustained downlink data rate (FDD single carrier)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	20	4 layer	4x4	80
2	15	4 layer	4x4	60

Table 8.7.9.2.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 6, 7	Cat. 9, 10	Cat. 11, 12	DL Cat. 13
B_{agg} (MHz)	BW (MHz)	MIMO layer		DL Cat. 9, 10	DL Cat. 11, 12	
80	20	4	1	-	-	-
60	15	4	2	-	-	-
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.						

Table 8.7.9.2.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 FDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	15MHz 4Rx	R.31-8 FDD	R.1-4B FDD	93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Table 8.7.9.2.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW (MHz)	MIMO layer	DL Cat. 11, 12					
80	20	4	-	1	-	-	-	-
60	15	4	-	2	-	-	-	-
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.								

Table 8.7.9.2.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-6 FDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	15MHz 4Rx	R.68-5 FDD	R.1-4B FDD	128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4: 124464 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.9.2.4.1-1 depending on the UE category according to Table 8.7.9.2.4.1-2 for UE not supporting 256QAM or Table 8.7.9.2.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.74 (without using faders and AWGN generators).

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.2.4.1-1 and Table 8.7.9.2.4.1-3 depending on the UE category according to Table 8.7.9.2.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.2.4.1-1 and Table 8.7.9.2.4.1-5 depending on the UE category according to Table 8.7.9.2.4.1-4.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.9.2.4.3.

8.7.9.2.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

2. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.2.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.9.2.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.2.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.9.2.4.1-4.

3. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and N_{DL_PDCP} to 0.

4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.9.2.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.9.2.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

6. Steps 4 to 5 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

10. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.9.2.4.3 Message contents

Table 8.7.9.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.9.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			

nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.9.2.4.3-3: *RRCConnectionReconfiguration*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {			
nonCriticalExtension SEQUENCE {			
antennaInfoDedicatedPCell-v10i0 SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			
}			

Table 8.7.9.2.4.3-4: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.8.2.1.6-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm3	1000		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

8.7.9.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.9.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.9.3 FDD sustained data rate performance for 4 layer MIMO (2DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

- Message contents need an update: Exception for SCellToAddMod-r10 no longer needed, as default message content in TS 36.508 is updated.

8.7.9.3.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.9.3.2 Test applicability

This test applies to E-UTRA FDD release 10 and forward UE of category 9, 10, 11 and 12 and DL category 9, 10, 11, 12 and 15 that supports inter-band OR intra-band contiguous DL CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any FDD RF band.

This test also applies to E-UTRA FDD release 11 and forward UE of category 9, 10, 11 and 12 and DL category 9, 10, 11, 12 and 15 that supports intra band non-contiguous DL CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any FDD RF band.

8.7.9.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.9.1.

8.7.9.3.4 Test description

8.7.9.3.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.9.1-2, with the addition of the parameters in Table 8.7.9.3.4.1-1 and Table 8.7.9.3.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.3.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.9.1-3, with the addition of the parameters in Table 8.7.9.3.4.1-1 and Table 8.7.9.3.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.3.4.1-4.

Table 8.7.9.3.4.1-1: Test parameters for sustained downlink data rate (FDD 2DL CA)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	2x20	4 layer	4x4	160
2	15+20	4 layer	4x4	140
3	20	2 layer	2x2	120
	20	4 layer	4x4	
4	15	2 layer	2x2	110
	20	4 layer	4x4	
5	10	2 layer	2x2	100
	20	4 layer	4x4	
6	20	2 layer	2x2	100
	15	4 layer	4x4	
7	15	2 layer	2x2	90
	15	4 layer	4x4	
8	5	2 layer	2x2	90
	20	4 layer	4x4	
9	5+15	4 layer	4x4	80
10	10	2 layer	2x2	80
	15	4 layer	4x4	
11	10	2 layer	2x2	60
	10	4 layer	4x4	

Editor's note: Tests in Table 8.7.9.3.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 2DL CA which are defined in Table 5.4.2A.1-1, Table 5.4.2A.1-2 or Table 5.4.2A.1-3.

Table 8.7.9.3.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
160	2x20	4	2	1	-	-	-	-	-
140	15+20	4	2	2	-	-	-	-	-
120	20	2	3	3	-	-	-	-	-
	20	4							
110	15	2	4	4	-	-	-	-	-
	20	4							
100	10	2	5	5	-	-	-	-	-
	20	4							
100	20	2	6	6	-	-	-	-	-
	15	4							
90	15	2	7	7	-	-	-	-	-
	15	4							
90	5	2	8	8	-	-	-	-	-
	20	4							
80	5+15	4	9	9	-	-	-	-	-
80	10	2	10	10	-	-	-	-	-
	15	4							
60	10	2	11	11	-	-	-	-	-
	10	4							
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.									

Table 8.7.9.3.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 FDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
2	15MHz 4Rx	R.31-8 FDD	R.1-4 FDD	93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
3	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
4	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
5	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
6	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
7	15MHz 2Rx	R.31-5 FDD	R.1-4B FDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
8	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB$_{size}$ – 128)/16)	1138
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
9	5MHz 4Rx	R.31-10 FDD	R.1-4B FDD	31704 (Note 10)	3	FLOOR((TB$_{size}$ – 152)/24)	1314
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
10	10MHz 2Rx	R.31-3A FDD	R.1-4B FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
11	10MHz 2Rx	R.31-3A FDD	R.1-3A FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	10MHz 4Rx	R.31-7 FDD		63776 (Note 5)	6	FLOOR((TB$_{size}$ – 240)/48)	1323

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4:	90816 bits for sub-frame 5.
Note 5:	59256 bits for sub-frame 5.
Note 6:	71112 bits for sub-frame 5.
Note 7:	52752 bits for sub-frame 5.
Note 8:	35160 bits for sub-frame 5.
Note 9:	15840 bits for sub-frame 0.
Note 10:	30576 bits for sub-frame 0.

Table 8.7.9.3.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	MIMO layer	DL Cat. 11, 12					
160	2x20	4	2	-	1	-	-	-
140	15+20	4	2	-	2	-	-	-
120	20	2	3	-	3	-	-	-
	20	4						
110	15	2	4	-	4	-	-	-
	20	4						
100	10	2	5	-	5	-	-	-
	20	4						
100	20	2	6	-	6	-	-	-
	15	4						
90	15	2	7	-	7	-	-	-
	15	4						
90	5	2	8	-	8	-	-	-
	20	4						
80	5+15	4	9	-	9	-	-	-
80	10	2	10	-	10	-	-	-
	15	4						
60	10	2	11	-	11	-	-	-
	10	4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.								

Table 8.7.9.3.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-6 FDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
2	15MHz 4Rx	R.68-5 FDD	R.1-4 FDD	128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
3	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
4	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
5	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
6	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
7	15MHz 2Rx	R.68-1 FDD	R.1-4B FDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
8	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB$_{size}$ – 152)/24)	1014
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
9	5MHz 4Rx	R.68-7 FDD	R.1-4B FDD	42368 (Note 10)	4	FLOOR((TB$_{size}$ – 184)/32)	1318
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
10	10MHz 2Rx	R.68-2 FDD	R.1-4B FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
11	10MHz 2Rx	R.68-2 FDD	R.1-3A FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	10MHz 4Rx	R.68-4 FDD		84760 (Note 5)	8	FLOOR((TB$_{size}$ – 296)/64)	1319

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4:	124464 bits for sub-frame 5.
Note 5:	81176 bits for sub-frame 5.
Note 6:	81176 bits for sub-frame 5.
Note 7:	61664 bits for sub-frame 5.
Note 8:	40576 bits for sub-frame 5.
Note 9:	19848 bits for sub-frame 5.
Note 10:	39232 bits for sub-frames 0 and 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.9.3.4.1-1 depending on the UE category according to Table 8.7.9.3.4.1-2 for UE not supporting 256QAM or Table 8.7.9.3.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.3.4.1-1 and Table 8.7.9.3.4.1-3 depending on the UE category according to Table 8.7.9.3.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.3.4.1-1 and Table 8.7.9.3.4.1-5 depending on the UE category according to Table 8.7.9.3.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.9.3.4.3.

8.7.9.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.9.3.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.9.3.4.3-4. Cell ID = 1 applies to S-Cell.

3. The SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.3.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.9.3.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.3.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.9.3.4.1-4.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.9.3.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.9.3.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.9.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.9.3.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.9.3.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.9.3.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.9.3.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

Table 8.7.9.3.4.3-5: *SCellToAddMod-r10*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SCellToAddMod-r10 ::= SEQUENCE {			
antennaInfoDedicatedSCell-v10i0 {			
maxLayersMIMO-r10	fourLayers		4TX
}			
}			

Condition	Explanation
4TX	4 SS Tx antenna S-Cell

8.7.9.3.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.9.3.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.9.4 FDD sustained data rate performance for 4 layer MIMO (3DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

- Message contents need an update: Exception for SCellToAddMod-r10 no longer needed, as default message content in TS 36.508 is updated.

8.7.9.4.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.9.4.2 Test applicability

This test applies to E-UTRA FDD release 10 and forward UE of category 11 and 12 and DL category 11, 12, 15, 16 and 18 that supports 3DL intra-band contiguous CA or 3DL inter-band CA or 3DL with intra-band contiguous and inter-band CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any FDD RF band.

This test applies to E-UTRA FDD release 11 and forward UE of category 11 and 12 and DL category 11, 12, 15, 16 and 18 that supports 3DL with intra-band non-contiguous and inter-band CA or 3DL with intra-band non-contiguous and intra-band contiguous CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any FDD RF band.

8.7.9.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.9.1.

8.7.9.4.4 Test description

8.7.9.4.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.9.1-2, with the addition of the parameters in Table 8.7.9.4.4.1-1 and Table 8.7.9.4.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.4.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.9.1-3, with the addition of the parameters in Table 8.7.9.4.4.1-1 and Table 8.7.9.4.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.4.4.1-4.

Table 8.7.9.4.4.1-1: Test parameters for sustained downlink data rate (FDD 3DL CA)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	3x20	4 layer	4x4	240
2	15+20+20	4 layer	4x4	220
3	20	2 layer	2x2	200
	2x20	4 layer	4x4	
4	10+20+20	4 layer	4x4	200
5	15	2 layer	2x2	190
	2x20	4 layer	4x4	
6	20	2 layer	2x2	180
	15+20	4 layer	4x4	
7	10	2 layer	2x2	180
	2x20	4 layer	4x4	
8	15	2 layer	2x2	170
	15+20	4 layer	4x4	
9	2x20	2 layer	2x2	160
	20	4 layer	4x4	
10	20	2 layer	2x2	160
	10+20	4 layer	4x4	
11	10	2 layer	2x2	160
	15+20	4 layer	4x4	
12	5+15+20	4 layer	4x4	160
13	15+20	2 layer	2x2	150
	20	4 layer	4x4	
14	2x20	2 layer	2x2	140
	15	4 layer	4x4	
15	10+20	2 layer	2x2	140
	20	4 layer	4x4	
16	2x15	2 layer	2x2	140
	20	4 layer	4x4	
17	15+20	2 layer	2x2	130
	15	4 layer	4x4	
18	10+15	2 layer	2x2	130
	20	4 layer	4x4	
19	2x20	2 layer	2x2	120
	10	4 layer	4x4	
20	10+20	2 layer	2x2	120
	15	4 layer	4x4	
21	5+15	2 layer	2x2	120
	20	4 layer	4x4	
22	2x10	2 layer	2x2	120
	20	4 layer	4x4	
23	20	2 layer	2x2	120
	5+15	4 layer	4x4	
24	5+10	2 layer	2x2	110
	20	4 layer	4x4	
25	2x5	2 layer	2x2	100
	20	4 layer	4x4	

Editor's note: Tests in Table 8.7.9.4.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 3DL CA which are defined in Table 5.4.2A.1-2 or Table 5.4.2A.1-2a.

Table 8.7.9.4.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
240	3x20	4x4	7	-	2	1	-	-
220	15+20+20	4x4	7	-	2	2	-	-
200	20	2x2	7	-	3	3	-	-
	2x20	4x4						
200	10+20+20	4x4	7	-	4	4	-	-
190	15	2x2	7	-	5	5	-	-
	2x20	4x4						
180	20	2x2	6	-	6	6	-	-
	15+20	4x4						
180	10	2x2	7	-	7	7	-	-
	2x20	4x4						
170	15	2x2	8	-	8	8	-	-
	15+20	4x4						
160	2x20	2x2	9	-	9	9	-	-
	20	4x4						
160	20	2x2	10	-	10	10	-	-
	10+20	4x4						
160	10	2x2	11	-	11	11	-	-
	15+20	4x4						
160	5+15+20	4x4	12	-	12	12	-	-
150	15+20	2x2	13	-	13	13	-	-
	20	4x4						
140	2x20	2x2	14	-	14	14	-	-
	15	4x4						
140	10+20	2x2	15	-	15	15	-	-
	20	4x4						
140	2x15	2x2	16	-	16	16	-	-
	20	4x4						
130	15+20	2x2	17	-	17	17	-	-
	15	4x4						
130	10+15	2x2	18	-	18	18	-	-
	20	4x4						
120	2x20	2x2	19	-	19	19	-	-
	10	4x4						
120	10+20	2x2	20	-	20	20	-	-
	15	4x4						
120	5+15	2x2	21	-	21	21	-	-
	20	4x4						
120	2x10	2x2	22	-	22	22	-	-
	20	4x4						
120	20	2x2	23	-	23	23	-	-
	5+15	4x4						
110	5+10	2x2	24	-	24	24	-	-
	20	4x4						
100	2x5	2x2	25	-	25	25	-	-
	20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.								

Table 8.7.9.4.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 FDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	15MHz 4Rx	R.31-8 FDD	R.1-4 FDD	93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
3	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
4	10MHz 4Rx	R.31-7 FDD	R.1-4 FDD	63776 (Note 5)	6	FLOOR((TB_{size} – 240)/48)	1323
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
5	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
6	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
7	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
8	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
9	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
10	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	10MHz 4Rx	R.31-7 FDD		63776 (Note 5)	6	FLOOR((TB_{size} – 240)/48)	1323
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
11	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
12	5MHz 4Rx	R.31-10 FDD	R.1-4 FDD	31704 (Note 10)	3	FLOOR((TB_{size} – 152)/24)	1314
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
13	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496	11	FLOOR((TB_{size}	1455

				(Note 3)		– 376)/88)	
14	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
15	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
16	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
17	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
18	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	15MHz 2Rx	R.31-5 FDD		55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
19	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	10MHz 4Rx	R.31-7 FDD		63776 (Note 5)	6	FLOOR((TB_{size} – 240)/48)	1323
20	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
21	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB_{size} – 128)/16)	1138
	15MHz 2Rx	R.31-5 FDD		55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
22	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
23	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	5MHz 4Rx	R.31-10 FDD		31704 (Note 10)	3	FLOOR((TB_{size} – 152)/24)	1314
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
24	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB_{size} – 128)/16)	1138
	10MHz 2Rx	R.31-3A FDD		36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
25	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB_{size} – 128)/16)	1138
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.							

Note 2:	Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is: PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.
Note 3:	124464 bits for sub-frame 5.
Note 4:	90816 bits for sub-frame 5.
Note 5:	59256 bits for sub-frame 5.
Note 6:	71112 bits for sub-frame 5.
Note 7:	52752 bits for sub-frame 5.
Note 8:	35160 bits for sub-frame 5.
Note 9:	15840 bits for sub-frame 0.
Note 10:	30576 bits for sub-frame 0.

Table 8.7.9.4.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
240	3x20	4x4	-	-	9	2	1	-
220	15+20+20	4x4	-	-	8	2	2	-
200	20	2x2	-	-	9	3	3	-
	2x20	4x4						
200	10+20+20	4x4	-	-	10	4	4	-
190	15	2x2	-	-	8	5	5	-
	2x20	4x4						
180	20	2x2	-	-	8	6	6	-
	15+20	4x4						
180	10	2x2	-	-	11	7	7	-
	2x20	4x4						
170	15	2x2	-	-	8	8	8	-
	15+20	4x4						
160	2x20	2x2	-	-	9	9	9	-
	20	4x4						
160	20	2x2	-	-	10	10	10	-
	10+20	4x4						
160	10	2x2	-	-	11	11	11	-
	15+20	4x4						
160	5+15+20	4x4	-	-	12	12	12	-
150	15+20	2x2	-	-	13	13	13	-
	20	4x4						
140	2x20	2x2	-	-	14	14	14	-
	15	4x4						
140	10+20	2x2	-	-	15	15	15	-
	20	4x4						
140	2x15	2x2	-	-	16	16	16	-
	20	4x4						
130	15+20	2x2	-	-	17	17	17	-
	15	4x4						
130	10+15	2x2	-	-	18	18	18	-
	20	4x4						
120	2x20	2x2	-	-	19	19	19	-
	10	4x4						
120	10+20	2x2	-	-	20	20	20	-
	15	4x4						
120	5+15	2x2	-	-	21	21	21	-
	20	4x4						
120	2x10	2x2	-	-	22	22	22	-
	20	4x4						
120	20	2x2	-	-	23	23	23	-
	5+15	4x4						
110	5+10	2x2	-	-	24	24	24	-
	20	4x4						
100	2x5	2x2	-	-	25	25	25	-
	20	4x4						

Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.

Table 8.7.9.4.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-6 FDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	15MHz 4Rx	R.68-5 FDD	R.1-4 FDD	128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
4	10MHz 4Rx	R.68-4 FDD	R.1-4 FDD	84760 (Note 5)	8	FLOOR((TB_{size} – 296)/64)	1319
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
5	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
6	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
7	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
8	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
9	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
10	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	10MHz 4Rx	R.68-4 FDD		84760 (Note 5)	8	FLOOR((TB_{size} – 296)/64)	1319
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
11	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
12	5MHz 4Rx	R.68-7 FDD	R.1-4 FDD	42368 (Note 10)	4	FLOOR((TB_{size} – 184)/32)	1318
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
13	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544	15	FLOOR((TB_{size}	1408

				(Note 3)		– 488)/120)	
14	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
15	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
16	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
17	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
18	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	15MHz 2Rx	R.68-1 FDD		75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
19	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	10MHz 4Rx	R.68-4 FDD		84760 (Note 5)	8	FLOOR((TB_{size} – 296)/64)	1319
20	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
21	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB_{size} – 152)/24)	1014
	15MHz 2Rx	R.68-1 FDD		75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
22	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
23	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	5MHz 4Rx	R.68-7 FDD		42368 (Note 10)	4	FLOOR((TB_{size} – 184)/32)	1318
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
24	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB_{size} – 152)/24)	1014
	10MHz 2Rx	R.68-2 FDD		48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
25	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB_{size} – 152)/24)	1014
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.							

Note 2:	Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is: PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits. The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.
Note 3:	161760 bits for sub-frame 5.
Note 4:	124464 bits for sub-frame 5.
Note 5:	81176 bits for sub-frame 5.
Note 6:	81176 bits for sub-frame 5.
Note 7:	61664 bits for sub-frame 5.
Note 8:	40576 bits for sub-frame 5.
Note 9:	19848 bits for sub-frame 5.
Note 10:	39232 bits for sub-frames 0 and 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.9.4.4.1-1 depending on the UE category according to Table 8.7.9.4.4.1-2 for UE not supporting 256QAM or Table 8.7.9.4.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.4.4.1-1 and Table 8.7.9.4.4.1-3 depending on the UE category according to Table 8.7.9.4.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.4.4.1-1 and Table 8.7.9.4.4.1-5 depending on the UE category according to Table 8.7.9.4.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.9.4.4.3.

8.7.9.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with three SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.9.4.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.9.4.4.3-4. Cell ID = n (where n is 1, 2) applies to S-Celln (where n is 1, 2).

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.4.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.9.4.4.1-2. For UE supporting 256QAM the SS looks up

TB_{size} in Table 8.7.9.4.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.9.4.4.1-4.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.9.4.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.9.4.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.9.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.9.4.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.9.4.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.9.4.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.9.4.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

Table 8.7.9.4.4.3-5: *SCellToAddMod-r10*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SCellToAddMod-r10 ::= SEQUENCE {			
antennaInfoDedicatedSCell-v10i0 {			
maxLayersMIMO-r10	fourLayers		4TX
}			
}			

Condition	Explanation
4TX	4 SS Tx antenna S-Cell

8.7.9.4.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.9.4.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.9.5 FDD sustained data rate performance for 4 layer MIMO (4DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.9.5.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.9.5.2 Test applicability

This test applies to E-UTRA FDD release 11 and forward UE of DL category 15, 16, 18 and 19 that supports 4DL intra-band contiguous CA or 4DL inter-band CA or 4DL with intra-band contiguous and inter-band CA or 4DL with intra-band non-contiguous and inter-band CA or 4DL with intra-band non-contiguous and intra-band contiguous CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any FDD RF band.

8.7.9.5.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.9.1.

8.7.9.5.4 Test description

8.7.9.5.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.9.1-2, with the addition of the parameters in Table 8.7.9.5.4.1-1 and Table 8.7.9.5.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.5.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.9.1-3, with the addition of the parameters in Table 8.7.9.5.4.1-1 and Table 8.7.9.5.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.5.4.1-4.

Table 8.7.9.5.4.1-1: Test parameters for sustained downlink data rate (FDD 4DL CA)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	4x20	4 layer	4x4	320
2	20	2 layer	2x2	280
	3x20	4 layer	4x4	
3	10	2 layer	2x2	260
	3x20	4 layer	4x4	
4	15	2 layer	2x2	250
	15+20+20	4 layer	4x4	
5	2x20	2 layer	2x2	240
	2x20	4 layer	4x4	
6	10	2 layer	2x2	240
	15+20+20	4 layer	4x4	
7	10+10+20+20	4 layer	4x4	240
8	10+20	2 layer	2x2	220
	2x20	4 layer	4x4	
9	2x15	2 layer	2x2	220
	2x20	4 layer	4x4	
10	10	2 layer	2x2	220
	10+20+20	4 layer	4x4	
11	15+20	2 layer	2x2	210
	15+20	4 layer	4x4	
12	10+15	2 layer	2x2	210
	2x20	4 layer	4x4	
13	3x20	2 layer	2x2	200
	20	4 layer	4x4	
14	15+20	2 layer	2x2	200
	10+20	4 layer	4x4	
15	2x10	2 layer	2x2	200
	2x20	4 layer	4x4	
16	5+10	2 layer	2x2	190
	2x20	4 layer	4x4	
17	10+20+20	2 layer	2x2	180
	20	4 layer	4x4	
18	15+15+20	2 layer	2x2	180
	20	4 layer	4x4	
19	10+20	2 layer	2x2	180
	10+20	4 layer	4x4	
20	2x5	2 layer	2x2	180
	2x20	4 layer	4x4	
21	15+20+20	2 layer	2x2	170
	15	4 layer	4x4	
22	10+15+20	2 layer	2x2	170
	20	4 layer	4x4	
23	10+20+20	2 layer	2x2	160
	15	4 layer	4x4	
24	10+10+20	2 layer	2x2	160
	20	4 layer	4x4	
25	5+10+20	2 layer	2x2	150
	20	4 layer	4x4	
26	5+5+20	2 layer	2x2	140
	20	4 layer	4x4	
27	10+10+10	2 layer	2x2	140
	20	4 layer	4x4	
28	5+10+10	2 layer	2x2	130
	20	4 layer	4x4	
29	5+5+10	2 layer	2x2	120
	20	4 layer	4x4	

Editor's note: Tests in Table 8.7.9.5.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 4DL CA, which are defined in Table 5.4.2A.1-2, Table 5.4.2A.1-2a or Table 5.4.2A.1-2b.

Table 8.7.9.5.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
320	4x20	4x4	-	-	8	2	1	-
280	20	2x2	-	-	8	2	2	-
	3x20	4x4						
260	10	2x2	-	-	8	3	3	-
	3x20	4x4						
250	15	2x2	-	-	9	4	4	-
	15+20+20	4x4						
240	2x20	2x2	-	-	8	5	5	-
	2x20	4x4						
240	10	2x2	-	-	12	6	6	-
	15+20+20	4x4						
240	10+10+20 +20	4x4	-	-	10	7	7	-
220	10+20	2x2	-	-	8	8	8	-
	2x20	4x4						
220	2x15	2x2	-	-	9	9	9	-
	2x20	4x4						
220	10	2x2	-	-	10	10	10	-
	10+20+20	4x4						
210	15+20	2x2	-	-	11	11	11	-
	15+20	4x4						
210	10+15	2x2	-	-	12	12	12	-
	2x20	4x4						
200	3x20	2x2	-	-	13	13	13	-
	20	4x4						
200	15+20	2x2	-	-	14	14	14	-
	10+20	4x4						
200	2x10	2x2	-	-	15	15	15	-
	2x20	4x4						
190	5+10	2x2	-	-	16	16	16	-
	2x20	4x4						
180	10+20+20	2x2	-	-	17	17	17	-
	20	4x4						
180	15+15+20	2x2	-	-	18	18	18	-
	20	4x4						
180	10+20	2x2	-	-	19	19	19	-
	10+20	4x4						
180	2x5	2x2	-	-	20	20	20	-
	2x20	4x4						
170	15+20+20	2x2	-	-	21	21	21	-
	15	4x4						
170	10+15+20	2x2	-	-	22	22	22	-
	20	4x4						
160	10+20+20	2x2	-	-	23	23	23	-
	15	4x4						
160	10+10+20	2x2	-	-	24	24	24	-
	20	4x4						
150	5+10+20	2x2	-	-	25	25	25	-
	20	4x4						
140	5+5+20	2x2	-	-	26	26	26	-
	20	4x4						
140	10+10+10	2x2	-	-	27	27	27	-
	20	4x4						
130	5+10+10	2x2	-	-	28	28	28	-
	20	4x4						
120	5+5+10	2x2	-	-	29	29	29	-
	20	4x4						

Note 1:	Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.

Table 8.7.9.5.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 FDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
3	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
4	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
5	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
6	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
7	10MHz 4Rx	R.31-7 FDD	R.1-4 FDD	63776 (Note 5)	6	FLOOR((TB_{size} – 240)/48)	1323
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
8	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
9	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
10	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	10MHz 4Rx	R.31-7 FDD		63776 (Note 5)	6	FLOOR((TB_{size} – 240)/48)	1323
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
11	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
12	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	15MHz 2Rx	R.31-5 FDD		55056 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
13	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376	7	FLOOR((TB_{size}	1341

				(Note 6)		– 264)/56)	
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
14	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	10MHz 4Rx	R.31-7 FDD		63776 (Note 5)	6	FLOOR((TB$_{size}$ – 240)/48)	1323
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
15	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
16	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB$_{size}$ – 128)/16)	1138
	10MHz 2Rx	R.31-3A FDD		36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
17	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
18	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
19	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	10MHz 4Rx	R.31-7 FDD		63776 (Note 5)	6	FLOOR((TB$_{size}$ – 240)/48)	1323
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
20	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB$_{size}$ – 128)/16)	1138
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
21	15MHz 2Rx	R.31-5 FDD	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
22	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 2Rx	R.31-5 FDD		55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
23	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
24	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141

	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
25	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB_{size} – 128)/16)	1138
	10MHz 2Rx	R.31-3A FDD		36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
26	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB_{size} – 128)/16)	1138
	20MHz 2Rx	R.31-4 FDD		75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
27	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
28	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB_{size} – 128)/16)	1138
	10MHz 2Rx	R.31-3A FDD		36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
29	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 9)	2	FLOOR((TB_{size} – 128)/16)	1138
	10MHz 2Rx	R.31-3A FDD		36696 (Note 8)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 59256 bits for sub-frame 5.

Note 6: 71112 bits for sub-frame 5.

Note 7: 52752 bits for sub-frame 5.

Note 8: 35160 bits for sub-frame 5.

Note 9: 15840 bits for sub-frame 0.

Table 8.7.9.5.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
320	4x20	4x4	-	-	-	8	3	1
280	20	2x2	-	-	-	8	3	2
	3x20	4x4						
260	10	2x2	-	-	-	8	3	3
	3x20	4x4						
250	15	2x2	-	-	-	11	4	4
	15+20+20	4x4						
240	2x20	2x2	-	-	-	8	5	5
	2x20	4x4						
240	10	2x2	-	-	-	12	6	6
	15+20+20	4x4						
240	10+10+20 +20	4x4	-	-	-	10	7	7
220	10+20	2x2	-	-	-	8	8	8
	2x20	4x4						
220	2x15	2x2	-	-	-	11	9	9
	2x20	4x4						
220	10	2x2	-	-	-	10	10	10
	10+20+20	4x4						
210	15+20	2x2	-	-	-	11	11	11
	15+20	4x4						
210	10+15	2x2	-	-	-	12	12	12
	2x20	4x4						
200	3x20	2x2	-	-	-	13	13	13
	20	4x4						
200	15+20	2x2	-	-	-	14	14	14
	10+20	4x4						
200	2x10	2x2	-	-	-	15	15	15
	2x20	4x4						
190	5+10	2x2	-	-	-	16	16	16
	2x20	4x4						
180	10+20+20	2x2	-	-	-	17	17	17
	20	4x4						
180	15+15+20	2x2	-	-	-	18	18	18
	20	4x4						
180	10+20	2x2	-	-	-	19	19	19
	10+20	4x4						
180	2x5	2x2	-	-	-	20	20	20
	2x20	4x4						
170	15+20+20	2x2	-	-	-	21	21	21
	15	4x4						
170	10+15+20	2x2	-	-	-	22	22	22
	20	4x4						
160	10+20+20	2x2	-	-	-	23	23	23
	15	4x4						
160	10+10+20	2x2	-	-	-	24	24	24
	20	4x4						
150	5+10+20	2x2	-	-	-	25	25	25
	20	4x4						
140	5+5+20	2x2	-	-	-	26	26	26
	20	4x4						
140	10+10+10	2x2	-	-	-	27	27	27
	20	4x4						
130	5+10+10	2x2	-	-	-	28	28	28
	20	4x4						
120	5+5+10	2x2	-	-	-	29	29	29
	20	4x4						

Note 1:	Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.

Table 8.7.9.5.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-6 FDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
4	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
5	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
6	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
7	10MHz 4Rx	R.68-4 FDD	R.1-4 FDD	84760 (Note 5)	8	FLOOR((TB_{size} – 296)/64)	1319
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
8	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
9	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
10	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	10MHz 4Rx	R.68-4 FDD		84760 (Note 5)	8	FLOOR((TB_{size} – 296)/64)	1319
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
11	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
12	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	15MHz 2Rx	R.68-1 FDD		75376 (Note 7)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
13	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896	9	FLOOR((TB_{size}	1355

				(Note 6)		– 320)/72)	
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
14	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	10MHz 4Rx	R.68-4 FDD		84760 (Note 5)	8	FLOOR((TB$_{size}$ – 296)/64)	1319
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
15	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
16	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB$_{size}$ – 152)/24)	1014
	10MHz 2Rx	R.68-2 FDD		48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
17	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
18	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
19	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	10MHz 4Rx	R.68-4 FDD		84760 (Note 5)	8	FLOOR((TB$_{size}$ – 296)/64)	1319
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
20	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB$_{size}$ – 152)/24)	1014
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
21	15MHz 2Rx	R.68-1 FDD	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
22	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	15MHz 2Rx	R.68-1 FDD		75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
23	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
24	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218

	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
25	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB_{size} – 152)/24)	1014
	10MHz 2Rx	R.68-2 FDD		48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
26	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB_{size} – 152)/24)	1014
	20MHz 2Rx	R.68 FDD		97896 (Note 6)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
27	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
28	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB_{size} – 152)/24)	1014
	10MHz 2Rx	R.68-2 FDD		48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
29	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 9)	3	FLOOR((TB_{size} – 152)/24)	1014
	10MHz 2Rx	R.68-2 FDD		48936 (Note 8)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.
Note 4: 124464 bits for sub-frame 5.
Note 5: 81176 bits for sub-frame 5.
Note 6: 81176 bits for sub-frame 5.
Note 7: 61664 bits for sub-frame 5.
Note 8: 40576 bits for sub-frame 5.
Note 9: 19848 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.9.5.4.1-1 depending on the UE category according to Table 8.7.9.5.4.1-2 for UE not supporting 256QAM or Table 8.7.9.5.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.
2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.5.4.1-1 and Table 8.7.9.5.4.1-3 depending on the UE category according to Table 8.7.9.5.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.5.4.1-1 and Table 8.7.9.5.4.1-5 depending on the UE category according to Table 8.7.9.5.4.1-4.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.9.5.4.3.

8.7.9.5.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with three SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.9.5.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.9.5.4.3-4. Cell ID = n (where n is 1, 2, 3) applies to S-Celln (where n is 1, 2, 3).
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.5.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.9.5.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.5.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.9.5.4.1-4.
6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.9.5.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.9.5.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
11. The SS calculates the TB success rate as $A = 100\% * N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.9.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.9.5.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.9.5.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.9.5.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.9.5.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.9.5.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.9.5.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.9.6 FDD sustained data rate performance for 4 layer MIMO (5DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.9.6.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.9.6.2 Test applicability

This test applies to E-UTRA FDD release 11 and forward UE of DL category 15, 16, 18 and 19 that supports 5DL with intra-band contiguous and inter-band CA or 5DL with intra-band non-contiguous and inter-band CA or 5DL with intra-band non-contiguous and intra-band contiguous CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any FDD RF band.

This test applies to E-UTRA FDD release 12 and forward UE of DL category 15, 16, 18 and 19 that supports 5DL inter-band CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any FDD RF band.

8.7.9.6.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.9.1.

8.7.9.6.4 Test description

8.7.9.6.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.9.1-2, with the addition of the parameters in Table 8.7.9.6.4.1-1 and Table 8.7.9.6.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.6.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.9.1-3, with the addition of the parameters in Table 8.7.9.6.4.1-1 and Table 8.7.9.6.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.9.6.4.1-4.

Table 8.7.9.6.4.1-1: Test parameters for sustained downlink data rate (FDD 5DL CA)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	5x20	4 layer	4x4	400
2	20	2 layer	2x2	360
	4x20	4 layer	4x4	
3	10	2 layer	2x2	340
	4x20	4 layer	4x4	
4	2x20	2 layer	2x2	320
	3x20	4 layer	4x4	
5	10+20	2 layer	2x2	300
	3x20	4 layer	4x4	
6	3x20	2 layer	2x2	280
	2x20	4 layer	4x4	
7	10+20+20	2 layer	2x2	260
	2x20	4 layer	4x4	
8	10	2 layer	2x2	260
	10+10+20+20	4 layer	4x4	
9	20	2 layer	2x2	240
	4x20	4 layer	4x4	
10	10+10+20	2 layer	2x2	240
	2x20	4 layer	4x4	
11	5+10+20	2 layer	2x2	230
	2x20	4 layer	4x4	
12	10+20+20+20	2 layer	2x2	220
	20	4 layer	4x4	
13	3x10	2 layer	2x2	220
	2x20	4 layer	4x4	
14	10+10+20+20	2 layer	2x2	200
	20	4 layer	4x4	
15	10+10+20	2 layer	2x2	200
	10+20	4 layer	4x4	
16	5+10+20+20	2 layer	2x2	190
	20	4 layer	4x4	
17	10+10+10+20	2 layer	2x2	180
	20	4 layer	4x4	
18	4x10	2 layer	2x2	160
	20	4 layer	4x4	

Editor's note: Tests in Table 8.7.9.6.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 5DL CA, which are defined in Table 5.4.2A.1-2, Table 5.4.2A.1-2a, Table 5.4.2A.1-2b or Table 5.4.2A.1-2c.

Table 8.7.9.6.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
400	5x20	4x4	-	-	13	6	3	1
360	20	2x2	-	-	13	6	3	2
	4x20	4x4						
340	10	2x2	-	-	13	7	3	3
	4x20	4x4						
320	2x20	2x2	-	-	13	6	4	4
	3x20	4x4						
300	10+20	2x2	-	-	13	7	5	5
	3x20	4x4						
280	3x20	2x2	-	-	13	6	6	6
	2x20	4x4						
260	10+20+20	2x2	-	-	13	7	7	7
	2x20	4x4						
260	10	2x2	-	-	13	8	8	8
	10+10+20 +20	4x4						
240	20	2x2	-	-	14	9	9	9
	4x20	4x4						
240	10+10+20	2x2	-	-	13	10	10	10
	2x20	4x4						
230	5+10+20	2x2	-	-	16	11	11	11
	2x20	4x4						
220	10+20+20 +20	2x2	-	-	14	12	12	12
	20	4x4						
220	3x10	2x2	-	-	13	13	13	13
	2x20	4x4						
200	10+10+20 +20	2x2	-	-	14	14	14	14
	20	4x4						
200	10+10+20	2x2	-	-	15	15	15	15
	10+20	4x4						
190	5+10+20+ 20	2x2	-	-	16	16	16	16
	20	4x4						
180	10+10+10 +20	2x2	-	-	17	17	17	17
	20	4x4						
160	4x10	2x2	-	-	18	18	18	18
	20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.								

Table 8.7.9.6.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 FDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
3	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
4	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
5	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
6	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
7	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
8	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB_{size} – 184)/32)	1141
	10MHz 4Rx	R.31-7 FDD		63776 (Note 4)	6	FLOOR((TB_{size} – 240)/48)	1323
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
9	20MHz 2Rx	R.31-4 FDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
10	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
11	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 7)	2	FLOOR((TB_{size} – 128)/16)	1138
	10MHz 2Rx	R.31-3A FDD		36696 (Note 6)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
12	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
13	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696	4	FLOOR((TB_{size}	1141

				(Note 6)		– 184)/32)	
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
14	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
15	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	10MHz 4Rx	R.31-7 FDD		63776 (Note 4)	6	FLOOR((TB$_{size}$ – 240)/48)	1323
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
17	5MHz 2Rx	R.31-6 FDD	R.1-4 FDD	18336 (Note 7)	2	FLOOR((TB$_{size}$ – 128)/16)	1138
	10MHz 2Rx	R.31-3A FDD		36696 (Note 6)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
18	10MHz 2Rx	R.31-3A FDD	R.1-4 FDD	36696 (Note 6)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 59256 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 35160 bits for sub-frame 5.

Note 7: 15840 bits for sub-frame 0.

Table 8.7.9.6.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
400	5x20	4x4	-	-	-	13	7	2
360	20	2x2	-	-	-	13	7	2
	4x20	4x4						
340	10	2x2	-	-	-	13	7	3
	4x20	4x4						
320	2x20	2x2	-	-	-	13	7	4
	3x20	4x4						
300	10+20	2x2	-	-	-	13	7	5
	3x20	4x4						
280	3x20	2x2	-	-	-	13	7	6
	2x20	4x4						
260	10+20+20	2x2	-	-	-	13	7	7
	2x20	4x4						
260	10	2x2	-	-	-	13	8	8
	10+10+20 +20	4x4						
240	20	2x2	-	-	-	14	9	9
	4x20	4x4						
240	10+10+20	2x2	-	-	-	13	10	10
	2x20	4x4						
230	5+10+20	2x2	-	-	-	16	11	11
	2x20	4x4						
220	10+20+20 +20	2x2	-	-	-	14	12	12
	20	4x4						
220	3x10	2x2	-	-	-	13	13	13
	2x20	4x4						
200	10+10+20 +20	2x2	-	-	-	14	14	14
	20	4x4						
200	10+10+20	2x2	-	-	-	15	15	15
	10+20	4x4						
190	5+10+20+ 20	2x2	-	-	-	16	16	16
	20	4x4						
180	10+10+10 +20	2x2	-	-	-	17	17	17
	20	4x4						
160	4x10	2x2	-	-	-	18	18	18
	20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.9.1. Only one test point to be tested.								

Table 8.7.9.6.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-6 FDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	10MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
4	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
5	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
6	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
7	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
8	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1218
	10MHz 4Rx	R.68-4 FDD		84760 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1319
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
9	20MHz 2Rx	R.68 FDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
10	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
11	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 7)	3	FLOOR((TB_{size} – 152)/24)	1014
	10MHz 2Rx	R.68-2 FDD		48936 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
12	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
13	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936	5	FLOOR((TB_{size}	1218

				(Note 6)		– 208)/40)	
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
14	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
15	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	10MHz 4Rx	R.68-4 FDD		84760 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1319
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
17	5MHz 2Rx	R.68-3 FDD	R.1-4 FDD	24496 (Note 7)	3	FLOOR((TB$_{size}$ – 152)/24)	1014
	10MHz 2Rx	R.68-2 FDD		48936 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
18	10MHz 2Rx	R.68-2 FDD	R.1-4 FDD	48936 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4: 81176 bits for sub-frame 5.

Note 5: 81176 bits for sub-frame 5.

Note 6: 40576 bits for sub-frame 5.

Note 7: 19848 bits for sub-frame 0.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.9.6.4.1-1 depending on the UE category according to Table 8.7.9.6.4.1-2 for UE not supporting 256QAM or Table 8.7.9.6.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.
2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.6.4.1-1 and Table 8.7.9.6.4.1-3 depending on the UE category according to Table 8.7.9.6.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.9.1-1, Table 8.7.9.6.4.1-1 and Table 8.7.9.6.4.1-5 depending on the UE category according to Table 8.7.9.6.4.1-4.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.9.6.4.3.

8.7.9.6.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with four SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.9.6.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.9.6.4.3-4. Cell ID = n (where n is 1, 2, 3, 4) applies to S-Celln (where n is 1, 2, 3, 4).
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.6.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.9.6.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.9.6.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.9.6.4.1-4.
6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.9.6.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.9.6.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
11. The SS calculates the TB success rate as $A = 100\% * N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.9.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.9.6.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.9.6.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.9.6.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Condition	**Explanation**

2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.9.6.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.9.6.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.9.6.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.10 TDD sustained data rate performance (4 layer MIMO)

8.7.10.1 Minimum conformance requirements

The parameters specified in Table 8.7.10.1-1 are valid for all TDD tests unless otherwise stated.

Table 8.7.10.1-1: Common Test Parameters (TDD)

Parameter	Unit	Value
Transmission mode		3
Special subframe configuration (Note 1)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,0,1,2} for 64QAM and 256QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured
Propagation condition		Static propagation condition No external noise sources are applied
$\hat{E}_s$ at antenna port	dBm/15kHz	-85
Symbols for unused PRBs		OP.1 TDD
Antenna configuration	2 layer CC	2x2 or 2x4
	4 layer CC	4x4
Codebook subset restriction	2 layer CC	10
	4 layer CC	1000
Downlink power allocation	2 layer CC	ρ_A = -3dB, ρ_B = -3dB, σ = 0dB
	4 layer CC	ρ_A = -6dB, ρ_B = -6dB, σ = 3dB
Symbols for unused PRBs		OP.1 TDD

For UE not supporting 256QAM, the TB success rate shall be higher than 85% when PDSCH are scheduled with FRC in Table 8.7.10.1-2 with the downlink physical channel setup according to Annex C.3.2.

For UE supporting 256QAM, the TB success rate shall be higher than 85% when PDSCH are scheduled with FRC in Table 8.7.10.1-3 with the downlink physical channel setup according to Annex C.3.2. For UE supporting 256QAM, the requirement with 64QAM is not applicable.

The TB success rate is defined as $100\%*N_{DL_correct_rx}/ (N_{DL_newtx} + N_{DL_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.10.1-2: Per-CC FRC for SDR test(TDD 64QAM)

MIMO layer	Bandwidth	Reference channel
2 layer	10	R.31-6 TDD
	15	R.31-5 TDD
	20	R.31-4 TDD
4 layer	10	R.31-7 TDD
	15	R.31-8 TDD
	20	R.31-9 TDD

Table 8.7.10.1-3: Per-CC FRC for SDR test (TDD 256QAM)

MIMO layer	Bandwidth	Reference channel
2 layer	10	R.68-2 TDD
	15	R.68-1 TDD
	20	R.68 TDD
4 layer	10	R.68-4 TDD
	15	R.68-5 TDD
	20	R.68-6 TDD

CA configuration, bandwidth combination and MIMO layer on each CC is determined by following procedure.

- Select one CA bandwidth combination among all supported CA configurations with bandwidth combination and MIMO layer on each CC that leads to largest equivalent aggregated bandwidth among all CA bandwidth combinations supported by UE. Equivalent aggregated bandwidth is defined as

$$B_{agg} = \sum_{i=0}^{N-1} R_i B_i$$

  where N is number of CCs, $R_i \in \{2,4\}$ and $B_i \in \{5,10,15,20\}$ is MIMO layer and bandwidth of CC i.

- When there are multiple sets of {CA configuration, bandwidth combination, MIMO layer} with same largest aggregated bandwidth, select one among sets with largest number of 4 layer CCs.

8.7.10.2 TDD sustained data rate performance for 4 layer MIMO (single carrier)

8.7.10.2.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.10.2.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UE of category 6 and 7 and DL category 13 that supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any TDD RF band.

8.7.10.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.10.1.

8.7.10.2.4 Test description

8.7.10.2.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.10.1-2, with the addition of the parameters in Table 8.7.10.2.4.1-1 and Table 8.7.10.2.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.2.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.10.1-3, with the addition of the parameters in Table 8.7.10.2.4.1-1 and Table 8.7.10.2.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.2.4.1-4.

Table 8.7.10.2.4.1-1: Test parameters for sustained downlink data rate (TDD single carrier)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	20	4 layer	4x4	80

Table 8.7.10.2.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 6, 7	Cat. 9, 10	Cat. 11, 12	DL Cat. 13
B_{agg} (MHz)	BW (MHz)	MIMO layer		DL Cat. 9, 10	DL Cat. 11, 12	
80	20	4	1	-	-	-
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.						

Table 8.7.10.2.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 TDD	R.1-4 TDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Table 8.7.10.2.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW (MHz)	MIMO layer	DL Cat. 11, 12					
80	20	4	-	1	-	-	-	-
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.								

Table 8.7.10.2.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-7 TDD	R.1-4 TDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.10.2.4.1-1 depending on the UE category according to Table 8.7.10.2.4.1-2 for UE not supporting 256QAM or Table 8.7.10.2.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.74 (without using faders and AWGN generators).

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.2.4.1-1 and Table 8.7.10.2.4.1-3 depending on the UE category according to Table 8.7.10.2.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.2.4.1-1 and Table 8.7.10.2.4.1-5 depending on the UE category according to Table 8.7.10.2.4.1-4.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.9.2.4.3.

8.7.9.2.4.2 Test procedure

1. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

2. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.2.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.10.2.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.2.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.10.2.4.1-4.

3. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and N_{DL_PDCP} to 0.

4. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.10.2.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.10.2.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

6. Steps 4 to 5 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

7. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

8. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

9. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

10. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.10.2.4.3 Message contents

Table 8.7.10.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.9.4.2.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			

}			
}			
}			

Table 8.7.10.2.4.3-3: *RRCConnectionReconfiguration*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {			
nonCriticalExtension SEQUENCE {			
antennaInfoDedicatedPCell-v10i0 SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			
}			

Table 8.7.10.2.4.3-4: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.8.2.1.6-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm3	1000		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

8.7.10.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.10.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.10.3 TDD sustained data rate performance for 4 layer MIMO (2DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.10.3.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.10.3.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UE of category 9, 10, 11 and 12 and DL category 9, 10, 11, 12 and 15 that supports inter-band OR intra-band contiguous DL CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any TDD RF band.

This test also applies to E-UTRA TDD release 11 and forward UE of category 9, 10, 11 and 12 and DL category 9, 10, 11, 12 and 15 that supports intra band non-contiguous DL CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any TDD RF band.

8.7.10.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.10.1.

8.7.10.3.4 Test description

8.7.10.3.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.10.1-2, with the addition of the parameters in Table 8.7.10.3.4.1-1 and Table 8.7.10.3.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.3.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.10.1-3, with the addition of the parameters in Table 8.7.10.3.4.1-1 and Table 8.7.10.3.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.3.4.1-4.

Table 8.7.10.3.4.1-1: Test parameters for sustained downlink data rate (TDD 2DL CA)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	2x20	4 layer	4x4	160
2	15+20	4 layer	4x4	140
3	20	2 layer	2x2	120
	20	4 layer	4x4	

Editor's note: Tests in Table 8.7.10.3.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 2DL CA which are defined in Table 5.4.2A.1-1, Table 5.4.2A.1-2 or Table 5.4.2A.1-3.

Table 8.7.10.3.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
160	2x20	4	2	1	-	-	-	-	-
140	15+20	4	2	2	-	-	-	-	-
120	20	2	3	3	-	-	-	-	-
	20	4							
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.									

Table 8.7.10.3.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 TDD	R.1-4 TDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	15MHz 4Rx	R.31-8 TDD	R.1-4 TDD	93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
3	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Table 8.7.10.3.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	MIMO layer	DL Cat. 11, 12					
160	2x20	4	2	-	1	-	-	-
140	15+20	4	2	-	2	-	-	-
120	20	2	3	-	3	-	-	-
	20	4						

Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.

Table 8.7.10.3.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-7 TDD	R.1-4 TDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	15MHz 4Rx	R.68-6 TDD	R.1-4 TDD	128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4: 124464 bits for sub-frame 5.

Note 5: 81176 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.10.3.4.1-1 depending on the UE category according to Table 8.7.10.3.4.1-2 for UE not supporting 256QAM or Table 8.7.10.3.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.3.4.1-1 and Table 8.7.10.3.4.1-3 depending on the UE category according to Table 8.7.10.3.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.3.4.1-1 and Table 8.7.10.3.4.1-5 depending on the UE category according to Table 8.7.10.3.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.10.3.4.3.

8.7.10.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.10.3.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.10.3.4.3-4. Cell ID = 1 applies to S-Cell.
3. The SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.3.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.10.3.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.3.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.10.3.4.1-4.
6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.
7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.10.3.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.10.3.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.
12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$
13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.10.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.10.3.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.10.3.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.10.3.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Condition	**Explanation**

2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.10.3.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	**Explanation**
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.10.3.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.10.3.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.10.4 TDD sustained data rate performance for 4 layer MIMO (3DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.10.4.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.10.4.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UE of category 11 and 12 and DL category 11, 12, 15, 16 and 18 that supports 3DL intra-band contiguous CA or 3DL inter-band CA or 3DL with intra-band contiguous and inter-band CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any TDD RF band.

This test applies to E-UTRA TDD release 11 and forward UE of category 11 and 12 and DL category 11, 12, 15, 16 and 18 that supports 3DL with intra-band non-contiguous and inter-band CA or 3DL with intra-band non-contiguous and intra-band contiguous CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any TDD RF band.

8.7.10.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.10.1.

8.7.10.4.4 Test description

8.7.10.4.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.10.1-2, with the addition of the parameters in Table 8.7.10.4.4.1-1 and Table 8.7.10.4.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.4.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.10.1-3, with the addition of the parameters in Table 8.7.10.4.4.1-1 and Table 8.7.10.4.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.4.4.1-4.

Table 8.7.10.4.4.1-1: Test parameters for sustained downlink data rate (TDD 3DL CA)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	3x20	4 layer	4x4	240
2	15+20+20	4 layer	4x4	220
3	20	2 layer	2x2	200
	2x20	4 layer	4x4	
4	20	2 layer	2x2	180
	15+20	4 layer	4x4	
5	2x20	2 layer	2x2	160
	20	4 layer	4x4	
6	15+20	2 layer	2x2	150
	20	4 layer	4x4	

Editor's note: Tests in Table 8.7.10.4.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 3DL CA which are defined in Table 5.4.2A.1-1 or Table 5.4.2A.1-2.

Table 8.7.10.4.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
240	3x20	4x4	4	-	2	1	-	-
220	15+20+20	4x4	4	-	2	2	-	-
200	20	2x2	4	-	3	3	-	-
	2x20	4x4						
180	20	2x2	4	-	4	4	-	-
	15+20	4x4						
160	2x20	2x2	5	-	5	5	-	-
	20	4x4						
150	15+20	2x2	6	-	6	6	-	-
	20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.								

Table 8.7.10.4.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 TDD	R.1-4 TDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	15MHz 4Rx	R.31-8 TDD	R.1-4 TDD	93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
3	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
4	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 TDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
5	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
6	15MHz 2Rx	R.31-5 TDD	R.1-4 TDD	55056 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 2Rx	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 52752 bits for sub-frame 5.

Table 8.7.10.4.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
240	3x20	4x4	-	-	5	2	1	-
220	15+20+20	4x4	-	-	6	2	2	-
200	20	2x2	-	-	5	3	3	-
	2x20	4x4						
180	20	2x2	-	-	6	4	4	-
	15+20	4x4						
160	2x20	2x2	-	-	5	5	5	-
	20	4x4						
150	15+20	2x2	-	-	6	6	6	-
	20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.								

Table 8.7.10.4.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-7 TDD	R.1-4 TDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	15MHz 4Rx	R.68-6 TDD	R.1-4 TDD	128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
4	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-6 TDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
5	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
6	15MHz 2Rx	R.68-1 TDD	R.1-4 TDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 2Rx	R.68 TDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4: 124464 bits for sub-frame 5.

Note 5: 81176 bits for sub-frame 5.

Note 6: 61664 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.10.4.4.1-1 depending on the UE category according to Table 8.7.10.4.4.1-2 for UE not supporting 256QAM or Table 8.7.10.4.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.4.4.1-1 and Table 8.7.10.4.4.1-3 depending on the UE category according to Table 8.7.10.4.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.4.4.1-1 and Table 8.7.10.4.4.1-5 depending on the UE category according to Table 8.7.10.4.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.10.4.4.3.

8.7.10.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with two SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.10.4.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.10.4.4.3-4. Cell ID = n (where n is 1, 2) applies to S-Celln (where n is 1, 2).

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.4.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.10.4.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.4.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.10.4.4.1-4.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.10.4.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.10.4.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\% * N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.10.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.10.4.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.10.4.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.10.4.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.10.4.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.10.4.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.10.4.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.10.5 TDD sustained data rate performance for 4 layer MIMO (4DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.10.5.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.10.5.2 Test applicability

This test case applies to all types of E-UTRA TDD UE release 11 and forward of UE DL category 16, 18 and 19 that support 4DL Intra-band contiguous CA or 4DL Inter-band CA or 4DL with Intra-band contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Inter-band CA or 4DL with Intra-band non-contiguous and Intra-band contiguous CA or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any TDD RF band.

8.7.10.5.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.10.1.

8.7.10.5.4 Test description

8.7.10.5.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.10.1-2, with the addition of the parameters in Table 8.7.10.5.4.1-1 and Table 8.7.10.5.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.5.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.10.1-3, with the addition of the parameters in Table 8.7.10.5.4.1-1 and Table 8.7.10.5.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.5.4.1-4.

Table 8.7.10.5.4.1-1: Test parameters for sustained downlink data rate (TDD 4DL CA)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	4x20	4 layer	4x4	320
2	15+20+20+20	4 layer	4x4	300
3	20	2 layer	2x2	280
	3x20	4 layer	4x4	
4	2x20	2 layer	2x2	240
	2x20	4 layer	4x4	
5	15+20	2 layer	2x2	230
	2x20	4 layer	4x4	
6	2x20	2 layer	2x2	220
	15+20	4 layer	4x4	
7	3x20	2 layer	2x2	200
	20	4 layer	4x4	

Editor's note: Tests in Table 8.7.10.5.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 4DL CA which are defined in Table 5.4.2A.1-1 or Table 5.4.2A.1-2.

Table 8.7.10.5.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
320	4x20	4x4	-	-	-	2	1	-
300	15+20+20 +20	4x4	-	-	-	2	2	-
280	20	2x2	-	-	-	3	3	-
	3x20	4x4						
240	2x20	2x2	-	-	-	4	4	-
	2x20	4x4						
230	15+20	2x2	-	-	-	5	5	-
	2x20	4x4						
220	2x20	2x2	-	-	-	6	6	-
	15+20	4x4						
200	3x20	2x2	-	-	-	7	7	-
	20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.								

Table 8.7.10.5.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 TDD	R.1-4 TDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	15MHz 4Rx	R.31-8 TDD	R.1-4 TDD	93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
3	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
4	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
5	15MHz 2Rx	R.31-5 TDD	R.1-4 TDD	55056 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 2Rx	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
6	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 TDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
7	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 52752 bits for sub-frame 5.

Table 8.7.10.5.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
320	4x20	4x4	-	-	-	-	4	1
300	15+20+20 +20	4x4	-	-	-	-	5	2
280	20	2x2	-	-	-	-	4	3
	3x20	4x4						
240	2x20	2x2	-	-	-	-	4	4
	2x20	4x4						
230	15+20	2x2	-	-	-	-	5	5
	2x20	4x4						
220	2x20	2x2	-	-	-	-	6	6
	15+20	4x4						
200	3x20	2x2	-	-	-	-	7	7
	20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.								

Table 8.7.10.5.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-7 TDD	R.1-4 TDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	15MHz 4Rx	R.68-6 TDD	R.1-4 TDD	128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
4	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
5	15MHz 2Rx	R.68-1 TDD	R.1-4 TDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 2Rx	R.68 TDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
6	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-6 TDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
7	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4: 124464 bits for sub-frame 5.

Note 5: 81176 bits for sub-frame 5.

Note 6: 61664 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.10.5.4.1-1 depending on the UE category according to Table 8.7.10.5.4.1-2 for UE not supporting 256QAM or Table 8.7.10.5.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.5.4.1-1 and Table 8.7.10.5.4.1-3 depending on the UE category according to Table 8.7.10.5.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.5.4.1-1 and Table 8.7.10.5.4.1-5 depending on the UE category according to Table 8.7.10.5.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.10.5.4.3.

8.7.10.5.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with three SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.10.5.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.10.5.4.3-4. Cell ID = n (where n is 1, 2, 3) applies to S-Celln (where n is 1, 2, 3).

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.5.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.10.5.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.5.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.10.5.4.1-4.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.10.5.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.10.5.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.10.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.10.5.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.10.5.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.10.5.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.10.5.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.10.5.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.10.5.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.10.6 TDD sustained data rate performance for 4 layer MIMO (5DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.10.6.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.10.6.2 Test applicability

This test applies to E-UTRA TDD release 11 and forward UE of DL category 18 and 19 that supports 5DL intra-band contiguous CA or 5DL with intra-band contiguous and inter-band CA and supports 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any TDD RF band.

8.7.10.6.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.10.1.

8.7.10.6.4 Test description

8.7.10.6.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.10.1-2, with the addition of the parameters in Table 8.7.10.6.4.1-1 and Table 8.7.10.6.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.6.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.10.1-3, with the addition of the parameters in Table 8.7.10.6.4.1-1 and Table 8.7.10.6.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.10.6.4.1-4.

Table 8.7.10.6.4.1-1: Test parameters for sustained downlink data rate (TDD 5DL CA)

Test	Bandwidth (MHz)	MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
1	5x20	4 layer	4x4	400
2	15+20+20+20+20	4 layer	4x4	380
3	2x20	2 layer	2x2	320
	3x20	4 layer	4x4	
4	15+20	2 layer	2x2	310
	3x20	4 layer	4x4	
5	3x20	2 layer	2x2	280
	2x20	4 layer	4x4	
6	3x20	2 layer	2x2	260
	15+20	4 layer	4x4	

Editor's note: Tests in Table 8.7.10.6.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 5DL CA which are defined in Table 5.4.2A.1-1 and Table 5.4.2A.1-2.

Table 8.7.10.6.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
400	5x20	4x4	-	-	-	-	3	1
380	15+20+20 +20+20	4x4	-	-	-	-	4	2
320	2x20	2x2	-	-	-	-	3	3
	3x20	4x4						
310	15+20	2x2	-	-	-	-	4	4
	3x20	4x4						
280	3x20	2x2	-	-	-	-	5	5
	2x20	4x4						
260	3x20	2x2	-	-	-	-	6	6
	15+20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.								

Table 8.7.10.6.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.31-9 TDD	R.1-4 TDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	15MHz 4Rx	R.31-8 TDD	R.1-4 TDD	93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
3	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
4	15MHz 2Rx	R.31-5 TDD	R.1-4 TDD	55056 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 2Rx	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
5	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
6	20MHz 2Rx	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 TDD		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 52752 bits for sub-frame 5.

Table 8.7.10.6.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW			Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)	Antenna config.	DL Cat. 11, 12					
400	5x20	4x4	-	-	-	-	-	3
380	15+20+20 +20+20	4x4	-	-	-	-	-	4
320	2x20	2x2	-	-	-	-	-	3
	3x20	4x4						
310	15+20	2x2	-	-	-	-	-	4
	3x20	4x4						
280	3x20	2x2	-	-	-	-	-	5
	2x20	4x4						
260	3x20	2x2	-	-	-	-	-	6
	15+20	4x4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.10.1. Only one test point to be tested.								

Table 8.7.10.6.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel	UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
1	20MHz 4Rx	R.68-7 TDD	R.1-4 TDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	15MHz 4Rx	R.68-6 TDD	R.1-4 TDD	128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
4	15MHz 2Rx	R.68-1 TDD	R.1-4 TDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 2Rx	R.68 TDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
5	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
6	20MHz 2Rx	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-6 TDD		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).
The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,
where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 52752 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.10.6.4.1-1 depending on the UE category according to Table 8.7.10.6.4.1-2 for UE not supporting 256QAM or Table 8.7.10.6.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.6.4.1-1 and Table 8.7.10.6.4.1-3 depending on the UE category according to Table 8.7.10.6.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.10.1-1, Table 8.7.10.6.4.1-1 and Table 8.7.10.6.4.1-5 depending on the UE category according to Table 8.7.10.6.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.10.6.4.3.

8.7.10.6.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4 with four SCCs configured. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.10.6.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.10.6.4.3-4. Cell ID = n (where n is 1, 2, 3, 4) applies to S-Celln (where n is 1, 2, 3, 4).

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.6.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.10.6.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.10.6.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.10.6.4.1-4.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.10.6.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.10.6.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\% * N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.10.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.10.6.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.10.6.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.10.6.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Condition	**Explanation**

2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.10.6.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.10.6.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.10.6.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.11 TDD FDD CA Sustained data rate performance (4 layer MIMO)

8.7.11.1 Minimum conformance requirements

The parameters specified in Table 8.7.11.1-1 are valid for all TDD FDD CA tests unless otherwise stated.

Table 8.7.11.1-1: Common Test Parameters (TDD FDD CA)

Parameter	Unit	FDD CC	TDD CC
Transmission mode		3	3
Uplink downlink configuration (Note 1)		N/A	1
Special subframe configuration (Note 2)		N/A	4
Cyclic prefix		Normal	Normal
Cell ID		0	0
Inter-TTI Distance		1	1
Number of HARQ processes per component carrier	Processes	8	8
Maximum number of HARQ transmission		4	4
Redundancy version coding sequence		{0,0,1,2} for 64QAM and 256QAM	{0,0,1,2} for 64QAM and 256QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1	1
Cross carrier scheduling		Not configured	Not configured
Propagation condition		Static propagation condition No external noise sources are applied	Static propagation condition No external noise sources are applied
$\hat{E}_s$ at antenna port	dBm/15kHz	-85	-85
Antenna configuration	2 layer CC	2x2 or 2x4	2x2 or 2x4
	4 layer CC	4x4	4x4
Codebook subset restriction	2 layer CC	10	10
	4 layer CC	1000	1000
Downlink power allocation	2 layer CC	ρ_A = -3dB, ρ_B = -3dB, σ = 0dB	ρ_A = -3dB, ρ_B = -3dB, σ = 0dB
	4 layer CC	ρ_A = -6dB, ρ_B = -6dB, σ = 3dB	ρ_A = -6dB, ρ_B = -6dB, σ = 3dB
Symbols for unused PRBs		OP.1 FDD	OP.1 TDD

Note 1: as specified in Table 4.2-2 in TS 36.211 [4].
Note 2: as specified in Table 4.2-1 in TS 36.211 [4].

For UE not supporting 256QAM, the TB success rate shall be higher than 85% when PDSCH are scheduled with FRC in Table 8.7.11.1-2 with the downlink physical channel setup according to Annex C.3.2.

For UE supporting 256QAM, the TB success rate shall be higher than 85% when PDSCH are scheduled with FRC in Table 8.7.11.1-3 with the downlink physical channel setup according to Annex C.3.2. For UE supporting 256QAM, the requirement with 64QAM is not applicable.

The TB success rate is defined as $100\%*N_{DL_correct_rx}/ (N_{DL_newtx} + N_{DL_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL_correct_rx}$ is the number of correctly received DL transport blocks. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.11.1-2: Per-CC FRC for SDR test (TDD-FDD 64QAM)

MIMO layer	Bandwidth	FDD Reference channel	TDD Reference channel
2 layer	5	R.31-6 FDD	N/A
	10	R.31-3A FDD	R.31-6 TDD
	15	R.31-5 FDD	R.31-5 TDD
	20	R.31-4 FDD	R.31-4 TDD
4 layer	5	R.31-10 FDD	N/A
	10	R.31-7 FDD	R.31-7 TDD
	15	R.31-8 FDD	R.31-8 TDD
	20	R.31-9 FDD	R.31-9 TDD

Table 8.7.11.1-3: Per-CC FRC for SDR test (TDD-FDD 256QAM)

MIMO layer	Bandwidth	FDD Reference channel	TDD Reference channel
2 layer	5	R.68-3 FDD	N/A
	10	R.68-2 FDD	R.68-2 TDD
	15	R.68-1 FDD	R.68-1 TDD
	20	R.68 FDD	R.68 TDD
4 layer	5	R.68-7 FDD	N/A
	10	R.68-4 FDD	R.68-4 TDD
	15	R.68-5 FDD	R.68-5 TDD
	20	R.68-6 FDD	R.68-6 TDD

CA configuration, bandwidth combination and MIMO layer on each CC is determined by following procedure.

- Select one CA bandwidth combination among all supported CA configurations with bandwidth combination and MIMO layer on each CC that leads to largest equivalent aggregated bandwidth among all CA bandwidth combinations supported by UE. Equivalent aggregated bandwidth is defined as

$$B_{agg} = \sum_{i=0}^{N-1} R_i B_i$$

  where N is number of CCs, $R_i \in \{2,4\}$ and $B_i \in \{5,10,15,20\}$ is MIMO layer and bandwidth of CC i.

- When there are multiple sets of {CA configuration, bandwidth combination, MIMO layer} with same largest aggregated bandwidth, select one among sets with largest number of 4 layer CCs.

8.7.11.2 TDD FDD CA sustained data rate performance for 4 layer MIMO (2DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.11.2.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.11.2.2 Test applicability

This test applies to all types of UE Release 12 and forward of category 9, 10, 11 and 12, and DL category 9, 10, 11, 12 and 15 that support E-UTRA FDD and TDD, 2DL TDD-FDD CA and support 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any RF band..

8.7.11.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.11.1.

8.7.11.2.4 Test description

8.7.11.2.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.11.1-2, with the addition of the parameters in Table 8.7.11.2.4.1-1 and Table 8.7.11.2.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.11.2.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.11.1-3, with the addition of the parameters in Table 8.7.11.2.4.1-1 and Table 8.7.11.2.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.11.2.4.1-4.

Table 8.7.11.2.4.1-1: Test parameters for sustained downlink data rate (TDD FDD 2DL CA)

Test	Bandwidth (MHz)			MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
	Total	FDD CC	TDD CC			
1	2x20	20	20	4 layer	4x4	160
2	15+20	15	20	4 layer	4x4	140
3	20	20	-	2 layer	2x2	120
	20	-	20	4 layer	4x4	
4	20	-	20	2 layer	2x2	120
	20	20	-	4 layer	4x4	
5	15	15	-	2 layer	2x2	110
	20	-	20	4 layer	4x4	
6	20	-	20	2 layer	2x2	100
	15	15	-	4 layer	4x4	
7	10	10	-	2 layer	2x2	100
	20	-	20	4 layer	4x4	

Editor's note: Tests in Table 8.7.11.2.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 2DL CA which are defined in Table 5.4.2A.1-2.

Table 8.7.11.2.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW				Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
Bagg (MHz)	BW combi-nation (MHz)		MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
	FDD CC	TDD CC								
160	20	20	4	3	1	-	-	-	-	-
140	15	20	4	2	2	-	-	-	-	-
120	20	-	2	3	3	-	-	-	-	-
	-	20	4							
120	-	20	2	4	4	-	-	-	-	-
	20	-	4							
110	15	-	2	5	5	-	-	-	-	-
	-	20	4							
100	-	20	2	6	6	-	-	-	-	-
	15	-	4							
100	10	-	2	7	7	-	-	-	-	-
	-	20	4							
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.11.1. Only one test point to be tested.										

Table 8.7.11.2.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel		UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
		FDD CC	TDD CC					
1	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
2	15MHz 4Rx	R.31-8 FDD	-	R.1-4 TDD	93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
	20MHz 4Rx		R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
3	20MHz 2Rx	R.31-4 FDD	-	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
4	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
5	15MHz 2Rx	R.31-5 FDD	-	R.1-4 TDD	55056 (Note 6)	5	FLOOR((TB_{size} – 208)/40)	1371
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455
6	20MHz 2Rx	-	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461
7	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 7)	4	FLOOR((TB_{size} – 184)/32)	1141
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB_{size} – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 52752 bits for sub-frame 5.

Note 7: 35160 bits for sub-frame 5.

Table 8.7.11.2.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW				Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
B_{agg} (MHz)	BW combi-nation (MHz)		MIMO layer	DL Cat. 11, 12					
	FDD CC	TDD CC							
160	20	20	4	3	5	1	-	-	-
140	15	20	4	2	5	2	-	-	-
120	20	-	2	3	5	3	-	-	-
	-	20	4						
120	-	20	2	4	6	4	-	-	-
	20	-	4						
110	15	-	2	5	5	5	-	-	-
	-	20	4						
100	-	20	2	6	6	6	-	-	-
	15	-	4						
100	10	-	2	7	7	7	-	-	-
	-	20	4						
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.11.1. Only one test point to be tested.									

Table 8.7.11.2.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel		UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
		FDD CC	TDD CC					
1	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	15MHz 4Rx	R.68-5 FDD	-	R.1-4 TDD	128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx		R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	20MHz 2Rx	R.68 FDD	-	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
4	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
5	15MHz 2Rx	R.68-1 FDD	-	R.1-4 TDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
6	20MHz 2Rx	-	R.68 TDD	R.1-4 TDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
7	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4: 124464 bits for sub-frame 5.

Note 5: 81176 bits for sub-frame 5.

Note 6: 61664 bits for sub-frame 5.

Note 7: 40576 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.11.2.4.1-1 depending on the UE category according to Table 8.7.11.2.4.1-2 for UE not supporting 256QAM or Table 8.7.11.2.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.11.1-1, Table 8.7.11.2.4.1-1 and Table 8.7.11.2.4.1-3 depending on the UE category according to Table 8.7.11.2.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.11.1-1, Table 8.7.11.2.4.1-1 and Table 8.7.11.2.4.1-5 depending on the UE category according to Table 8.7.11.2.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.11.2.4.3.

8.7.11.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.11.2.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.11.2.4.3-4. Cell ID = 1 applies to S-Cell.

3. The SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.11.2.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.11.2.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.11.2.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.11.2.4.1-4.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.11.2.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.11.2.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\% * N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.11.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.11.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.11.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.11.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Condition	**Explanation**

2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.11.2.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.11.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.11.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.11.3 TDD FDD CA sustained data rate performance for 4 layer MIMO (3DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.11.3.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.11.3.2 Test applicability

This test applies to all types of UE Release 12 and forward of category 11 and 12, and DL category 11, 12, 15, 16 and 18 that support E-UTRA FDD and TDD, 3DL TDD-FDD CA and support 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any RF band.

8.7.11.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.11.1.

8.7.11.3.4 Test description

8.7.11.3.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.11.1-2, with the addition of the parameters in Table 8.7.11.3.4.1-1 and Table 8.7.11.3.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.11.3.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.11.1-3, with the addition of the parameters in Table 8.7.11.3.4.1-1 and Table 8.7.11.3.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.11.3.4.1-4.

Table 8.7.11.3.4.1-1: Test parameters for sustained downlink data rate (TDD FDD 3DL CA)

Test	Bandwidth (MHz)			MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
	Total	FDD CC	TDD CC			
1	3x20	20	2x20	4 layer	4x4	240
2	3x20	2x20	20	4 layer	4x4	240
3	15+20+20	15	2x20	4 layer	4x4	220
4	15+20+20	15+20	20	4 layer	4x4	220
5	20	20	-	2 layer	2x2	200
	2x20	-	2x20	4 layer	4x4	
6	20	-	20	2 layer	2x2	200
	2x20	20	20	4 layer	4x4	
7	20	20	-	2 layer	2x2	200
	2x20	20	20	4 layer	4x4	
8	20	-	20	2 layer	2x2	200
	2x20	2x20	-	4 layer	4x4	
9	10+20+20	10	2x20	4 layer	4x4	200
10	15	15	-	2 layer	2x2	190
	2x20	-	2x20	4 layer	4x4	
11	15	15	-	2 layer	2x2	190
	2x20	20	20	4 layer	4x4	
12	20	20	-	2 layer	2x2	180
	15+20	15	20	4 layer	4x4	
13	20	-	20	2 layer	2x2	180
	15+20	15+20	-	4 layer	4x4	
14	10	10	-	2 layer	2x2	180
	2x20	-	2x20	4 layer	4x4	
15	10	10	-	2 layer	2x2	180
	2x20	20	20	4 layer	4x4	
16	15	15	-	2 layer	2x2	170
	15+20	15	20	4 layer	4x4	
17	2x20	20	20	2 layer	2x2	160
	20	-	20	4 layer	4x4	
18	2x20	-	2x20	2 layer	2x2	160
	20	20	-	4 layer	4x4	
19	2x20	2x20	-	2 layer	2x2	160
	20	-	20	4 layer	4x4	
20	2x20	20	20	2 layer	2x2	160
	20	20	-	4 layer	4x4	
21	10	10	-	2 layer	2x2	160
	15+20	-	15+20	4 layer	4x4	
22	10	10	-	2 layer	2x2	160
	15+20	15	20	4 layer	4x4	
23	15+20	15+20	-	2 layer	2x2	150
	20	-	20	4 layer	4x4	
24	15+20	15	20	2 layer	2x2	150
	20	20	-	4 layer	4x4	
25	2x20	-	2x20	2 layer	2x2	140
	15	15	-	4 layer	4x4	
26	2x20	20	20	2 layer	2x2	140
	15	15	-	4 layer	4x4	
27	10+20	10	20	2 layer	2x2	140
	20	-	20	4 layer	4x4	
28	10+20	10+20	-	2 layer	2x2	140
	20	-	20	4 layer	4x4	
29	10+20	10	20	2 layer	2x2	140
	20	20	-	4 layer	4x4	
30	2x15	2x15	-	2 layer	2x2	140
	20	-	20	4 layer	4x4	
31	10	10	-	2 layer	2x2	140
	10+20	10	20	4 layer	4x4	
32	15+20	15	20	2 layer	2x2	130
	15	15	-	4 layer	4x4	
33	10+15	10+15	-	2 layer	2x2	130

	20	-	20	4 layer	4x4	
34	2x20	-	2x20	2 layer	2x2	120
	10	10	-	4 layer	4x4	
35	10+20	10	20	2 layer	2x2	120
	15	15	-	4 layer	4x4	
36	2x10	2x10	-	2 layer	2x2	120
	20	-	20	4 layer	4x4	
37	10+20	10	20	2 layer	2x2	100
	10	10	-	4 layer	4x4	

Editor's note: Tests in Table 8.7.11.3.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 3DL CA, which are defined in Table 5.4.2A.1-2 or Table 5.4.2A.1-2a.

Table 8.7.11.3.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW				Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
Bagg (MHz)	BW combi-nation (MHz)		MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
	FDD CC	TDD CC								
240	20	2x20	4	-	14	-	3	1	-	-
240	2x20	20	4	-	12	-	4	2	-	-
220	15	2x20	4	-	14	-	3	3	-	-
220	15+20	20	4	-	12	-	4	4	-	-
200	20	-	2	-	14	-	5	5	-	-
	-	2x20	4							
200	-	20	2	-	18	-	6	6	-	-
	20	20	4							
200	20	-	2	-	12	-	7	7	-	-
	20	20	4							
200	-	20	2	-	13	-	8	8	-	-
	2x20	-	4							
200	10	2x20	4	-	14	-	9	9	-	-
190	15	-	2	-	14	-	10	10	-	-
	-	2x20	4							
190	15	-	2	-	15	-	11	11	-	-
	20	20	4							
180	20	-	2	-	12	-	12	12	-	-
	15	20	4							
180	-	20	2	-	13	-	13	13	-	-
	15+20	-	4							
180	10	-	2	-	14	-	14	14	-	-
	-	2x20	4							
180	10	-	2	-	15	-	15	15	-	-
	20	20	4							
170	15	-	2	-	16	-	16	16	-	-
	15	20	4							
160	20	20	2	-	17	-	17	17	-	-
	-	20	4							
160	-	2x20	2	-	18	-	18	18	-	-
	20	-	4							
160	2x20	-	2	-	19	-	19	19	-	-
	-	20	4							
160	20	20	2	-	20	-	20	20	-	-
	20	-	4							
160	10	-	2	-	21	-	21	21	-	-
	-	15+20	4							
160	10	-	2	-	22	-	22	22	-	-
	15	20	4							
150	15+20	-	2	-	23	-	23	23	-	-
	-	20	4							
150	15	20	2	-	24	-	24	24	-	-
	20	-	4							
140	-	2x20	2	-	25	-	25	25	-	-
	15	-	4							
140	20	20	2	-	26	-	26	26	-	-
	15	-	4							
140	10	20	2	-	27	-	27	27	-	-
	-	20	4							
140	10+20	-	2	-	28	-	28	28	-	-
	-	20	4							
140	10	20	2	-	29	-	29	29	-	-
	20	-	4							
140	2x15	-	2	-	30	-	30	30	-	-
	-	20	4							
140	10	-	2	-	31	-	31	31	-	-
	10	20	4							
130	15	20	2	-	32	-	32	32	-	-
	15	-	4							

130	10+15	-	2	-	33	-	33	33	-	-
	-	20	4							
120	-	2x20	2	-	34	-	34	34	-	-
	10	-	4							
120	10	20	2	-	35	-	35	35	-	-
	15	-	4							
120	2x10	-	2	-	36	-	36	36	-	-
	-	20	4							
100	10	20	2	-	37	-	37	37	-	-
	10	-	4							
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.11.1. Only one test point to be tested.										

Table 8.7.11.3.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel		UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
		FDD CC	TDD CC					
1	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
2	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
3	15MHz 4Rx	R.31-8 FDD	-	R.1-4 TDD	93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
4	15MHz 4Rx	R.31-8 FDD	-	R.1-4 FDD	93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
5	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
6	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
7	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
8	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
9	10MHz 4Rx	R.31-7 FDD	-	R.1-4 TDD	63776 (Note 5)	6	FLOOR((TB$_{size}$ – 240)/48)	1323
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
10	15MHz 2Rx	R.31-5 FDD	-	R.1-4 TDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
11	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
12	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
13	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
14	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
15	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
16	15MHz 2Rx	R.31-5 FDD	-	R.1-4 TDD	55056	5	FLOOR((TB$_{size}$	1371

					(Note 7)		– 208)/40)	
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
17	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
18	20MHz 2Rx		R.31-4 TDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
19	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
20	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
21	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 4Rx	-	R.31-8 TDD		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
22	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
23	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
24	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
25	20MHz 2Rx		R.31-4 TDD	R.1-4 TDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
26	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
27	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
28	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
29	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141

	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
30	15MHz 2Rx	R.31-5 FDD	-	R.1-4 TDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
31	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	10MHz 4Rx	R.31-7 FDD	-		63776 (Note 5)	6	FLOOR((TB$_{size}$ – 240)/48)	1323
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
32	15MHz 2Rx	R.31-5 FDD	-	R.1-4 TDD	55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
33	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 2Rx	R.31-5 FDD	-		55056 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
34	20MHz 2Rx	-	R.31-4 TDD	R.1-4 TDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	10MHz 4Rx	R.31-7 FDD	-		63776 (Note 5)	6	FLOOR((TB$_{size}$ – 240)/48)	1323
35	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
36	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
37	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 8)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	10MHz 4Rx	R.31-7 FDD	-		63776 (Note 5)	6	FLOOR((TB$_{size}$ – 240)/48)	1323

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 59256 bits for sub-frame 5.

Note 6: 71112 bits for sub-frame 5.

Note 7: 52752 bits for sub-frame 5.

Note 8: 35160 bits for sub-frame 5.

Table 8.7.11.3.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW				Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
Bagg (MHz)	BW combi-nation (MHz)		MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
	FDD CC	TDD CC								
240	20	2x20	4	-	-	-	18	3	1	-
240	2x20	20	4	-	-	-	16	4	2	-
220	15	2x20	4	-	-	-	21	3	3	-
220	15+20	20	4	-	-	-	16	4	4	-
200	20	-	2	-	-	-	17	5	5	-
	-	2x20	4							
200	-	20	2	-	-	-	18	6	6	-
	20	20	4							
200	20	-	2	-	-	-	19	7	7	-
	20	20	4							
200	-	20	2	-	-	-	20	8	8	-
	2x20	-	4							
200	10	2x20	4	-	-	-	21	9	9	-
190	15	-	2	-	-	-	21	10	10	-
	-	2x20	4							
190	15	-	2	-	-	-	16	11	11	-
	20	20	4							
180	20	-	2	-	-	-	22	12	12	-
	15	20	4							
180	-	20	2	-	-	-	24	13	13	-
	15+20	-	4							
180	10	-	2	-	-	-	21	14	14	-
	-	2x20	4							
180	10	-	2	-	-	-	28	15	15	-
	20	20	4							
170	15	-	2	-	-	-	16	16	16	-
	15	20	4							
160	20	20	2	-	-	-	17	17	17	-
	-	20	4							
160	-	2x20	2	-	-	-	18	18	18	-
	20	-	4							
160	2x20	-	2	-	-	-	19	19	19	-
	-	20	4							
160	20	20	2	-	-	-	20	20	20	-
	20	-	4							
160	10	-	2	-	-	-	21	21	21	-
	-	15+20	4							
160	10	-	2	-	-	-	22	22	22	-
	15	20	4							
150	15+20	-	2	-	-	-	23	23	23	-
	-	20	4							
150	15	20	2	-	-	-	24	24	24	-
	20	-	4							
140	-	2x20	2	-	-	-	25	25	25	-
	15	-	4							
140	20	20	2	-	-	-	26	26	26	-
	15	-	4							
140	10	20	2	-	-	-	27	27	27	-
	-	20	4							
140	10+20	-	2	-	-	-	28	28	28	-
	-	20	4							
140	10	20	2	-	-	-	29	29	29	-
	20	-	4							
140	2x15	-	2	-	-	-	30	30	30	-
	-	20	4							
140	10	-	2	-	-	-	31	31	31	-
	10	20	4							
130	15	20	2	-	-	-	32	32	32	-
	15	-	4							

130	10+15	-	2	-	-	-	33	33	33	-
	-	20	4							
120	-	2x20	2	-	-	-	34	34	34	-
	10	-	4							
120	10	20	2	-	-	-	35	35	35	-
	15	-	4							
120	2x10	-	2	-	-	-	36	36	36	-
	-	20	4							
100	10	20	2	-	-	-	37	37	37	-
	10	-	4							
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.11.1. Only one test point to be tested.										

Table 8.7.11.3.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel		UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
		FDD CC	TDD CC					
1	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
2	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
3	15MHz 4Rx	R.68-5 FDD	-	R.1-4 TDD	128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
4	15MHz 4Rx	R.68-5 FDD	-	R.1-4 FDD	128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
5	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
6	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
7	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
8	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
9	10MHz 4Rx	R.68-4 FDD	-	R.1-4 TDD	84760 (Note 5)	8	FLOOR((TB$_{size}$ – 296)/64)	1319
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
10	15MHz 2Rx	R.68-1 FDD	-	R.1-4 TDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
11	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
12	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
13	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
14	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
15	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
16	15MHz 2Rx	R.68-1 FDD	-	R.1-4 TDD	75376	7	FLOOR((TB$_{size}$	1341

					(Note 7)		– 264)/56)	
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
17	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
18	20MHz 2Rx		R.68 TDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
19	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
20	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
21	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	15MHz 4Rx	-	R.68-6 TDD		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
22	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
23	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD	-		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
24	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	-	R.68 TDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
25	20MHz 2Rx		R.68 TDD	R.1-4 TDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
26	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
27	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
28	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD	-		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
29	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218

	20MHz 2Rx	-	R.68 TDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
30	15MHz 2Rx	R.68-1 FDD	-	R.1-4 TDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
31	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	10MHz 4Rx	R.68-4 FDD	-		84760 (Note 5)	8	FLOOR((TB$_{size}$ – 296)/64)	1319
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
32	15MHz 2Rx	R.68-1 FDD	-	R.1-4 TDD	75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	-	R.68 TDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
33	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	15MHz 2Rx	R.68-1 FDD	-		75376 (Note 7)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
34	20MHz 2Rx	-	R.68 TDD	R.1-4 TDD	97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	10MHz 4Rx	R.68-4 FDD	-		84760 (Note 5)	8	FLOOR((TB$_{size}$ – 296)/64)	1319
35	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
36	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
37	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 8)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 6)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	10MHz 4Rx	R.68-4 FDD	-		84760 (Note 5)	8	FLOOR((TB$_{size}$ – 296)/64)	1319

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4: 124464 bits for sub-frame 5.

Note 5: 81176 bits for sub-frame 5.

Note 6: 81176 bits for sub-frame 5.

Note 7: 61664 bits for sub-frame 5.

Note 8: 40576 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.11.3.4.1-1 depending on the UE category according to Table 8.7.11.3.4.1-2 for UE not supporting 256QAM or Table 8.7.11.3.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.11.1-1, Table 8.7.11.3.4.1-1 and Table 8.7.11.3.4.1-3 depending on the UE category according to Table 8.7.11.3.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.11.1-1, Table 8.7.11.3.4.1-1 and Table 8.7.11.3.4.1-5 depending on the UE category according to Table 8.7.11.3.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.11.3.4.3.

8.7.11.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.11.3.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.11.3.4.3-4. Cell ID = n (where n is 1, 2) applies to S-Celln (where n is 1, 2).

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.11.3.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.11.3.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.11.3.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.11.3.4.1-4.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.11.3.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.11.3.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\% * N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as B = N_{DL_PDCP} - N_{UL_PDCP}

13. The UE passes the test if A > 85% and B = 0.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.11.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.11.3.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.11.3.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.11.3.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.11.3.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.11.3.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.11.3.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.11.4 TDD FDD CA sustained data rate performance for 4 layer MIMO (4DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.11.4.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.11.4.2 Test applicability

This test applies to all types of UE Release 12 and forward of DL category 15, 16, 18 and 19 that support E-UTRA FDD and TDD, 4DL TDD-FDD CA and support 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any RF band.

8.7.11.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.11.1.

8.7.11.4.4 Test description

8.7.11.4.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.11.1-2, with the addition of the parameters in Table 8.7.11.4.4.1-1. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.11.4.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.11.1-3, with the addition of the parameters in Table 8.7.11.4.4.1-1. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.11.4.4.1-3.

Table 8.7.11.4.4.1-1: Test parameters for sustained downlink data rate (TDD FDD 4DL CA)

Test	Bandwidth (MHz)			MIMO layer	Antenna confi-guration	Equivalent aggr. BW (MHz)	PDCP SDU size [Octets] 64QAM	PDCP SDU size [Octets] 64QAM
	Total	FDD CC	TDD CC					
1	4x20	2x20	2x20	4 layer	4x4	320	1455	1408
2	4x20	20	3x20	4 layer	4x4	320	1455	1408
3	4x20	3x20	20	4 layer	4x4	320	1455	1408
4	15+20+20+20	15+20	2x20	4 layer	4x4	300	1455	1408
5	15+20+20+20	15+20+20	20	4 layer	4x4	300	1455	1408
6	20	20	-	2 layer	2x2	280	1341	1355
	3x20	20	2x20	4 layer	4x4			
7	20	-	20	2 layer	2x2	280	1341	1355
	3x20	20	2x20	4 layer	4x4			
8	20	20	-	2 layer	2x2	280	1341	1355
	3x20	-	3x20	4 layer	4x4			
9	20	-	20	2 layer	2x2	280	1341	1355
	3x20	3x20	-	4 layer	4x4			
10	20	20	-	2 layer	2x2	280	1341	1355
	3x20	2x20	20	4 layer	4x4			
11	15	15	-	2 layer	2x2	270	1371	1341
	3x20	20	2x20	4 layer	4x4			
12	15	15	-	2 layer	2x2	270	1371	1341
	3x20	2x20	20	4 layer	4x4			
13	20	20	-	2 layer	2x2	260	1341	1355
	15+20+20	15	2x20	4 layer	4x4			
14	20	-	20	2 layer	2x2	260	1341	1355
	15+20+20	15+20+20	-	4 layer	4x4			
15	20	20	-	2 layer	2x2	260	1341	1355
	15+20+20	15+20	20	4 layer	4x4			
16	10	10	-	2 layer	2x2	260	1141	1218
	3x20	-	3x20	4 layer	4x4			
17	10	10	-	2 layer	2x2	260	1141	1218
	3x20	2x20	20	4 layer	4x4			
18	10	10	-	2 layer	2x2	260	1141	1218
	3x20	20	2x20	4 layer	4x4			
19	15	15	-	2 layer	2x2	250	1371	1341
	15+20+20	15	2x20	4 layer	4x4			
20	15	15	-	2 layer	2x2	250	1371	1341
	15+20+20	15+20	20	4 layer	4x4			
21	2x20	2x20	-	2 layer	2x2	240	1341	1355
	2x20	-	2x20	4 layer	4x4			
22	2x20	-	2x20	2 layer	2x2	240	1341	1355
	2x20	2x20	-	4 layer	4x4			
23	2x20	20	20	2 layer	2x2	240	1341	1355
	2x20	-	2x20	4 layer	4x4			
24	2x20	-	2x20	2 layer	2x2	240	1341	1355
	2x20	20	20	4 layer	4x4			
25	2x20	2x20	-	2 layer	2x2	240	1341	1355
	2x20	20	20	4 layer	4x4			
26	2x20	20	20	2 layer	2x2	240	1341	1355
	2x20	2x20	-	4 layer	4x4			
27	10	10	-	2 layer	2x2	240	1141	1218
	15+20+20	15	2x20	4 layer	4x4			
28	10	10	-	2 layer	2x2	240	1141	1218
	15+20+20	15+20	20	4 layer	4x4			
29	15+20	15+20	-	2 layer	2x2	230	1341	1341
	2x20	-	2x20	4 layer	4x4			
30	15+20	15+20	-	2 layer	2x2	230	1341	1341
	2x20	20	20	4 layer	4x4			
31	15+20	15	20	2 layer	2x2	230	1341	1341
	2x20	20+20	-	4 layer	4x4			
32	2x20	-	2x20	2 layer	2x2	220	1341	1355
	15+20	15+20	-	4 layer	4x4			
33	2x20	2x20	-	2 layer	2x2	220	1341	1355

	15+20	15	20	4 layer	4x4			
34	2x20	20	20	2 layer	2x2	220	1341	1355
	15+20	15+20	-	4 layer	4x4			
35	2x15	2x15	-	2 layer	2x2	220	1371	1341
	2x20	-	2x20	4 layer	4x4			
36	10+20	10	20	2 layer	2x2	220	1141	1218
	2x20	-	2x20	4 layer	4x4			
37	10+20	10	20	2 layer	2x2	220	1141	1218
	2x20	2x20	-	4 layer	4x4			
38	10+20	10+20	-	2 layer	2x2	220	1141	1218
	2x20	20	20	4 layer	4x4			
39	2x15	2x15	-	2 layer	2x2	220	1371	1341
	2x20	20	20	4 layer	4x4			
40	10+20	10	20	2 layer	2x2	220	1141	1218
	2x20	20	20	4 layer	4x4			
41	10+20	10+20	-	2 layer	2x2	220	1141	1218
	2x20	-	2x20	4 layer	4x4			
42	15+20	15	20	2 layer	2x2	210	1341	1341
	15+20	15+20	-	4 layer	4x4			
43	15+20	15+20	-	2 layer	2x2	210	1341	1341
	15+20	15	20	4 layer	4x4			
44	10+15	10+15	-	2 layer	2x2	210	1141	1218
	2x20	-	2x20	4 layer	4x4			
45	10+15	10+15	-	2 layer	2x2	210	1141	1218
	2x20	20	20	4 layer	4x4			
46	3x20	20	2x20	2 layer	2x2	200	1341	1355
	20	20	-	4 layer	4x4			
47	3x20	20	2x20	2 layer	2x2	200	1341	1355
	20	-	20	4 layer	4x4			
48	3x20	-	3x20	2 layer	2x2	200	1341	1355
	20	20	-	4 layer	4x4			
49	3x20	3x20	-	2 layer	2x2	200	1341	1355
	20	-	20	4 layer	4x4			
50	3x20	2x20	20	2 layer	2x2	200	1341	1355
	20	20	-	4 layer	4x4			
51	10+20	10	20	2 layer	2x2	200	1141	1218
	15+20	15+20	-	4 layer	4x4			
52	10+20	10+20	-	2 layer	2x2	200	1141	1218
	15+20	15	20	4 layer	4x4			
53	2x10	2x10	-	2 layer	2x2	200	1141	1218
	2x20	-	2x20	4 layer	4x4			
54	15+20+20	15	2x20	2 layer	2x2	190	1341	1341
	20	20	-	4 layer	4x4			
55	15+20+20	15+20+20	-	2 layer	2x2	190	1341	1341
	20	-	20	4 layer	4x4			
56	15+20+20	15+20	20	2 layer	2x2	190	1341	1341
	20	20	-	4 layer	4x4			
57	3x20	-	3x20	2 layer	2x2	180	1341	1355
	15	15	-	4 layer	4x4			
58	3x20	20	2x20	2 layer	2x2	180	1341	1355
	15	15	-	4 layer	4x4			
59	3x20	2x20	20	2 layer	2x2	180	1341	1355
	15	15	-	4 layer	4x4			
60	10+20+20	10	2x20	2 layer	2x2	180	1141	1218
	20	-	20	4 layer	4x4			
61	10+20+20	10+20+20	-	2 layer	2x2	180	1141	1218
	20	-	20	4 layer	4x4			
62	10+20+20	10+20	20	2 layer	2x2	180	1141	1218
	20	20	-	4 layer	4x4			
63	15+15+20	15+15+20	-	2 layer	2x2	180	1341	1341
	20	-	20	4 layer	4x4			
64	15+15+20	15+15	20	2 layer	2x2	180	1341	1341
	20	20	-	4 layer	4x4			
65	10+20+20	10+20	20	2 layer	2x2	180	1141	1218
	20	-	20	4 layer	4x4			

66	10+20+20	10	2x20	2 layer	2x2	180	1141	1218
	20	20	-	4 layer	4x4			
67	2x10	2x10	-	2 layer	2x2	180	1141	1218
	15+20	-	15+20	4 layer	4x4			
68	15+20+20	15	2x20	2 layer	2x2	170	1341	1341
	15	15	-	4 layer	4x4			
69	15+20+20	15+20	20	2 layer	2x2	170	1341	1341
	15	15	-	4 layer	4x4			
70	10+15+20	10+15+20	-	2 layer	2x2	170	1141	1218
	20	-	20	4 layer	4x4			
71	10+15+20	10+15	20	2 layer	2x2	170	1141	1218
	20	20	-	4 layer	4x4			
72	10+20+20	10	2x20	2 layer	2x2	160	1141	1218
	15	15	-	4 layer	4x4			
73	10+20+20	10+20	20	2 layer	2x2	160	1141	1218
	15	15	-	4 layer	4x4			

Editor's note: Tests in Table 8.7.11.4.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 4DL CA, which are defined in Table 5.4.2A.1-2, Table 5.4.2A.1-2a and Table 5.4.2A.1-2b.

Table 8.7.11.4.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW				Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
Bagg (MHz)	BW combi-nation (MHz)		MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
	FDD CC	TDD CC								
320	2x20	2x20	4	-	-	-	32	4	1	-
320	20	3x20	4	-	-	-	36	7	2	-
320	3x20	20	4	-	-	-	33	5	3	-
300	15+20	2x20	4	-	-	-	32	4	4	-
300	15+20+20	20	4	-	-	-	33	5	5	-
280	20	-	2	-	-	-	41	6	6	-
	20	2x20	4							
280	-	20	2	-	-	-	47	7	7	-
	20	2x20	4							
280	20	-	2	-	-	-	36	8	8	-
	-	3x20	4							
280	-	20	2	-	-	-	34	9	9	-
	3x20	-	4							
280	20	-	2	-	-	-	38	10	10	-
	2x20	20	4							
270	15	-	2	-	-	-	41	11	11	-
	20	2x20	4							
270	15	-	2	-	-	-	38	12	12	-
	2x20	20	4							
260	20	-	2	-	-	-	35	13	13	-
	15	2x20	4							
260	-	20	2	-	-	-	34	14	14	-
	15+20+20	-	4							
260	20	-	2	-	-	-	33	15	15	-
	15+20	20	4							
260	10	-	2	-	-	-	36	16	16	-
	-	3x20	4							
260	10	-	2	-	-	-	38	17	17	-
	2x20	20	4							
260	10	-	2	-	-	-	41	18	18	-
	20	2x20	4							
250	15	-	2	-	-	-	44	19	19	-
	15	2x20	4							
250	15	-	2	-	-	-	39	20	20	-
	15+20	20	4							
240	2x20	-	2	-	-	-	41	21	21	-
	-	2x20	4							
240	-	2x20	2	-	-	-	32	22	22	-
	2x20	-	4							
240	20	20	2	-	-	-	36	23	23	-
	-	2x20	4							
240	-	2x20	2	-	-	-	47	24	24	-
	20	20	4							
240	2x20	-	2	-	-	-	38	25	25	-
	20	20	4							
240	20	20	2	-	-	-	37	26	26	-
	2x20	-	4							
240	10	-	2	-	-	-	44	27	27	-
	15	2x20	4							
240	10	-	2	-	-	-	45	28	28	-
	15+20	20	4							
230	15+20	-	2	-	-	-	41	29	29	-
	-	2x20	4							
230	15+20	-	2	-	-	-	38	30	30	-
	20	20	4							
230	15	20	2	-	-	-	37	31	31	-
	20+20	-	4							
220	-	2x20	2	-	-	-	32	32	32	-
	15+20	-	4							

220	2x20	-	2	-	-	-	33	33	33	-
	15	20	4							
220	20	20	2	-	-	-	34	34	34	-
	15+20	-	4							
220	2x15	-	2	-	-	-	35	35	35	-
	-	2x20	4							
220	10	20	2	-	-	-	36	36	36	-
	-	2x20	4							
220	10	20	2	-	-	-	37	37	37	-
	2x20	-	4							
220	10+20	-	2	-	-	-	38	38	38	-
	20	20	4							
220	2x15	-	2	-	-	-	39	39	39	-
	20	20	4							
220	10	20	2	-	-	-	40	40	40	-
	20	20	4							
220	10+20	-	2	-	-	-	41	41	41	-
	-	2x20	4							
210	15	20	2	-	-	-	42	42	42	-
	15+20	-	4							
210	15+20	-	2	-	-	-	43	43	43	-
	15	20	4							
210	10+15	-	2	-	-	-	44	44	44	-
	-	2x20	4							
210	10+15	-	2	-	-	-	45	45	45	-
	20	20	4							
200	20	2x20	2	-	-	-	46	46	46	-
	20	-	4							
200	20	2x20	2	-	-	-	47	47	47	-
	-	20	4							
200	-	3x20	2	-	-	-	48	48	48	-
	20	-	4							
200	3x20	-	2	-	-	-	49	49	49	-
	-	20	4							
200	2x20	20	2	-	-	-	50	50	50	-
	20	-	4							
200	10	20	2	-	-	-	51	51	51	-
	15+20	-	4							
200	10+20	-	2	-	-	-	52	52	52	-
	15	20	4							
200	2x10	-	2	-	-	-	53	53	53	-
	-	2x20	4							
190	15	2x20	2	-	-	-	54	54	54	-
	20	-	4							
190	15+20+20	-	2	-	-	-	55	55	55	-
	-	20	4							
190	15+20	20	2	-	-	-	56	56	56	-
	20	-	4							
180	-	3x20	2	-	-	-	57	57	57	-
	15	-	4							
180	20	2x20	2	-	-	-	58	58	58	-
	15	-	4							
180	2x20	20	2	-	-	-	59	59	59	-
	15	-	4							
180	10	2x20	2	-	-	-	60	60	60	-
	-	20	4							
180	10+20+20	-	2	-	-	-	61	61	61	-
	-	20	4							
180	10+20	20	2	-	-	-	62	62	62	-
	20	-	4							
180	15+15+20	-	2	-	-	-	63	63	63	-
	-	20	4							
180	15+15	20	2	-	-	-	64	64	64	-
	20	-	4							
180	10+20	20	2	-	-	-	65	65	65	-

	-	20	4							
180	10	2x20	2	-	-	-	66	66	66	-
	20	-	4							
180	2x10	-	2	-	-	-	67	67	67	-
	-	15+20	4							
170	15	2x20	2	-	-	-	68	68	68	-
	15	-	4							
170	15+20	20	2	-	-	-	69	69	69	-
	15	-	4							
170	10+15+20	-	2	-	-	-	70	70	70	-
	-	20	4							
170	10+15	20	2	-	-	-	71	71	71	-
	20	-	4							
160	10	2x20	2	-	-	-	72	72	72	-
	15	-	4							
160	10+20	20	2	-	-	-	73	73	73	-
	15	-	4							

Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.11.1. Only one test point to be tested.

Table 8.7.11.4.4.1-3: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW				Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
Bagg (MHz)	BW combi-nation (MHz)		MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
	FDD CC	TDD CC								
320	2x20	2x20	4	-	-	-	-	40	11	1
320	20	3x20	4	-	-	-	-	36	16	2
320	3x20	20	4	-	-	-	-	37	12	3
300	15+20	2x20	4	-	-	-	-	54	11	4
300	15+20+20	20	4	-	-	-	-	37	12	5
280	20	-	2	-	-	-	-	40	11	6
	20	2x20	4							
280	-	20	2	-	-	-	-	36	23	7
	20	2x20	4							
280	20	-	2	-	-	-	-	36	16	8
	-	3x20	4							
280	-	20	2	-	-	-	-	37	14	9
	3x20	-	4							
280	20	-	2	-	-	-	-	37	12	10
	2x20	20	4							
270	15	-	2	-	-	-	-	41	11	11
	20	2x20	4							
270	15	-	2	-	-	-	-	37	12	12
	2x20	20	4							
260	20	-	2	-	-	-	-	41	13	13
	15	2x20	4							
260	-	20	2	-	-	-	-	37	14	14
	15+20+20	-	4							
260	20	-	2	-	-	-	-	38	15	15
	15+20	20	4							
260	10	-	2	-	-	-	-	36	16	16
	-	3x20	4							
260	10	-	2	-	-	-	-	38	17	17
	2x20	20	4							
260	10	-	2	-	-	-	-	41	18	18
	20	2x20	4							
250	15	-	2	-	-	-	-	44	19	19
	15	2x20	4							
250	15	-	2	-	-	-	-	42	20	20
	15+20	20	4							
240	2x20	-	2	-	-	-	-	44	21	21
	-	2x20	4							
240	-	2x20	2	-	-	-	-	46	22	22
	2x20	-	4							
240	20	20	2	-	-	-	-	36	23	23
	-	2x20	4							
240	-	2x20	2	-	-	-	-	47	24	24
	20	20	4							
240	2x20	-	2	-	-	-	-	38	25	25
	20	20	4							
240	20	20	2	-	-	-	-	37	26	26
	2x20	-	4							
240	10	-	2	-	-	-	-	44	27	27
	15	2x20	4							
240	10	-	2	-	-	-	-	45	28	28
	15+20	20	4							
230	15+20	-	2	-	-	-	-	44	29	29
	-	2x20	4							
230	15+20	-	2	-	-	-	-	38	30	30
	20	20	4							
230	15	20	2	-	-	-	-	37	31	31
	20+20	-	4							
220	-	2x20	2	-	-	-	-	54	32	32
	15+20	-	4							

220	2x20	-	2	-	-	-	-	55	33	33
	15	20	4							
220	20	20	2	-	-	-	-	56	34	34
	15+20	-	4							
220	2x15	-	2	-	-	-	-	44	35	35
	-	2x20	4							
220	10	20	2	-	-	-	-	36	36	36
	-	2x20	4							
220	10	20	2	-	-	-	-	37	37	37
	2x20	-	4							
220	10+20	-	2	-	-	-	-	38	38	38
	20	20	4							
220	2x15	-	2	-	-	-	-	45	39	39
	20	20	4							
220	10	20	2	-	-	-	-	40	40	40
	20	20	4							
220	10+20	-	2	-	-	-	-	41	41	41
	-	2x20	4							
210	15	20	2	-	-	-	-	42	42	42
	15+20	-	4							
210	15+20	-	2	-	-	-	-	43	43	43
	15	20	4							
210	10+15	-	2	-	-	-	-	44	44	44
	-	2x20	4							
210	10+15	-	2	-	-	-	-	45	45	45
	20	20	4							
200	20	2x20	2	-	-	-	-	46	46	46
	20	-	4							
200	20	2x20	2	-	-	-	-	47	47	47
	-	20	4							
200	-	3x20	2	-	-	-	-	48	48	48
	20	-	4							
200	3x20	-	2	-	-	-	-	49	49	49
	-	20	4							
200	2x20	20	2	-	-	-	-	50	50	50
	20	-	4							
200	10	20	2	-	-	-	-	51	51	51
	15+20	-	4							
200	10+20	-	2	-	-	-	-	52	52	52
	15	20	4							
200	2x10	-	2	-	-	-	-	53	53	53
	-	2x20	4							
190	15	2x20	2	-	-	-	-	54	54	54
	20	-	4							
190	15+20+20	-	2	-	-	-	-	55	55	55
	-	20	4							
190	15+20	20	2	-	-	-	-	56	56	56
	20	-	4							
180	-	3x20	2	-	-	-	-	57	57	57
	15	-	4							
180	20	2x20	2	-	-	-	-	58	58	58
	15	-	4							
180	2x20	20	2	-	-	-	-	59	59	59
	15	-	4							
180	10	2x20	2	-	-	-	-	60	60	60
	-	20	4							
180	10+20+20	-	2	-	-	-	-	61	61	61
	-	20	4							
180	10+20	20	2	-	-	-	-	62	62	62
	20	-	4							
180	15+15+20	-	2	-	-	-	-	63	63	63
	-	20	4							
180	15+15	20	2	-	-	-	-	64	64	64
	20	-	4							
180	10+20	20	2	-	-	-	-	65	65	65

	-	20	4							
180	10	2x20	2	-	-	-	-	66	66	66
	20	-	4							
180	2x10	-	2	-	-	-	-	67	67	67
	-	15+20	4							
170	15	2x20	2	-	-	-	-	68	68	68
	15	-	4							
170	15+20	20	2	-	-	-	-	69	69	69
	15	-	4							
170	10+15+20	-	2	-	-	-	-	70	70	70
	-	20	4							
170	10+15	20	2	-	-	-	-	71	71	71
	20	-	4							
160	10	2x20	2	-	-	-	-	72	72	72
	15	-	4							
160	10+20	20	2	-	-	-	-	73	73	73
	15	-	4							
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.11.1. Only one test point to be tested.										

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.11.4.4.1-1 depending on the UE category according to Table 8.7.11.4.4.1-2 for UE not supporting 256QAM or Table 8.7.11.4.4.1-3 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.
2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.11.1-1, Table 8.7.11.4.4.1-1 depending on the UE category according to Table 8.7.11.4.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.11.1-1, Table 8.7.11.4.4.1-1 depending on the UE category according to Table 8.7.11.4.4.1-3.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.11.4.4.3.

8.7.11.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.11.4.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.11.4.4.3-4. Cell ID = n (where n is 1, 2, 3) applies to S-Celln (where n is 1, 2, 3).
3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).
5. For UE not supporting 256QAM the SS looks up TB_{size} in Annex A.3.9 for the RMCs in accordance with Table 8.7.11.1-2, for the tests to be performed depending on the UE category according to Table 8.7.11.4.4.1-2. For UE

supporting 256QAM the SS looks up TB_{size} in Annex A.3.9 for the RMCs in accordance with Table 8.7.11.1-3, for the tests to be performed depending on the UE category according to Table 8.7.11.4.4.1-3.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.11.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.11.4.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.11.4.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.11.4.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.11.4.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.11.4.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.11.4.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.7.11.5 TDD FDD CA sustained data rate performance for 4 layer MIMO (5DL CA)

Editor's note: Simplification of test point tables, to reduce future maintenance, needs further investigation. This test case is incomplete. The following aspects are either missing or not yet determined:

- Applicability in TS 36.521-2 is FFS.

8.7.11.5.1 Test purpose

Same test purpose as 8.7.1.1.

8.7.11.5.2 Test applicability

This test applies to all types of UE Release 12 and forward of DL category 16, 18 and 19 that support E-UTRA FDD and TDD, 5DL TDD-FDD CA and support 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 3 in any RF band.

8.7.11.5.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.7.11.1.

8.7.11.5.4 Test description

8.7.11.5.4.1 Initial conditions

For UE not supporting 256QAM, the requirements are specified in Table 8.7.11.1-2, with the addition of the parameters in Table 8.7.11.5.4.1-1 and Table 8.7.11.5.4.1-3. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.11.5.4.1-2.

For UE supporting 256QAM, the requirements are specified in Table 8.7.11.1-3, with the addition of the parameters in Table 8.7.11.5.4.1-1 and Table 8.7.11.5.4.1-5. The test points are applied to UE category and bandwidth combination with maximum equivalent aggregated bandwidth as specified in Table 8.7.11.5.4.1-4.

Table 8.7.11.5.4.1-1: Test parameters for sustained downlink data rate (TDD FDD 5DL CA)

Test	Bandwidth (MHz)			MIMO layer	Antenna configuration	Equivalent aggr. BW (MHz)
	Total	FDD CC	TDD CC			
1	5x20	2x20	3x20	4 layer	4x4	400
2	5x20	3x20	2x20	4 layer	4x4	400
3	5x20	20	4x20	4 layer	4x4	400
4	5x20	4x20	20	4 layer	4x4	400
5	15+20+20+20+20	15+20+20	2x20	4 layer	4x4	380
6	20	20	-	2 layer	2x2	360
	4x20	2x20	2x20	4 layer	4x4	
7	20	20	-	2 layer	2x2	360
	4x20	-	4x20	4 layer	4x4	
8	20	20	-	2 layer	2x2	360
	4x20	3x20	20	4 layer	4x4	
9	20	-	20	2 layer	2x2	360
	4x20	4x20	-	4 layer	4x4	
10	15	15	-	2 layer	2x2	350
	4x20	2x20	2x20	4 layer	4x4	
11	20	20	-	2 layer	2x2	340
	15+20+20+20	15+20	2x20	4 layer	4x4	
12	10	10	-	2 layer	2x2	340
	4x20	-	4x20	4 layer	4x4	
13	10	10	-	2 layer	2x2	340
	4x20	2x20	2x20	4 layer	4x4	
14	10	10	-	2 layer	2x2	340
	4x20	20	3x20	4 layer	4x4	
15	15	15	-	2 layer	2x2	330
	15+20+20+20	15+20	2x20	4 layer	4x4	
16	2x20	2x20	-	2 layer	2x2	320
	3x20	-	3x20	4 layer	4x4	
17	2x20	2x20	-	2 layer	2x2	320
	3x20	20	2x20	4 layer	4x4	
18	2x20	-	2x20	2 layer	2x2	320
	3x20	3x20	-	4 layer	4x4	
19	2x20	-	2x20	2 layer	2x2	320
	3x20	20	2x20	4 layer	4x4	
20	2x20	2x20	-	2 layer	2x2	320
	3x20	2x20	20	4 layer	4x4	
21	2x20	20	20	2 layer	2x2	320
	3x20	3x20	-	4 layer	4x4	
22	10	10	-	2 layer	2x2	320
	15+20+20+20	15+20	2x20	4 layer	4x4	
23	15+20	15+20	-	2 layer	2x2	310
	3x20	20	2x20	4 layer	4x4	
24	2x20	-	2x20	2 layer	2x2	300
	15+20+20	15+20+20	-	4 layer	4x4	
25	2x20	2x20	-	2 layer	2x2	300
	15+20+20	15	2x20	4 layer	4x4	
26	10+20	10+20	-	2 layer	2x2	300
	3x20	20	2x20	4 layer	4x4	
27	2x15	2x15	-	2 layer	2x2	300
	3x20	20	2x20	4 layer	4x4	
28	10+20	10+20	-	2 layer	2x2	300
	3x20	-	3x20	4 layer	4x4	
29	10+20	10	20	2 layer	2x2	300
	3x20	20	2x20	4 layer	4x4	
30	15+20	15+20	-	2 layer	2x2	290
	15+20+20	15	2x20	4 layer	4x4	
31	10+15	10+15	-	2 layer	2x2	290
	3x20	20	2x20	4 layer	4x4	
32	3x20	-	3x20	2 layer	2x2	280
	2x20	2x20	-	4 layer	4x4	
33	3x20	20	2x20	2 layer	2x2	280

	2x20	2x20	-	4 layer	4x4	
34	3x20	3x20	-	2 layer	2x2	280
	2x20	-	2x20	4 layer	4x4	
35	3x20	20	2x20	2 layer	2x2	280
	2x20	-	2x20	4 layer	4x4	
36	3x20	3x20	-	2 layer	2x2	280
	2x20	20	20	4 layer	4x4	
37	3x20	2x20	20	2 layer	2x2	280
	2x20	2x20	-	4 layer	4x4	
38	10+20	10+20	-	2 layer	2x2	280
	15+20+20	15	2x20	4 layer	4x4	
39	2x10	2x10	-	2 layer	2x2	280
	3x20	-	3x20	4 layer	4x4	
40	15+20+20	15	2x20	2 layer	2x2	270
	2x20	2x20	-	4 layer	4x4	
41	15+20+20	15+20+20	-	2 layer	2x2	270
	2x20	-	2x20	4 layer	4x4	
42	3x20	20	2x20	2 layer	2x2	260
	15+20	15+20	-	4 layer	4x4	
43	10+20+20	10	2x20	2 layer	2x2	260
	2x20	-	2x20	4 layer	4x4	
44	10+20+20	10	2x20	2 layer	2x2	260
	2x20	2x20	-	4 layer	4x4	
45	10+20+20	10+20+20	-	2 layer	2x2	260
	2x20	-	2x20	4 layer	4x4	
46	15+15+20	15+15+20	-	2 layer	2x2	260
	2x20	-	2x20	4 layer	4x4	
47	10+20+20	10	2x20	2 layer	2x2	260
	2x20	20	20	4 layer	4x4	
48	10+20+20	10+20	20	2 layer	2x2	260
	2x20	-	2x20	4 layer	4x4	
49	15+20+20	15	2x20	2 layer	2x2	250
	15+20	15+20	-	4 layer	4x4	
50	10+15+20	10+15+20	-	2 layer	2x2	250
	2x20	-	2x20	4 layer	4x4	
51	4x20	2x20	2x20	2 layer	2x2	240
	20	20	-	4 layer	4x4	
52	4x20	-	4x20	2 layer	2x2	240
	20	20	-	4 layer	4x4	
53	4x20	4x20	-	2 layer	2x2	240
	20	-	20	4 layer	4x4	
54	4x20	3x20	20	2 layer	2x2	240
	20	20	-	4 layer	4x4	
55	10+20+20	10	2x20	2 layer	2x2	240
	15+20	15+20	-	4 layer	4x4	
56	10+10+20	2x10	20	2 layer	2x2	240
	2x20	-	2x20	4 layer	4x4	
57	15+20+20+20	15+20	2x20	2 layer	2x2	230
	20	20	-	4 layer	4x4	
58	4x20	-	4x20	2 layer	2x2	220
	15	15	-	4 layer	4x4	
59	4x20	2x20	2x20	2 layer	2x2	220
	15	15	-	4 layer	4x4	
60	10+20+20+20	10+20	2x20	2 layer	2x2	220
	20	20	-	4 layer	4x4	
61	15+15+20+20	2x15	2x20	2 layer	2x2	220
	20	20	-	4 layer	4x4	
62	10+20+20+20	10	3x20	2 layer	2x2	220
	20	20	-	4 layer	4x4	
63	10+20+20+20	10+20	2x20	2 layer	2x2	220
	20	-	20	4 layer	4x4	
64	15+20+20+20	15+20	2x20	2 layer	2x2	210
	15	15	-	4 layer	4x4	
65	10+15+20+20	10+15	2x20	2 layer	2x2	210
	20	20	-	4 layer	4x4	

66	10+20+20+20	10+20	2x20	2 layer	2x2	200
	15	15	-	4 layer	4x4	

Editor's note: Tests in Table 8.7.11.5.4.1-1 are covering maximum aggregated bandwidth for each Bandwidth combination set with 5DL CA which are defined in Table 5.4.2A.1-2, Table 5.4.2A.1-2a, Table 5.4.2A.1-2b and Table 5.4.2A.1-2c.

Table 8.7.11.5.4.1-2: Test points for sustained data rate (FRC 64QAM)

Maximum supported equivalent aggr. BW				Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
Bagg (MHz)	BW combi-nation (MHz)		MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
	FDD CC	TDD CC								
400	2x20	3x20	4	-	-	-	-	32	16	1
400	3x20	2x20	4	-	-	-	-	34	17	2
400	20	4x20	4	-	-	-	-	35	19	3
400	4x20	20	4	-	-	-	-	36	20	4
380	15+20+20	2x20	4	-	-	-	-	41	10	5
360	20	-	2	-	-	-	-	34	17	6
	2x20	2x20	4							
360	20	-	2	-	-	-	-	35	35	7
	-	4x20	4							
360	20	-	2	-	-	-	-	36	20	8
	3x20	20	4							
360	-	20	2	-	-	-	-	37	21	9
	4x20	-	4							
350	15	-	2	-	-	-	-	41	10	10
	2x20	2x20	4							
340	20	-	2	-	-	-	-	41	11	11
	15+20	2x20	4							
340	10	-	2	-	-	-	-	43	12	12
	-	4x20	4							
340	10	-	2	-	-	-	-	45	13	13
	2x20	2x20	4							
340	10	-	2	-	-	-	-	47	14	14
	20	3x20	4							
330	15	-	2	-	-	-	-	46	15	15
	15+20	2x20	4							
320	2x20	-	2	-	-	-	-	39	16	16
	-	3x20	4							
320	2x20	-	2	-	-	-	-	34	17	17
	20	2x20	4							
320	-	2x20	2	-	-	-	-	33	18	18
	3x20	-	4							
320	-	2x20	2	-	-	-	-	35	19	19
	20	2x20	4							
320	2x20	-	2	-	-	-	-	36	20	20
	2x20	20	4							
320	20	20	2	-	-	-	-	37	21	21
	3x20	-	4							
320	10	-	2	-	-	-	-	31	22	22
	15+20	2x20	4							
310	15+20	-	2	-	-	-	-	41	23	23
	20	2x20	4							
300	-	2x20	2	-	-	-	-	40	24	24
	15+20+20	-	4							
300	2x20	-	2	-	-	-	-	41	25	25
	15	2x20	4							
300	10+20	-	2	-	-	-	-	45	26	26
	20	2x20	4							
300	2x15	-	2	-	-	-	-	46	27	27
	20	2x20	4							
300	10+20	-	2	-	-	-	-	48	28	28
	-	3x20	4							
300	10	20	2	-	-	-	-	47	29	29
	20	2x20	4							
290	15+20	-	2	-	-	-	-	30	30	30
	15	2x20	4							
290	10+15	-	2	-	-	-	-	31	31	31
	20	2x20	4							
280	-	3x20	2	-	-	-	-	32	32	32
	2x20	-	4							

280	20	2x20	2	-	-	-	-	33	33	33
	2x20	-	4							
280	3x20	-	2	-	-	-	-	34	34	34
	-	2x20	4							
280	20	2x20	2	-	-	-	-	35	35	35
	-	2x20	4							
280	3x20	-	2	-	-	-	-	36	36	36
	20	20	4							
280	2x20	20	2	-	-	-	-	37	37	37
	2x20	-	4							
280	10+20	-	2	-	-	-	-	38	38	38
	15	2x20	4							
280	2x10	-	2	-	-	-	-	39	39	39
	-	3x20	4							
270	15	2x20	2	-	-	-	-	40	40	40
	2x20	-	4							
270	15+20+20	-	2	-	-	-	-	41	41	41
	-	2x20	4							
260	20	2x20	2	-	-	-	-	42	42	42
	15+20	-	4							
260	10	2x20	2	-	-	-	-	43	43	43
	-	2x20	4							
260	10	2x20	2	-	-	-	-	44	44	44
	2x20	-	4							
260	10+20+20	-	2	-	-	-	-	45	45	45
	-	2x20	4							
260	15+15+20	-	2	-	-	-	-	46	46	46
	-	2x20	4							
260	10	2x20	2	-	-	-	-	47	47	47
	20	20	4							
260	10+20	20	2	-	-	-	-	48	48	48
	-	2x20	4							
250	15	2x20	2	-	-	-	-	49	49	49
	15+20	-	4							
250	10+15+20	-	2	-	-	-	-	50	50	50
	-	2x20	4							
240	2x20	2x20	2	-	-	-	-	51	51	51
	20	-	4							
240	-	4x20	2	-	-	-	-	52	52	52
	20	-	4							
240	4x20	-	2	-	-	-	-	53	53	53
	-	20	4							
240	3x20	20	2	-	-	-	-	54	54	54
	20	-	4							
240	10	2x20	2	-	-	-	-	55	55	55
	15+20	-	4							
240	2x10	20	2	-	-	-	-	56	56	56
	-	2x20	4							
230	15+20	2x20	2	-	-	-	-	57	57	57
	20	-	4							
220	-	4x20	2	-	-	-	-	58	58	58
	15	-	4							
220	2x20	2x20	2	-	-	-	-	59	59	59
	15	-	4							
220	10+20	2x20	2	-	-	-	-	60	60	60
	20	-	4							
220	2x15	2x20	2	-	-	-	-	61	61	61
	20	-	4							
220	10	3x20	2	-	-	-	-	62	62	62
	20	-	4							
220	10+20	2x20	2	-	-	-	-	63	63	63
	-	20	4							
210	15+20	2x20	2	-	-	-	-	64	64	64
	15	-	4							
210	10+15	2x20	2	-	-	-	-	65	65	65

	20	-	4							
200	10+20	2x20	2	-	-	-	-	66	66	66
	15	-	4							
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.11.1. Only one test point to be tested.										

Table 8.7.11.5.4.1-3: Further test parameters per test (FRC 64QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel		UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
		FDD CC	TDD CC					
1	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
2	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
3	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
4	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD	R.1-4 FDD	128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
5	15MHz 4Rx	R.31-8 FDD	-	R.1-4 FDD	93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
6	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
7	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
8	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
9	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
10	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
11	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
12	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
13	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
14	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
15	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
16	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
17	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376	7	FLOOR((TB$_{size}$	1341

					(Note 5)		– 264)/56)	
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
18	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
19	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
20	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
21	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-4 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
22	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
23	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
24	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-4 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
25	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
26	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
27	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
28	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
29	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
30	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371

	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
31	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 2Rx	R.31-5 FDD	-		55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
32	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
33	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
34	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
35	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
36	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
37	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
38	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
39	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
40	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
41	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
42	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
43	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696	4	FLOOR((TB$_{size}$	1141

					(Note 7)		– 184)/32)	
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
44	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
45	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
46	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
47	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
48	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
49	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
50	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 2Rx	R.31-5 FDD	-		55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD	-		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
51	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
52	20MHz 2Rx	-	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
53	20MHz 2Rx	R.31-4 FDD	-	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
54	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455

55	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
56	10MHz 2Rx	R.31-3A FDD	-	R.1-4 TDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
57	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-9 FDD	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
58	20MHz 2Rx	-	R.1-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
59	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD	R.1-4 FDD	75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
60	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
61	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
62	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
63	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	-	R.31-9 TDD		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
64	15MHz 2Rx	R.31-5 FDD	-	R.1-4 FDD	55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB$_{size}$ – 296)/64)	1461
65	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696 (Note 7)	4	FLOOR((TB$_{size}$ – 184)/32)	1141
	15MHz 2Rx	R.31-5 FDD	-		55056 (Note 6)	5	FLOOR((TB$_{size}$ – 208)/40)	1371
	20MHz 2Rx	-	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.31-9 FDD	-		128496 (Note 3)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
66	10MHz 2Rx	R.31-3A FDD	-	R.1-4 FDD	36696	4	FLOOR((TB$_{size}$	1141

					(Note 7)		– 184)/32)	
	20MHz 2Rx	R.31-4 FDD	R.31-4 TDD		75376 (Note 5)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.31-8 FDD	-		93800 (Note 4)	8	FLOOR((TB_{size} – 296)/64)	1461

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 124464 bits for sub-frame 5.

Note 4: 90816 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Note 6: 52752 bits for sub-frame 5.

Note 7: 35160 bits for sub-frame 5.

Table 8.7.11.5.4.1-4: Test points for sustained data rate (FRC 256QAM)

Maximum supported equivalent aggr. BW				Cat. 9, 10	Cat. 11, 12	DL Cat. 13	DL Cat. 15	DL Cat. 16	DL Cat. 18	DL Cat. 19
Bagg (MHz)	BW combi-nation (MHz)		MIMO layer	DL Cat. 9, 10	DL Cat. 11, 12					
	FDD CC	TDD CC								
400	2x20	3x20	4	-	-	-	-	-	47	16
400	3x20	2x20	4	-	-	-	-	-	51	6
400	20	4x20	4	-	-	-	-	-	52	7
400	4x20	20	4	-	-	-	-	-	53	8
380	15+20+20	2x20	4	-	-	-	-	-	57	10
360	20	-	2	-	-	-	-	-	51	6
	2x20	2x20	4							
360	20	-	2	-	-	-	-	-	43	7
	-	4x20	4							
360	20	-	2	-	-	-	-	-	53	8
	3x20	20	4							
360	-	20	2	-	-	-	-	-	54	9
	4x20	-	4							
350	15	-	2	-	-	-	-	-	57	10
	2x20	2x20	4							
340	20	-	2	-	-	-	-	-	57	11
	15+20	2x20	4							
340	10	-	2	-	-	-	-	-	43	12
	-	4x20	4							
340	10	-	2	-	-	-	-	-	44	13
	2x20	2x20	4							
340	10	-	2	-	-	-	-	-	47	14
	20	3x20	4							
330	15	-	2	-	-	-	-	-	61	15
	15+20	2x20	4							
320	2x20	-	2	-	-	-	-	-	47	16
	-	3x20	4							
320	2x20	-	2	-	-	-	-	-	51	17
	20	2x20	4							
320	-	2x20	2	-	-	-	-	-	51	18
	3x20	-	4							
320	-	2x20	2	-	-	-	-	-	52	19
	20	2x20	4							
320	2x20	-	2	-	-	-	-	-	53	20
	2x20	20	4							
320	20	20	2	-	-	-	-	-	54	21
	3x20	-	4							
320	10	-	2	-	-	-	-	-	50	22
	15+20	2x20	4							
310	15+20	-	2	-	-	-	-	-	57	23
	20	2x20	4							
300	-	2x20	2	-	-	-	-	-	57	24
	15+20+20	-	4							
300	2x20	-	2	-	-	-	-	-	59	25
	15	2x20	4							
300	10+20	-	2	-	-	-	-	-	60	26
	20	2x20	4							
300	2x15	-	2	-	-	-	-	-	61	27
	20	2x20	4							
300	10+20	-	2	-	-	-	-	-	48	28
	-	3x20	4							
300	10	20	2	-	-	-	-	-	47	29
	20	2x20	4							
290	15+20	-	2	-	-	-	-	-	64	30
	15	2x20	4							
290	10+15	-	2	-	-	-	-	-	50	31
	20	2x20	4							
280	-	3x20	2	-	-	-	-	-	62	32
	2x20	-	4							

280	20	2x20	2	-	-	-	-	-	51	33
	2x20	-	4							
280	3x20	-	2	-	-	-	-	-	50	34
	-	2x20	4							
280	20	2x20	2	-	-	-	-	-	43	35
	-	2x20	4							
280	3x20	-	2	-	-	-	-	-	53	36
	20	20	4							
280	2x20	20	2	-	-	-	-	-	54	37
	2x20	-	4							
280	10+20	-	2	-	-	-	-	-	50	38
	15	2x20	4							
280	2x10	-	2	-	-	-	-	-	56	39
	-	3x20	4							
270	15	2x20	2	-	-	-	-	-	57	40
	2x20	-	4							
270	15+20+20	-	2	-	-	-	-	-	50	41
	-	2x20	4							
260	20	2x20	2	-	-	-	-	-	57	42
	15+20	-	4							
260	10	2x20	2	-	-	-	-	-	43	43
	-	2x20	4							
260	10	2x20	2	-	-	-	-	-	44	44
	2x20	-	4							
260	10+20+20	-	2	-	-	-	-	-	45	45
	-	2x20	4							
260	15+15+20	-	2	-	-	-	-	-	46	46
	-	2x20	4							
260	10	2x20	2	-	-	-	-	-	47	47
	20	20	4							
260	10+20	20	2	-	-	-	-	-	48	48
	-	2x20	4							
250	15	2x20	2	-	-	-	-	-	49	49
	15+20	-	4							
250	10+15+20	-	2	-	-	-	-	-	50	50
	-	2x20	4							
240	2x20	2x20	2	-	-	-	-	-	51	51
	20	-	4							
240	-	4x20	2	-	-	-	-	-	52	52
	20	-	4							
240	4x20	-	2	-	-	-	-	-	53	53
	-	20	4							
240	3x20	20	2	-	-	-	-	-	54	54
	20	-	4							
240	10	2x20	2	-	-	-	-	-	55	55
	15+20	-	4							
240	2x10	20	2	-	-	-	-	-	56	56
	-	2x20	4							
230	15+20	2x20	2	-	-	-	-	-	57	57
	20	-	4							
220	-	4x20	2	-	-	-	-	-	58	58
	15	-	4							
220	2x20	2x20	2	-	-	-	-	-	59	59
	15	-	4							
220	10+20	2x20	2	-	-	-	-	-	60	60
	20	-	4							
220	2x15	2x20	2	-	-	-	-	-	61	61
	20	-	4							
220	10	3x20	2	-	-	-	-	-	62	62
	20	-	4							
220	10+20	2x20	2	-	-	-	-	-	63	63
	-	20	4							
210	15+20	2x20	2	-	-	-	-	-	64	64
	15	-	4							
210	10+15	2x20	2	-	-	-	-	-	65	65

	20	-	4							
200	10+20	2x20	2	-	-	-	-	-	66	66
	15	-	4							
Note 1: Select the largest equivalent aggregated bandwidth supported by the UE as defined in clause 8.7.11.1. Only one test point to be tested.										

Table 8.7.11.5.4.1-5: Further test parameters per test (FRC 256QAM)

Test	Bandwidth and number of Rx antennas	DL Measurement channel		UL Measurement channel	TBsize per Codeword per CC	Number of PDCP SDU per Codeword	PDCP SDU size [Octets] Calculation (Note 1)	PDCP SDU size [Octets]
		FDD CC	TDD CC					
1	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
2	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
3	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
4	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD	R.1-4 FDD	169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
5	15MHz 4Rx	R.68-5 FDD	-	R.1-4 FDD	128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
6	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
7	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
8	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
9	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
10	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
11	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
12	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
13	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
14	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
15	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
16	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
17	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896	9	FLOOR((TB_{size}	1355

					(Note 5)		– 320)/72)	
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
18	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
19	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
20	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
21	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68 FDD	-		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
22	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1218
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
23	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
24	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	R.68 FDD	-		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
25	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB_{size} – 376)/88)	1455
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
26	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
27	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
28	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
29	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB_{size} – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB_{size} – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB_{size} – 488)/120)	1408
30	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB_{size} – 264)/56)	1341

	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
31	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	15MHz 2Rx	R.68-1 FDD	-		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
32	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
33	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
34	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
35	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
36	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
37	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
38	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
39	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
40	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
41	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
42	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
43	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936	5	FLOOR((TB$_{size}$	1218

					(Note 7)		– 208)/40)	
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
44	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
45	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
46	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
47	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
48	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
49	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
50	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	15MHz 2Rx	R.68-1 FDD	-		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD	-		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
51	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
52	20MHz 2Rx	-	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
53	20MHz 2Rx	R.68 FDD	-	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
54	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408

55	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
56	10MHz 2Rx	R.68-2 FDD	-	R.1-4 TDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
57	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68-6 FDD	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
58	20MHz 2Rx	-	R.1-4 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
59	20MHz 2Rx	R.68 FDD	R.68 TDD	R.1-4 FDD	97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
60	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
61	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
62	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
63	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	20MHz 2Rx	R.68 FDD	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	-	R.68-7 TDD		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
64	15MHz 2Rx	R.68-1 FDD	-	R.1-4 FDD	75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	R.68 FDD	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455
65	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936 (Note 7)	5	FLOOR((TB$_{size}$ – 208)/40)	1218
	15MHz 2Rx	R.68-1 FDD	-		75376 (Note 6)	7	FLOOR((TB$_{size}$ – 264)/56)	1341
	20MHz 2Rx	-	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	20MHz 4Rx	R.68-6 FDD	-		169544 (Note 3)	15	FLOOR((TB$_{size}$ – 488)/120)	1408
66	10MHz 2Rx	R.68-2 FDD	-	R.1-4 FDD	48936	5	FLOOR((TB$_{size}$	1218

					(Note 7)		– 208)/40)	
	20MHz 2Rx	R.68 FDD	R.68 TDD		97896 (Note 5)	9	FLOOR((TB$_{size}$ – 320)/72)	1355
	15MHz 4Rx	R.68-5 FDD	-		128496 (Note 4)	11	FLOOR((TB$_{size}$ – 376)/88)	1455

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation. In case of different resulting PDCP SDU sizes among component carriers, the smaller calculated PDCP SDU size is used across all the carriers.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12). The PDCP SDU size of each PDCP SDU is:
PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N, where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: 161760 bits for sub-frame 5.

Note 4: 124464 bits for sub-frame 5.

Note 5: 81176 bits for sub-frame 5.

Note 6: 61664 bits for sub-frame 5.

Note 7: 40576 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: according to Table 8.7.11.5.4.1-1 depending on the UE category according to Table 8.7.11.5.4.1-2 for UE not supporting 256QAM or Table 8.7.11.5.4.1-4 for UE supporting 256QAM.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.90.

2. For UE not supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.11.1-1, Table 8.7.11.5.4.1-1 and Table 8.7.11.5.4.1-3 depending on the UE category according to Table 8.7.11.5.4.1-2. For UE supporting 256QAM the parameter settings for the cell are set up according to Table 8.7.11.1-1, Table 8.7.11.5.4.1-1 and Table 8.7.11.5.4.1-5 depending on the UE category according to Table 8.7.11.5.4.1-4.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4A-RF according to TS 36.508 [7] clause 5.2A.3. Message contents are defined in clause 8.7.11.5.4.3.

8.7.11.5.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. PhysicalConfigDedicated-DEFAULT is defined in Table 8.7.11.5.4.3-3, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.7.11.5.4.3-4. Cell ID = n (where n is 1, 2, 3, 4) applies to S-Celln (where n is 1, 2, 3, 4).

3. The SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Propagation conditions are set according to Annex B.1 (No external noise sources are applied).

5. For UE not supporting 256QAM the SS looks up TB_{size} in Table 8.7.11.5.4.1-3 for the tests to be performed depending on the UE category according to Table 8.7.11.5.4.1-2. For UE supporting 256QAM the SS looks up TB_{size} in Table 8.7.11.5.4.1-5 for the tests to be performed depending on the UE category according to Table 8.7.11.5.4.1-4.

6. The SS sets the counters N_{DL_newtx}, N_{DL_retx}, N_{UL_PDCP} and ND_{DL_PDCP} to 0.

7. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.11.5.4.1-3 (Note 1) for UE not supporting 256QAM or in accordance with Table 8.7.11.5.4.1-5 (Note 1) for UE supporting 256QAM. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

8. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

9. Steps 7 to 8 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

10. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

11. The SS calculates the TB success rate as $A = 100\%*N_{DL_newtx} / (N_{DL_newtx} + N_{DL_retx})$. Measurements are not based on UE feedback but on SS counters instead (N_{DL_newtx} and N_{DL_retx}) in order to validate HARQ feedback received from the UE.

12. The SS calculates the PDCP SDU loss as $B = N_{DL_PDCP} - N_{UL_PDCP}$

13. The UE passes the test if $A > 85\%$ and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.11.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 and 4.7A, with the following exceptions:

Table 8.7.11.5.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.11.5.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS 36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

Table 8.7.11.5.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm3	Transmission mode 3	
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	10		2TX
n4TxAntenna-tm3	1000		4TX
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna P-Cell
4TX	4 SS Tx antenna P-Cell

Table 8.7.11.5.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
transmissionMode-r10	tm3	Transmission mode 3	
codebookSubsetRestriction-r10	10		2TX
codebookSubsetRestriction-r10	1000		4TX
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
pdsch-ConfigDedicated-r10 CHOICE {			4TX
p-a	dB-6		
}			
}			
}			

Condition	Explanation
2TX	2 SS Tx antenna S-Cell
4TX	4 SS Tx antenna S-Cell

8.7.11.5.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 8.7.11.5.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

8.8 Demodulation of EPDCCH

8.8.1 Distributed Transmission

8.8.1.1 FDD distributed EPDCCH performance

8.8.1.1.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH.

8.8.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward supporting EPDCCH.

8.8.1.1.3 Minimum conformance requirements

The parameters specified in Table 8.8.1.1.3-1 are valid for all FDD distributed EPDCCH tests unless otherwise stated.

Table 8.8.1.1.3-1: Test Parameters for Distributed EPDCCH

Parameter		Unit	Value
Number of PDCCH symbols		symbols	2 (Note 1)
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
	δ	dB	3
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	1
Beamforming Pre-Coder			Annex B.4.4
Cell Specific Reference Signal			Port 0 and 1
Number of EPDCCH Sets Configured			2 (Note 2)
Number of PRB per EPDCCH Set			4 (1st Set) 8 (2nd Set)
EPDCCH Subframe Monitoring			NA
PDSCH TM			TM3
DCI Format			2A

Note 1: The starting symbol for EPDCCH is derived from the PCFICH. RRC signalling *epdcch-StartSymbol-r11* is not configured.

Note 2: The two sets are distributed EPDCCH sets and non-overlapping with PRB = {3, 17, 31, 45} for the first set and PRB = {0, 7, 14, 21, 28, 35, 42, 49} for the second set. EPDCCH is scheduled in the first set for Test 1 and second set for Test 2, respectively. Both sets are always configured.

For the parameters specified in Table 8.8.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.1.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.1.1.3-2: Minimum performance Distributed EPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	2.6
2	10 MHz	16 ECCE	R.56 FDD	OP.7 FDD	EVA70	2 x 2 Low	1	-3.2

The normative reference for this requirement is TS 36.101 [2] clause 8.8.1.1.

8.8.1.1.4 Test description

8.8.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.8.1.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.1.1.4.3.

8.8.1.1.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.8.1.1.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.8.1.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.8.1.1.5-1, pass the UE. Otherwise fail the UE.

8.8.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.8.1.1.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, Condition: FDD

8.8.1.1.5 Test requirement

For the parameters specified in Table 8.8.1.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.1.1.1.5-1.

Table 8.8.1.1.1.5-1: Test requirement Distributed EPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	3.5
2	10 MHz	16 ECCE	R.56 FDD	OP.7 FDD	EVA70	2 x 2 Low	1	-2.3

8.8.1.2 TDD distributed EPDCCH performance

8.8.1.2.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH.

8.8.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward supporting EPDCCH.

8.8.1.2.3 Minimum conformance requirements

The parameters specified in Table 8.8.1.2.3-1 are valid for all TDD distributed EPDCCH tests unless otherwise stated.

Table 8.8.1.2.3-1: Test Parameters for Distributed EPDCCH

Parameter		Unit	Value
Number of PDCCH symbols		symbols	2 (Note 1)
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
	δ	dB	3
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	1
Beamforming Pre-Coder			Annex B.4.4
Cell Specific Reference Signal			Port 0 and 1
Number of EPDCCH Sets Configured			2 (Note 2)
Number of PRB per EPDCCH Set			4 (1st Set) 8 (2nd Set)
EPDCCH Subframe Monitoring			NA
PDSCH TM			TM3
DCI Format			2A
TDD UL/DL Configuration			0
TDD Special Subframe			1 (Note 3)

Note 1: The starting symbol for EPDCCH is derived from the PCFICH. RRC signalling *epdcch-StartSymbol-r11* is not configured.

Note 2: The two sets are distributed EPDCCH sets and non-overlapping with PRB = {3, 17, 31, 45} for the first set and PRB = {0, 7, 14, 21, 28, 35, 42, 49} for the second set. EPDCCH is scheduled in the first set for Test 1 and second set for Test 2, respectively. Both sets are always configured.

Note 3: Demodulation performance is averaged over normal and special subframe.

For the parameters specified in Table 8.8.1.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.1.2.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.1.2.3-2: Minimum performance Distributed EPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	2.8
2	10 MHZ	16 ECCE	R.56 TDD	OP.7 TDD	EVA70	2 x 2 Low	1	-3.1

The normative reference for this requirement is TS 36.101 [2] clause 8.8.1.2

8.8.1.2.4 Test description

8.8.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to 8.8.1.2.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.1.2.4.3.

8.8.1.2.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.8.1.2.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.8.1.2.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.8.1.2.5-1, pass the UE. Otherwise fail the UE.

8.8.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.8.1.2.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, Condition: TDD

Table 8.8.1.2.4.3-2: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	Ssp1		
}			

8.8.1.2.5 Test requirement

For the parameters specified in Table 8.8.1.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.1.2.5-1.

Table 8.8.1.2.5-1: Test requirement Distributed EPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	3.7
2	10 MHz	16 ECCE	R.56 TDD	OP.7 TDD	EVA70	2 x 2 Low	1	-2.2

8.8.2 Localized Transmission with TM9

8.8.2.1 FDD localized EPDCCH performance with TM9

Editor's notes: The following items are missing or incomplete:

- Test Tolerance

8.8.2.1.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). In this test, EPDCCH and PCFICH are not tested jointly.

8.8.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward supportingEPDCCH and FGI bit 103.

8.8.2.1.3 Minimum conformance requirements

The parameters specified in Table 8.8.2.1.3-1 are valid for all FDD TM9 localized ePDCCH tests unless otherwise stated.

Table 8.8.2.1.3-1: Test Parameters for Localized EPDCCH

Parameter		Unit	Value
Number of PDCCH symbols		symbols	1 (Note 1)
EPDCCH starting symbol		symbols	2 (Note 1)
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	-3
	δ	dB	0
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	1
Beamforming Pre-Coder			Annex B.4.5
Cell Specific Reference Signal			Port 0 and 1
CSI-RS Reference Signal			Port 15 and 16
CSI-RS reference signal resource configuration			0
CSI reference signal subframe configuration I_{CSI-RS}			2
ZP-CSI-RS configuration bitmap			0000010000000000
ZP-CSI-RS subframe configuration $I_{ZP-CSI-RS}$			2
Number of EPDCCH Sets			2 (Note 2)
EPDCCH Subframe Monitoring pattern *subframePatternConfig-r11*			1111111110 1111111101 1111111011 1111110111 (Note 3)
PDSCH TM			TM9

Note 1: The starting symbol for EPDCCH is signalled with *epdcch-StartSymbol-r11*. However, CFI is set to 1.

Note 2: The first set is distributed transmission with PRB = {0, 49} and the second set is localized transmission with PRB = {0, 7, 14, 21, 28, 35, 42, 49}. ePDCCH is scheduled in the second set for all tests.

Note 3: EPDCCH is scheduled in every SF. UE is required to monitor ePDCCH for UE-specific search space only in SFs configured by *subframePatternConfig-r11*. Legacy PDCCH is not scheduled.

For the parameters specified in Table 8.8.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.2.1.3-2. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is statDTX of 99.9%. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.2.1.3-2: Minimum performance Localized EPDCCH with TM9

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	12.2
2	10 MHZ	8 ECCE	R.58 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	2.5

The normative reference for this requirement is TS 36.101 [2] clause 8.8.2.1.

8.8.2.1.4 Test description

8.8.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.8.2.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.2.1.4.3.

8.8.2.1.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Table 8.8.2.1.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.8.2.1.5-1 as appropriate.
3. Measure the Pm-dsg on monitoring subframes for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval for monitoring subframes. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). Also, count the number of statDTX on the UL PUCCH for unmonitoring subframes and calculate the ratio of (number of statDTX on the UL PUCCH for unmonitoring subframes)/(the number of configured unmonitoring subframes). If Pm-dsg is less than the value specified in table 8.8.2.1.5-1 and the ratio of statDTX on the UL PUCCH for unmonitoring subframes is no less than 99.9%+TT, pass the UE. Otherwise fail the UE.

8.8.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.8.2.1.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, condition: FDD, TM9

Table 8.8.2.1.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	111111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.8.2.1.5 Test requirement

For the parameters specified in Table 8.8.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.2.1.5-1. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is no less than statDTX of 99.9%+TT.

Table 8.8.2.1.5-1: Test requirement localized EPDCCH with TM9

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	13.1
2	10 MHZ	8 ECCE	R.58 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	3.4

8.8.2.2 TDD localized EPDCCH performance with TM9

Editor's notes: The following items are missing or incomplete:

- Test Tolerance

8.8.2.2.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). In this test, EPDCCH and PCFICH are not tested jointly.

8.8.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward supportingEPDCCH and FGI bit 103.

8.8.2.2.3 Minimum conformance requirements

The parameters specified in Table 8.8.2.2.3-1 are valid for all TDD TM9 localized ePDCCH tests unless otherwise stated.

Table 8.8.2.2.3-1: Test Parameters for Localized EPDCCH with TM9

Parameter		Unit	Value
Number of PDCCH symbols		symbols	1 (Note 1)
EPDCCH starting symbol		symbols	2 (Note 1)
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	-3
	δ	dB	0
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	1
Beamforming Pre-Coder			Annex B.4.5
Cell Specific Reference Signal			Port 0 and 1
CSI-RS Reference Signal			Port 15 and 16
CSI-RS reference signal resource configuration			0
CSI reference signal subframe configuration I_{CSI-RS}			0
ZP-CSI-RS configuration bitmap			0000010000000000
ZP-CSI-RS subframe configuration $I_{ZP-CSI-RS}$			0
Number of EPDCCH Sets			2 (Note 2)
EPDCCH Subframe Monitoring pattern *subframePatternConfig-r11*			1100011000 1100010000 1100011000 1100001000 1100011000 1000011000 1100011000 (Note 3)
PDSCH TM			TM9
TDD UL/DL Configuration			0
TDD Special Subframe			1 (Note 4)

Note 1: The starting symbol for EPDCCH is signalled with *epdcch-StartSymbol-r11*. However, CFI is set to 1.
Note 2: The first set is distributed transmission with PRB = {0, 49} and the second set is localized transmission with PRB = {0, 7, 14, 21, 28, 35, 42, 49}. ePDCCH is scheduled in the second set for all tests.
Note 3: EPDCCH is scheduled in every SF. UE is required to monitor ePDCCH for UE-specific search space only in SFs configured by *subframePatternConfig-r11*. Legacy PDCCH is not scheduled.
Note 4: Demodulation performance is averaged over normal and special subframe.

For the parameters specified in Table 8.8.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.2.2.3-2. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is statDTX of 99.9%.

The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.2.2.3-2: Minimum performance Localized EPDCCH with TM9

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	12.8
2	10 MHZ	8 ECCE	R.58 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	2.0

The normative reference for this requirement is TS 36.101 [2] clause 8.8.2.2.

8.8.2.2.4 Test description

8.8.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to 8.8.2.2.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.2.2.4.3.

8.8.2.2.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Table 8.8.2.2.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.8.2.2.5-1 as appropriate.
3. Measure the Pm-dsg on monitoring subframes for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval for monitoring subframes. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). Also, count the number of statDTX on the UL PUCCH for unmonitoring subframes and calculate the ratio of (number of statDTX on the UL PUCCH for unmonitoring subframes)/(the number of configured unmonitoring subframes). If Pm-dsg is less than the value specified in table 8.8.2.2.5-1 and the ratio of statDTX on the UL PUCCH for unmonitoring subframes is no less than 99.9%+TT, pass the UE. Otherwise fail the UE.

8.8.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.8.2.2.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, condition: TDD, TM9

Table 8.8.2.2.4.3-2: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	ssp1		
}			

Table 8.8.2.2.4.3-3: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	111111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.8.2.2.5 Test requirement

For the parameters specified in Table 8.8.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.2.2.5-1. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is no less than statDTX of 99.9%+TT.

Table 8.8.2.2.5-1: Test requirement Localized EPDCCH with TM9

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	13.7
2	10 MHZ	8 ECCE	R.58 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	2.9

8.8.3 Localized transmission with TM10 Type B quasi co-location type

8.8.3.1 FDD localized EPDCCH transmission with TM10 Type B quasi co-location type

8.8.3.1.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). In this test, EPDCCH and PCFICH are not tested jointly.

8.8.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward supporting EPDCCH with multiple CSI processes on a component carrier within a band with PDSCH transmission mode 10.

8.8.3.1.3 Minimum conformance requirements

For the parameters specified in Table 8.8.3.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.3.1.3-2. In Table 8.8.3.1.3-1, transmission point 1 (TP 1) is the serving cell. The downlink physical setup is accordance with Annex C.3.2.

Table 8.8.3.1.3-1: Test Parameters for Localized Transmission TM10 Type B quasi co-location type

Parameter		Unit	Test 1		Test 2	
			TP 1	TP 2	TP 1	TP 2
PHICH duration			Normal			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	-3			
	δ	dB	0			
$\hat{E}_s/N_{oc}$		dB	0dB power imbalance is considered between TP 1 and TP 2,	Reference value in Table 8.8.3.1.3-2	Reference value in Table 8.8.3.1.3-2	Reference value in Table 8.8.3.1.3-2
N_{oc} at antenna port		dBm/15kHz	-98			
Bandwidth		MHz	10	10	10	10
Number of configured EPDCCH Sets			2 (Note 1)		2 (Note 1)	
EPDCCH-PRB-Set ID (setConfigId)			0	1	0	1
Transmission type of EPDCCH-PRB-set			Localized	Localized	Localized	Localized
Number of PRB pair per EPDCCH-PRB-set		PRB	8	8	8	8
EPDCCH beamforming model			Annex B.4.5	Annex B.4.5	Annex B.4.5	Annex B.4.5
PDSCH transmission mode			TM10	TM10	TM10	TM10
PDSCH transmission scheduling			Blanked in all the subframes	Transmit in all the subframes	Probability of occurrence of PDSCH transmission is 30% (Note 3)	Probability of occurrence of PDSCH transmission is 70% (Note 3)
Non-zero power CSI reference signal (NZPId=1)	CSI reference signal configuration		N/A	0	N/A	0
	CSI reference signal subframe configuration I_{CSI-RS}		N/A	2	N/A	2
Non-zero power CSI reference signal (NZPId=2)	CSI reference signal configuration		N/A	N/A	10	N/A
	CSI reference signal subframe configuration I_{CSI-RS}		N/A	N/A	2	N/A
Zero power CSI reference signal (ZPId=1)	CSI-RS Configuration list (ZeroPowerCSI-RS bitmap)	Bitmap	N/A	0000010000000000	N/A	1000010000000000
	CSI-RS subframe configuration I_{CSI-RS}		N/A	2	N/A	2
Zero power CSI reference signal (ZPId=2)	CSI-RS Configuration list (ZeroPowerCSI-RS bitmap)	Bitmap	N/A	N/A	1000010000000000	N/A
	CSI-RS subframe configuration I_{CSI-RS}		N/A	N/A	2	N/A
PQI set 0 (Note 4)	Non-Zero power CSI RS Identity (NZPId)		N/A	1	N/A	1

	Zero power CSI RS Identity (ZPId)		N/A	1	N/A	1
PQI set 1 (Note 4)	Non-Zero power CSI RS Identity (NZPId)		N/A	N/A	2	N/A
	Zero power CSI RS Identity (ZPId)		N/A	N/A	2	N/A
Number of PDCCH symbols		Symbols	1 (Note 2)			
EPDCCH starting position			pdsch-Start-r11=2 (Note 2)	pdsch-Start-r11=2 (Note 2)	pdsch-Start-r11=2 (Note 2)	pdsch-Start-r11=2 (Note 2)
Subframe configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN
Time offset between TPs		μs	N/A	2	N/A	2
Frequency shift between TPs		Hz	N/A	200	N/A	200
Cell ID			0	126	0	126

Note 1: Resource blocks n_{PRB} =0, 7, 14, 21, 28, 35, 42, 49 are allocated for both the first set and the second set.
Note 2: The starting OFDM symbol for EPDCCH is determined from the higher layer signalling pdsch-Start-r11. And CFI is set to 1.
Note 3: The TP from which PDSCH is transmitted shall be randomly determined independently for each subframe. Probabilities of occurrence of PDSCH transmission from TP 1 and TP 2 are specified.
Note 4: For PQI set 0, PDSCH and EPDCCH are transmitted from TP 2. For PQI set 1, PDSCH and EPDCCH are transmitted from TP1. EPDCCH and PDSCH are transmitted from same TP.

Table 8.8.3.1.3-2: Minimum Performance

Test number	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-dsg (%)	SNR (dB)
1	2 ECCE	R.59 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	13.4
2	2 ECCE	R.59 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	13.4

The normative reference for this requirement is TS 36.101 [2] clause 8.8.3.1.

8.8.3.1.4 Test description

8.8.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40.
2. The parameter settings for the cell are set up according to Table 8.8.3.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.3.1.4.3.

8.8.3.1.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to Table 8.8.3.1.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.8.3.1.5-1 as appropriate.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.8.3.1.5-1, pass the UE. Otherwise fail the UE.

8.8.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.8.3.1.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, Condition: FDD, TM10

Table 8.8.3.1.4.3-2: PDSCH-ConfigDedicated-v1130

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-6AA			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {			
dmrs-ConfigPDSCH-r11	DMRS-Config-r11-DEFAULT		
qcl-Operation	typeB		
re-MappingQCLConfigToReleaseList-r11	Not present		
re-MappingQCLConfigToAddModList-r11 SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF SEQUENCE {	2 entries		
pdsch-RE-MappingQCL-ConfigId-r11[1]	0		
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11 CHOICE {			
release	NULL		
setup SEQUENCE {			
subframeConfigList	Not present		
}			
}			
pdsch-Start-r11	n2		
}			
csi-RS-ConfigZPId-r11[1]	1		
qcl-CSI-RS-ConfigNZPId-r11[1]	1		
pdsch-RE-MappingQCL-ConfigId-r11[2]	2		
optionalSetOfFields-r11[2] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11 CHOICE {			
release	Null		
setup SEQUENCE {			
subframeConfigList	Not present		
}			
}			
pdsch-Start-r11	n2		
}			
csi-RS-ConfigZPId-r11[2]	2		
qcl-CSI-RS-ConfigNZPId-r11[2]	2		
}			
}			

Table 8.8.3.1.4.3-3: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
codebookSubsetRestriction-r10	FFS		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.8.3.1.5 Test requirement

For the parameters specified in Table 8.8.3.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.3.1.5-1.

Table 8.8.3.1.5-1: Test Performance

Test number	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-dsg (%)	SNR (dB)
1	2 ECCE	R.59 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	14.3
2	2 ECCE	R.59 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	14.3

8.8.3.2 TDD localized EPDCCH transmission with TM10 Type B quasi co-location type

8.8.3.2.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). In this test, EPDCCH and PCFICH are not tested jointly.

8.8.3.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward supporting EPDCCH with multiple CSI processes on a component carrier within a band with PDSCH transmission mode 10.

8.8.3.2.3 Minimum conformance requirements

For the parameters specified in Table 8.8.3.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.3.2.3-2. In Table 8.8.3.2.3-1, transmission point 1 (TP1) is the serving cell. The downlink physical setup is accordance with Annex C.3.2.

Table 8.8.3.2.3-1: Test Parameters for Localized Transmission TM10 Type B quasi co-location type

Parameter		Unit	Test 1		Test 2	
			TP 1	TP 2	TP 1	TP 2
PHICH duration			Normal			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	-3			
	δ	dB	0			
$\hat{E}_s/N_{oc}$		dB	0dB power imbalance is considered between TP 1 and TP 2,	Reference value in Table 8.8.3.2.3-2	Reference value in Table 8.8.3.2.3-2	Reference value in Table 8.8.3.2.3-2
N_{oc} at antenna port		dBm/15kHz	-98			
Bandwidth		MHz	10	10	10	10
Number of EPDCCH Sets			2 (Note 1)		2 (Note 1)	
EPDCCH-PRB-Set ID (setConfigId)			0	1	0	1
Transmission type of EPDCCH-PRB-set			Localized	Localized	Localized	Localized
Number of PRB pair per EPDCCH-PRB-set		PRB	8	8	8	8
EPDCCH beamforming model			Annex B.4.5	Annex B.4.5	Annex B.4.5	Annex B.4.5
PDSCH transmission mode			TM10	TM10	TM10	TM10
PDSCH transmission scheduling			Blanked in all the subframes	Transmit in all the subframes	Probability of occurrence of PDSCH transmission is 30% (Note 3)	Probability of occurrence of PDSCH transmission is 70% (Note 3)
CSI reference signal configurations			Antenna ports 15,16	Antenna ports 15,16	Antenna ports 15,16	Antenna ports 15,16
Non-zero power CSI reference signal (NZPId=1)	CSI reference signal configuration		N/A	0	N/A	0
	CSI reference signal subframe configuration I_{CSI-RS}		N/A	0	N/A	0
Non-zero power CSI reference signal (NZPId=2)	CSI reference signal configuration		N/A	N/A	10	N/A
	CSI reference signal subframe configuration I_{CSI-RS}		N/A	N/A	0	N/A
Zero power CSI reference signal (ZPId=1)	CSI-RS Configuration list (ZeroPowerCSI-RS bitmap)	Bitmap	N/A	0000010000000000	N/A	1000010000000000
	CSI-RS subframe configuration I_{CSI-RS}		N/A	0	N/A	0
Zero power CSI reference signal (ZPId=2)	CSI-RS Configuration list (ZeroPowerCSI-RS bitmap)	Bitmap	N/A	N/A	1000010000000000	N/A
	CSI-RS subframe configuration I_{CSI-RS}		N/A	N/A	0	N/A

PQI set 0 (Note 4)	Non-Zero power CSI RS Identity (NZPId)		N/A	1	N/A	1
	Zero power CSI RS Identity (ZPId)		N/A	1	N/A	1
PQI set 1 (Note 4)	Non-Zero power CSI RS Identity (NZPId)		N/A	N/A	2	N/A
	Zero power CSI RS Identity (ZPId)		N/A	N/A	2	N/A
Number of PDCCH symbols		Symbols	1 (Note 2)			
EPDCCH starting position			pdsch-Start-r11=2 (Note 2)	pdsch-Start-r11=2 (Note 2)	pdsch-Start-r11=2 (Note 2)	pdsch-Start-r11=2 (Note 2)
Subframe configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN
Time offset between TPs		μs	N/A	2	N/A	2
Frequency shift between TPs		Hz	N/A	200	N/A	200
Cell ID			0	126	0	126
TDD UL/DL configuration			0			
TDD special subframe			1			

Note 1: Resource blocks n_{PRB} = 0, 7, 14, 21, 28, 35, 42, 49 are allocated for both the first set and the second set.
Note 2: The starting OFDM symbol for EPDCCH is determined from the higher layer signalling pdsch-Start-r11. And CFI is set to 1.
Note 3: The TP from which PDSCH is transmitted shall be randomly determined independently for each subframe. Probabilities of occurrence of PDSCH transmission from TP 1 and TP 2 are specified.
Note 4: For PQI set 0, PDSCH and EPDCCH are transmitted from TP 2. For PQI set 1, PDSCH and EPDCCH are transmitted from TP1. EPDCCH and PDSCH are transmitted from same TP.

Table 8.8.3.2.3-2: Minimum Performance

Test number	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-dsg (%)	SNR (dB)
1	2 ECCE	R.59 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	13.6
2	2 ECCE	R.59 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	13.6

The normative reference for this requirement is TS 36.101 [2] clause 8.8.3.2.

8.8.3.2.4 Test description

8.8.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40.
2. The parameter settings for the cell are set up according to 8.8.3.2.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.3.2.4.3.

8.8.3.2.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to Table 8.8.3.2.3-2. The details of EPDCCH and PDSCH are specified in Table A.3.10.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.8.3.2.5-1 as appropriate.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.8.3.2.5-1 pass the UE. Otherwise fail the UE.

8.8.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.8.3.2.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, Condition: TDD, TM10

Table 8.8.3.2.4.3-2: PDSCH-ConfigDedicated-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-6AA			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {			
dmrs-ConfigPDSCH-r11	DMRS-Config-r11-DEFAULT		
qcl-Operation	typeB		
re-MappingQCLConfigToReleaseList-r11	Not present		
re-MappingQCLConfigToAddModList-r11 SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF SEQUENCE {	2 entries		
pdsch-RE-MappingQCL-ConfigId-r11[1]	0		
optionalSetOfFields-r11[1] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11 CHOICE {			
release	NULL		
setup SEQUENCE {			
subframeConfigList	Not present		
}			
}			
pdsch-Start-r11	n2		
}			
csi-RS-ConfigZPId-r11[1]	1		
qcl-CSI-RS-ConfigNZPId-r11[1]	1		
pdsch-RE-MappingQCL-ConfigId-r11[2]	2		
optionalSetOfFields-r11[2] SEQUENCE {			
crs-PortsCount-r11	n2		
crs-FreqShift-r11	0		
mbsfn-SubframeConfigList-r11 CHOICE {			
release	NULL		
setup SEQUENCE {			
subframeConfigList	Not present		
}			
}			
pdsch-Start-r11	n2		
}			
csi-RS-ConfigZPId-r11[2]	2		
qcl-CSI-RS-ConfigNZPId-r11[2]	2		
}			
}			

Table 8.8.3.2.4.3-3: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
codebookSubsetRestriction-r10	FFS		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.8.3.2.5 Test requirement

For the parameters specified in Table 8.8.3.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.3.2.5-1.

Table 8.8.3.2.5-1: Test Performance

Test number	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-dsg (%)	SNR (dB)
1	2 ECCE	R.59 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	14.5
2	2 ECCE	R.59 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	14.5

8.8.4

8.8.4.1 FDD Enhanced Downlink Control Channel Performance Requirements Type A for EDPCCH - Localized Transmission with CRS Interference Model

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.8.4.1.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for localized EPDCCH transmission with CRS interference model. This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

8.8.4.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Detailed Test Applicability TBD

8.8.4.1.3 Minimum conformance requirements

The purpose of this test is to verify the localized EPDCCH performance the EPDCCH transmission in the serving cell is interfered by the CRS of the interfering cells, applying the CRS interference model defined in clause B.6.5. The receiver performance of the distributed EPDCCH is determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH. The parameters specified in Table 8.8.4.1.3-1.

In Table 8.8.4.1-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical setup is in accordance with Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.8.4.1.3-1: Test Parameters for EPDCCH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Number of PDCCH symbols		symbols	1 (Note 1)	2	2
EPDCCH starting symbol		symbols	2 (Note 1)	N/A	N/A
PHICH duration			Normal	Normal	Normal
Unused RE-s and PRB-s			OCNG	N/A	N/A
Cell ID			0	1	6
Downlink power allocation	ρ_A	dB	0	-3	-3
	ρ_B	dB	0	-3	-3
	σ	dB	-3	0	0
	δ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
EPDCCH Precoder Update Granularity		PRB	1	N/A	N/A
		ms	1	N/A	N/A
EPDCCH Beamforming Pre-Coder			Annex B. 4.5	N/A	N/A
CSI-RS Reference Signal			Port 15 and 16	N/A	N/A
CSI-RS reference signal resource configuration			0	N/A	N/A
CSI reference signal subframe configuration I_{CSI-RS}			2	N/A	N/A
ZP-CSI-RS configuration bitmap			0000010000000000	N/A	N/A
ZP-CSI-RS subframe configuration $I_{ZP-CSI-RS}$			2	N/A	N/A
Number of EPDCCH Sets			1	N/A	N/A
EPDCCH Set type			Localized	N/A	N/A
Number of PRB per EPDCCH Set			8	N/A	N/A
EPDCCH Set PRBs			0, 7, 14, 21, 28, 35, 42, 49	N/A	N/A
PDSCH TM			TM9	N/A	N/A
Interference model			N/A	As specified in clause B.6.5	As specified in clause B.6.5
Time offset to cell 1		μs	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
Note 1: The starting symbol for EPDCCH is signalled with *epdcch-StartSymbol-r11*. CFI is set to 1. Note 2: EPDCCH is scheduled in every subframe. EPDCCH Subframe Monitoring pattern is not configured.					

For the parameters specified in Table 8.8.4.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.4.1.3-2.

Table 8.8.4.1.3-2: Minimum performance for EPDCCH for enhanced downlink control channel performance requirements Type A

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 FDD	OP.7 FDD	EPA5	2 x 2 Low	1	13.4

The normative reference for this requirement is TS 36.101 [2] clause 8.8.4.1.

8.8.4.1.4 Test description

8.8.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.8.4.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.4.1.4.3.

8.8.4.1.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Table 8.8.4.1.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.8.4.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.8.4.1.5-1, pass the UE. Otherwise fail the UE.

8.8.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.8.4.1.5 Test requirement

For the parameters specified in Table 8.8.4.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.4.1.5-1.

Table 8.8.4.1.5-1: Test requirement for EPDCCH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 FDD	OP.7 FDD	EPA5	2 x 2 Low	1	TBD

8.8.4.2 TDD Enhanced Downlink Control Channel Performance Requirements Type A for EDPCCH - Localized Transmission with CRS Interference Model

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.8.4.2.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for localized EPDCCH transmission with CRS interference model. This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

8.8.4.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE Release 13 and forward. Detailed Test Applicability TBD

8.8.4.2.3 Minimum conformance requirements

The purpose of this test is to verify the localized EPDCCH performance the EPDCCH transmission in the serving cell is interfered by the CRS of the interfering cells, applying the CRS interference model defined in clause B.6.5. The receiver performance of the distributed EPDCCH is determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH. The parameters specified in Table 8.8.4.2.3-1.

In Table 8.8.4.2-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical setup is in accordance with Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.8.4.2.3-1: Test Parameters for EPDCCH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Number of PDCCH symbols		symbols	1 (Note 1)	2	2
EPDCCH starting symbol		symbols	2 (Note 1)	N/A	N/A
PHICH duration			Normal	Normal	Normal
Unused RE-s and PRB-s			OCNG	N/A	N/A
Cell ID			0	1	6
Downlink power allocation	ρ_A	dB	0	-3	-3
	ρ_B	dB	0	-3	-3
	σ	dB	-3	0	0
	δ	dB	0	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
EPDCCH Precoder Update Granularity		PRB	1	N/A	N/A
		ms	1	N/A	N/A
EPDCCH Beamforming Pre-Coder			Annex B. 4.5	N/A	N/A
CSI-RS Reference Signal			Port 15 and 16	N/A	N/A
CSI-RS reference signal resource configuration			0	N/A	N/A
CSI reference signal subframe configuration I_{CSI-RS}			2	N/A	N/A
ZP-CSI-RS configuration bitmap			0000010000000000	N/A	N/A
ZP-CSI-RS subframe configuration $I_{ZP-CSI-RS}$			2	N/A	N/A
Number of EPDCCH Sets			1	N/A	N/A
EPDCCH Set type			Localized	N/A	N/A
Number of PRB per EPDCCH Set			8	N/A	N/A
EPDCCH Set PRBs			0, 7, 14, 21, 28, 35, 42, 49	N/A	N/A
PDSCH TM			TM9	N/A	N/A
Interference model			N/A	As specified in clause B.6.5	As specified in clause B.6.5
Time offset to cell 1		μs	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
TDD UL/DL Configuration			0	0	0
TDD Special Subframe			1 (Note 4)	1	1
Note 1: The starting symbol for EPDCCH is signalled with *epdcch-StartSymbol-r11*. CFI is set to 1. Note 2: EPDCCH is scheduled in every subframe. EPDCCH Subframe Monitoring pattern is not configured. Note 3: Demodulation performance is averaged over normal and special subframes.					

For the parameters specified in Table 8.8.4.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.4.2.3-2.

Table 8.8.4.2.3-2: Minimum performance for EPDCCH for enhanced downlink control channel performance requirements Type A

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 TDD	OP.7 TDD	EPA5	2 x 2 Low	1	14.2

The normative reference for this requirement is TS 36.101 [2] clause 8.8.4.2.

8.8.4.2.4 Test description

8.8.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.8.4.2.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.4.2.4.3.

8.8.4.2.4.2 Test procedure

2. SS transmits PDSCH via EPDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Table 8.8.4.2.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.8.4.2.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.8.4.2.5-1, pass the UE. Otherwise fail the UE.

8.8.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.8.4.2.5 Test requirement

For the parameters specified in Table 8.8.4.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.4.2.5-1.

Table 8.8.4.2.5-1: Test requirement for EPDCCH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 TDD	OP.7 TDD	EPA5	2 x 2 Low	1	TBD

8.8.5

8.8.5.1 TDD Enhanced Downlink Control Channel Performance Requirements Type A for EDPCCH - Distributed Transmission with TM9 Interference Model

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.8.5.1.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for distributed EPDCCH transmission with TM9 interference model. This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

8.8.5.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Detailed Test Applicability TBD

8.8.5.1.3 Minimum conformance requirements

The purpose of this test is to verify the distributed EPDCCH performance when the EPDCCH transmission in the serving cell is interfered by two interfering cells and applying TM9 interference model. The receiver performance of the distributed EPDCCH is determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH. The parameters specified in Table 8.8.5.1.3-1.

In Table 8.8.5.1-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical setup is in accordance with Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is provided and includes Cell 2 and Cell 3.

Table 8.8.5.1.3-1: Test Parameters for EPDCCH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Number of PDCCH symbols		symbols	2 (Note 1)	2	2
PHICH duration			Normal	Normal	Normal
Cell ID			0	6	1
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3	-3	-3
	σ	dB	0	0	0
	δ	dB	3	3	3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
EPDCCH precoder Update Granularity		PRB	1	N/A	N/A
		ms	1	N/A	N/A
Beamforming Pre-Coder			Annex B. 4.4	N/A	N/A
Number of EPDCCH Sets Configured			1	N/A	N/A
EPDCCH Set type			Distributed	N/A	N/A
Number of PRB per EPDCCH Set			4	N/A	N/A
EPDCCH Set PRBs			3, 17, 31, 45	N/A	N/A
PDSCH TM			TM9	N/A	N/A
Interference model			N/A	As specified in clause B.5.4	As specified in clause B.5.4
Probability of occurrence of PDSCH transmission rank in interfering cells	Rank 1	%	N/A	70	70
	Rank 2	%	N/A	30	30
PDSCH precoder update granularity		PRB	N/A	50	50
Time offset to cell 1		μs	N/A	2	3
Frequency offset to cell 1		Hz	N/A	200	300
TDD UL/DL Configuration			0	0	0
TDD Special Subframe			1 (Note 3)	1	1

Note 1: The starting symbol for EPDCCH is derived from the PCFICH. RRC signalling *epdcch-StartSymbol-r11* is not configured.
Note 2: EPDCCH is scheduled in every subframe. EPDCCH Subframe Monitoring pattern is not configured.
Note 3: Demodulation performance is averaged over normal and special subframes.

For the parameters specified in Table 8.8.5.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.5.1.3-2.

Table 8.8.5.1.3-2: Minimum performance for EPDCCH for enhanced downlink control channel performance requirements Type A

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55-1 TDD	OP.7 TDD	EPA5	2 x 2 Low	1	14.8

The normative reference for this requirement is TS 36.101 [2] clause 8.8.5.1.

8.8.5.1.4 Test description

8.8.5.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.8.5.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.5.1.4.3.

8.8.5.1.4.2 Test procedure

3. SS transmits PDSCH via EPDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.8.5.1.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.8.5.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.8.5.1.5-1, pass the UE. Otherwise fail the UE.

8.8.5.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.8.5.1.5 Test requirement

For the parameters specified in Table 8.8.5.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.5.1.5-1.

Table 8.8.5.1.5-1: Test requirement for EPDCCH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55-1 TDD	OP.7 TDD	EPA5	2 x 2 Low	1	TBD

8.8.6

8.8.6.1 FDD Enhanced Downlink Control Channel Performance Type A for EDPCCH- Distributed Transmission with TM3 Interference Model

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- Test Applicability

- Test tolerances are undefined

- Message exceptions

8.8.6.1.1 Test purpose

This test verifies the Enhanced downlink control channel performance requirement Type A for distributed EPDCCH transmission with TM3 interference model. This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

8.8.6.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 13 and forward. Detailed Test Applicability TBD

8.8.6.1.3 Minimum conformance requirements

The purpose of this test is to verify the distributed EPDCCH performance when the serving cell EPDCCH transmission is interfered by two interfering cells applying asynchronous TM3 interference model. The receiver performance of the distributed EPDCCH is determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH. The parameters specified in Table 8.8.6.1.3-1.

In Table 8.8.6.1.3-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical setup is in accordance with Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively. The CRS assistance information [7] is not provided.

Table 8.8.6.1.3-1: Test Parameters for EPDCCH

Parameter		Unit	Cell 1	Cell 2	Cell 3
Number of PDCCH symbols		symbols	2 (Note 1)	2	2
PHICH duration			Normal	Normal	Normal
Cell ID			0	1	6
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3	-3	-3
	σ	dB	0	0	0
	δ	dB	3	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98		
$\hat{E}_s / N_{oc}$		dB	N/A	13.91	3.34
$BW_{Channel}$		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
EPDCCH Precoder Update Granularity		PRB	1	N/A	N/A
		ms	1	N/A	N/A
EPDCCH Beamforming Pre-Coder			Annex B.4.4	N/A	N/A
Number of EPDCCH Sets Configured			1	N/A	N/A
EPDCCH Set type			Distributed	N/A	N/A
Number of PRB per EPDCCH Set			4	N/A	N/A
EPDCCH Set PRBs			3, 17, 31, 45	N/A	N/A
PDSCH TM			TM9	N/A	N/A
Interference model			N/A	As specified in clause B.5.2	As specified in clause B.5.2
Probability of occurrence of PDSCH transmission rank in interfering cells	Rank 1	%	N/A	70	70
	Rank 2	%	N/A	30	30
Time offset to cell 1		μs	N/A	330	667
Frequency offset to cell 1		Hz	N/A	0	0
Note 1: The starting symbol for EPDCCH is derived from the PCFICH. RRC signalling *epdcch-StartSymbol-r11* is not configured. Note 2: EPDCCH is scheduled in every subframe. EPDCCH Subframe Monitoring pattern is not configured.					

For the parameters specified in Table 8.8.6.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.6.1.3-2.

Table 8.8.6.1.3-2: Minimum performance for EPDCCH for enhanced downlink control channel performance requirements Type A

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55-1 FDD	OP.7 FDD	EVA70	2 x 2 Low	1	15.9

The normative reference for this requirement is TS 36.101 [2] clause 8.8.6.1.

8.8.6.1.4 Test description

8.8.6.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Table 8.8.6.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.8.6.1.4.3.

8.8.6.1.4.2 Test procedure

4. SS transmits PDSCH via EPDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.8.6.1.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.8.6.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.8.6.1.5-1, pass the UE. Otherwise fail the UE.

8.8.6.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

TBD

8.8.6.1.5 Test requirement

For the parameters specified in Table 8.8.6.1.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.6.1.5-1.

Table 8.8.6.1.5-1: Test requirement for EPDCCH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55-1 FDD	OP.7 FDD	EVA70	2 x 2 Low	1	TBD

8.9 Demodulation (Single receiver antenna)

The SNR definition is given in Clause 8.1.1 where the number of receiver antennas N_{RX} assumed for the minimum performance requirement in this clause is 1.

8.9.1 PDSCH

8.9.1.1 FDD and half-duplex FDD (Fixed Reference Channel)

The parameters specified in Table 8.9.1.1-1 are valid for FDD and half-duplex FDD tests unless otherwise stated.

Table 8.9.1.1-1: Common Test Parameters (FDD and half-duplex FDD)

Parameter	Unit	Value
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths
Cyclic Prefix		Normal
Precoder update granularity		Frequency domain: 1 PRG Time domain: 1 ms for transmission mode 9

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.

8.9.1.1.1 FDD PDSCH Transmit Diversity 2x1 for UE category 0

8.9.1.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity.

8.9.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward of UE category 0.

8.9.1.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause [A.3.3.2], with the addition of the relevant parameters in Tables 8.9.1.1-1 and 8.9.1.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.9.1.1.1.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 transmitter antennas (SFBC) as specified.

Table 8.9.1.1.1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$.			

Table 8.9.1.1.1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE downlink category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.62 FDD	OP.1 FDD	EPA5	2x1 Low	70	9.0	0

8.9.1.1.1.4 Test description

8.9.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.9.1.1.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.9.1.1-1 and 8.9.1.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.1.1.4.3.

8.9.1.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.9.1.1.1.3-1 and 8.9.1.1.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.9.1.1.1.3-2 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.9.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.9.1.1.1.5 Test requirement

Table 8.9.1.1.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.3.2] for each throughput test shall meet or exceed the specified value in Table 8.9.1.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.1.1.5-1: Minimum performance Transmit Diversity (FRC)

Test number	Band-width and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE downlink category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.xx FDD	OP.1 FDD	EPA5	2x1 Low	70	9.8	0

8.9.1.1.1_1 FDD PDSCH Transmit Diversity 2x1 for UE category 1bis

8.9.1.1.1_1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity.

8.9.1.1.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 13 and forward of UE category 1bis

8.9.1.1.1_1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.9.1.1-1 and 8.9.1.1.1_1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.9.1.1.1_1.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 transmitter antennas (SFBC) as specified.

Table 8.9.1.1.1_1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$.			

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.1.

Table 8.9.1.1.1_1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.62 FDD	OP.1 FDD	EPA5	2x1 Low	70	9.0	0
2	10 MHz 16QAM 1/2	R.84 FDD	OP.1 FDD	EPA5	2x1 Low	70	9.3	1bis

8.9.1.1.1_1.4 Test description

8.9.1.1.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.9.1.1.1_1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.9.1.1-1 and 8.9.1.1.1_1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.1.1_1.4.3.

8.9.1.1.1_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.9.1.1.1_1.3-1 and 8.9.1.1.1_1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.9.1.1.1_1.3-2 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.9.1.1.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.9.1.1.1_1.5 Test requirement

Table 8.9.1.1.4.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.9.1.1.1_1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.1.1_1.5-1: Minimum performance Transmit Diversity (FRC)

Test number	Band-width and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz 16QAM 1/2	R.84 FDD	OP.1 FDD	EPA5	2x1 Low	70	10.1	1bis

8.9.1.1.2 FDD closed-loop spatial multiplexing performance (Cell-Specific Reference Symbols)

8.9.1.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.9.1.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward of UE category 0.

8.9.1.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.9.1.1-1 and 8.9.1.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.9.1.1.2.3-2 for the specified SNR. For Single-Layer Spatial Multiplexing performance with 2 transmitter antennas as specified.

Table 8.9.1.1.2.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	8
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			001111
PDSCH transmission mode			4
Note 1: $P_B = 1$.			
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			

Table 8.9.1.1.2.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 64QAM 1/2	R. 63 FDD	OP.1 FDD	EPA5	2x1Low	70	13.2	0

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.1.2.

8.9.1.1.2.4 Test description

8.9.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.9.1.1.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.9.1.1-1 and 8.9.1.1.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.1.2.4.3.

8.9.1.1.2.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.9.1.1.2.3-1 and 8.9.1.1.2.3-2.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.9.1.1.2.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
5. Repeat steps from 1 to 4 for each test interval in Tables 8.9.1.1.2.5-1as appropriate.

8.9.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.9.1.1.2.5 Test requirement

Table 8.9.1.1.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.3.2] for each throughput test shall meet or exceed the specified value in Table 8.9.1.1.2.3-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.1.2.5-1: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 64QAM 1/2	R. 63 FDD	OP.1 FDD	EPA5	2x1Low	70	14	0

8.9.1.1.2_1 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x1 for UE Category 1bis

8.9.1.1.2_1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.9.1.1.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 13 and forward of UE category 1bis.

8.9.1.1.2_1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.9.1.1-1 and 8.9.1.1.2_1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.9.1.1.2_1.3-2 for the specified SNR. For Single-Layer Spatial Multiplexing performance with 4 transmitter antennas as specified.

Table 8.9.1.1.2_1.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	8
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			000000000000FFFF
PDSCH transmission mode			4
Note 1: $P_B = 1$.			
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			

Table 8.9.1.1.2_1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 64QAM 1/2	R.85 FDD	OP.1 FDD	EPA5	4x1 Low	70	11.3	1bis

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.1.2.

8.9.1.1.2_1.4 Test description

8.9.1.1.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.9.1.1.2_1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to Tables 8.9.1.1-1 and 8.9.1.1.2_1.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.1.2_1.4.3.

8.9.1.1.2_1.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.9.1.1.2_1.3-1 and 8.9.1.1.2_1.3-2.

2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.9.1.1.2_1.5-1 as appropriate.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

5. Repeat steps from 1 to 4 for each test interval in Tables 8.9.1.1.2_1.5-1as appropriate.

8.9.1.1.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.9.1.1.2_1.5 Test requirement

Table 8.9.1.1.2_1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.3.2] for each throughput test shall meet or exceed the specified value in Table 8.9.1.1.2_1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.1.2_1.5-1: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 64QAM 1/2	R.85 FDD	OP.1 FDD	EPA5	4x1 Low	70	12.1	1bis

8.9.1.1.3 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0

8.9.1.1.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port and multiple CSI reference symbols configurations with non-zero and zero transmission power.

8.9.1.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 12 and forward of UE category 0. Applicability requires support for FGI bit 103.

8.9.1.1.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1, with the addition of the relevant parameters in Tables 8.9.1.1-1 and 8.9.1.1.3.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.9.1.1.3.3-2 for the specified SNR.

Table 8.9.1.1.3.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Beamforming model			Annex B.4.1
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2
CSI reference signal configuration			0
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0001000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 4)
Number of allocated resource blocks (Note 2)		PRB	6
PDSCH transmission mode			9
Note 1: $P_B = 1$.			
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.			
Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.9.1.1.3.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.64 FDD	OP.1 FDD	EPA5	2x1 Low	70	4.7	0

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.1.3.

8.9.1.1.3.4 Test description

8.9.1.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.9.1.1.3.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9(using only main UE Tx/Rx antenna).
2. The parameter settings for the cell are set up according to Tables 8.9.1.1-1 and 8.9.1.1.3.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.1.3.4.3.

8.9.1.1.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.9.1.1.3.3-1, 8.9.1.1.3.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.9.1.1.3.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.9.1.1-1. CSI-RS are sent on antenna ports 15-22 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.9.1.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.9.1.1.3.5 Test requirement

Table 8.9.1.1.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.3.1] for each throughput test shall meet or exceed the specified value in Table 8.9.1.1.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.1.3.5-1: Test requirement for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.64 FDD	OP.1 FDD	EPA5	2x1 Low	70	5.5	0

8.9.1.2 TDD (Fixed Reference Channel)

The parameters specified in Table 8.9.1.2-1 are valid for all TDD tests unless otherwise stated.

Table 8.9.1.2-1: Common Test Parameters (TDD)

Parameter	Unit	Value
Uplink downlink configuration (Note 1)		1
Special subframe configuration (Note 2)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	7
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths
Precoder update granularity		Frequency domain: 1 PRG Time domain: 1 ms for Transmission mode 9
ACK/NACK feedback mode		Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [4]. Note 2: as specified in Table 4.2-1 in TS 36.211 [4].		

8.9.1.2.1 TDD PDSCH Transmit Diversity for UE category 0

8.9.1.2.1.1 Test purpose

The purpose is to verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity.

8.9.1.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward of UE category 0.

8.9.1.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.9.1.2-1 and 8.9.1.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.9.1.2.1.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 transmitter antennas (SFBC) as specified.

Table 8.9.1.2.1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.9.1.2.1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.62 TDD	OP.1 TDD	EPA5	2x1 Low	70	8.8	0

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.2.1.

8.9.1.2.1.4 Test description

8.9.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.9.1.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9(using only main UE Tx/Rx antenna).

2. The parameter settings for the cell are set up according to Tables 8.9.1.2-1 and 8.9.1.2.1.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.2.1.4.3.

8.9.1.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.9.1.2.1.3-1 and 8.9.1.2.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.9.1.2.1.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.9.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.9.1.2.1.5 Test requirement

Table 8.9.1.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.4.2] for each throughput test shall meet or exceed the specified value in Table 8.9.1.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.2.1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.62 TDD	OP.1 TDD	EPA5	2x1 Low	70	9.6	0

8.9.1.2.2 TDD closed-loop spatial multiplexing performance (Cell-Specific Reference Symbols)

8.9.1.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.9.1.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward of UE category 0.

8.9.1.2.2.3 Minimum conformance requirements

The requirements are specified in Table 8.9.1.2.2.3-2, with the addition of the parameters in Table 8.9.1.2.2.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-one performance with frequency selective precoding.

Table 8.9.1.2.2.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			001111
ACK/NACK feedback mode			Multiplexing
PDSCH transmission mode			4
Note 1: $P_B = 1$.			
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.			

Table 8.9.1.2.2.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 64QAM 1/2	R. 63 TDD	OP.1 TDD	EPA5	2x1 Low	70	13.1	0

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.2.2.

8.9.1.2.2.4 Test description

8.9.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.9.1.2.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.9.1.2-1 and 8.9.1.2.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.1.2.4.3.

8.9.1.2.2.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.9.1.2.2.3-1 and 8.9.1.2.2.3-2.The SS sends downlink MAC padding bits on the DL RMC.

2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.9.1.2.2.5-1 as appropriate.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

5. Repeat steps from 1 to 4 for each test interval in Tables 8.9.1.2.2.5-1 as appropriate.

8.9.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.9.1.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	001111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.9.1.2.2.4.3-2: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop single -layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.9.1.2.2.5 Test requirement

Table 8.9.1.2.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.9.1.2.2.3-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.2.2.5-1: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 64QAM 1/2	R. 63 TDD	OP.1 TDD	EPA5	2x1 Low	70	13.9	0

8.9.1.2.2_1 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x1 for UE Category 1bis

8.9.1.2.2_1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.9.1.2.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 13 and forward of UE category 1bis.

8.9.1.2.2_1.3 Minimum conformance requirements

The requirements are specified in Table 8.9.1.2.2_1.3-2, with the addition of the parameters in Table 8.9.1.2.2_1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-one performance with frequency selective precoding.

Table 8.9.1.2.2_1.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			000000000000FFFF
ACK/NACK feedback mode			Multiplexing
PDSCH transmission mode			4

Note 1: $P_B = 1$.

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.

Table 8.9.1.2.2_1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	

1	10 MHz 64QAM 1/2	R.85 TDD	OP.1 TDD	EPA5	4x1 Low	70	11.6	1bis

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.2.2.

8.9.1.2.2_1.4 Test description

8.9.1.2.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.9.1.2.2_1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.9.1.2-1 and 8.9.1.2.2_1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.1.2.4.3.

8.9.1.2.2_1.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.9.1.2.2_1.3-1 and 8.9.1.2.2_1.3-2.The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.9.1.2.2_1.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
5. Repeat steps from 1 to 4 for each test interval in Tables 8.9.1.2.2_1.5-1 as appropriate.

8.9.1.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.9.1.2.2_1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	000000000000FFFF		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.9.1.2.2_1.4.3-2: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop single -layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.9.1.2.2_1.5 Test requirement

Table 8.9.1.2.2_1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.9.1.2.2_1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.2.2_1.5-1: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 64QAM 1/2	R.85 TDD	OP.1 TDD	EPA5	4x1 Low	70	12.4	1bis

8.9.1.2.3 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0)

8.9.1.2.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port and multiple CSI reference symbols configurations with non-zero and zero transmission power.

8.9.1.2.3.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward of UE category 0. Applicability requires support for FGI bit 103.

8.9.1.2.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.1, with the addition of the relevant parameters in Tables 8.9.1.2-1 and 8.9.1.2.3.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.9.1.2.3.3-2 for the specified SNR.

Table 8.9.1.2.3.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
Beamforming model			Annex B.4.1
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 4
CSI reference signal configuration			1
Zero-power CSI-RS configuration $I_{CSI\text{-}RS}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4 / 0010000100000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 4)
Number of allocated resource blocks (Note 2)		PRB	6
Simultaneous transmission			No
PDSCH transmission mode			9

Note 1: $P_B = 1$.

Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.

Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.9.1.2.3.3-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.64 TDD	OP.1 TDD	EPA5	2x1 Low	70	4.5	0

The normative reference for this requirement is TS 36.101 [2] clause 8.9.1.2.3.

8.9.1.2.3.4 Test description

8.9.1.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.9.1.2.3.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9(using only main UE Tx/Rx antenna).
2. The parameter settings for the cell are set up according to Tables 8.9.1.2-1 and 8.9.1.2.3.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.1.2.3.4.3.

8.9.1.2.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.9.1.1.3.3-1, 8.9.1.1.3.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.9.1.1.3.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.9.1.1-1. CSI-RS are sent on antenna ports 15-22 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.9.1.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.9.1.2.3.5 Test requirement

Table 8.9.1.2.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.4.1] for each throughput test shall meet or exceed the specified value in Table 8.9.1.2.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.9.1.2.3.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE DL category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.64 TDD	OP.1 TDD	EPA5	2x1 Low	70	5.3	0

8.9.2 PHICH

8.9.2.1 FDD and half-duplex FDD

8.9.2.1.1 FDD PHICH Transmit Diversity for UE category 0

8.9.2.1.1.1 Test purpose

To verify the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.9.2.1.1.2 Test applicability

This test applies to all type of E-UTRA FDD UE release 12 and forward of UE category 0.

8.9.2.1.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.9.2.1.1.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port	Transmit diversity
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH duration			Normal	Normal
PHICH Ng (Note 1)			Ng = 1	Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG	OCNG
Cell ID			0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic prefix			Normal	Normal
Note 1: according to Clause 6.9 in TS 36.211 [4]				

For the parameters specified in Table 8.9.2.1.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.9.2.1.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.9.2.1.1.3-2: Minimum performance PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value		UE DL category
						Pm-an (%)	SNR (dB)	
1	10 MHz	R.19	OP.1 FDD	EPA5	2 x 1 Low	0.1	8.6	0, 1bis

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1 and 8.9.2.1.1.

8.9.2.1.1.4 Test description

8.9.2.1.1.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: Depending on the bandwidth specified per test number in Table 8.9.2.1.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna..
2. The parameter settings for the cell are set up according to Table 8.9.2.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.2.1.1.4.3.

8.9.2.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.9.2.1.1.5-1.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1a to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.9.2.1.1.4.2-1 indicates the transmissions for one cycle.

Table 8.9.2.1.1.4.2-1: PHICH test pattern

TTI	1-3	4	5-7	8	9-11	12	13-15	16	17-19	20	21-23	24
PDCCH	S		-		-		-		S		-	
PHICH	-		-		A		-		-		-	
PUSCH	-		T		-		R		-		T	
UL HARQ Process	-		5-7		-		5-7		-		5-7	
Note 1: This table gives an example test pattern for HARQ process for HD-FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK												

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 15. DTXs on TTI 13 to 15 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.9.2.1.1.5-1, pass the UE. Otherwise fail the UE.

8.9.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.9.2.1.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.9.2.1.1.5 Test requirement

For the parameters specified in Table 8.9.2.1.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.9.2.1.1.5-1.

Table 8.9.2.1.1.5-1: Test requirement PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19	OP.1 FDD	EPA5	2 x 1 Low	0.1	9.5

8.9.2.1.1_1 FDD PHICH Transmit Diversity for UE category 1bis

8.9.2.1.1_1.1 Test purpose

To verify the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.9.2.1.1_1.2 Test applicability

This test applies to all type of E-UTRA FDD UE release 13 and forward of UE category 1bis.

8.9.2.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.9.2.1.1.3.

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1 and 8.9.2.1.1.

8.9.2.1.1_1.4 Test description

8.9.2.1.1_1.4.1 Initial conditions

Same initial conditions as in clause 8.9.2.1.1.4.1.

8.9.2.1.1_1.4.2 Test procedure

Same test procedure as in clause 8.9.2.1.1.4.2.

8.9.2.1.1_1.4.3 Message contents

Same message content in clause 8.9.2.1.1.4.3.

8.9.2.1.1_1.5 Test requirement

For the parameters specified in Table 8.9.2.1.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.9.2.1.1_1.5-1.

Table 8.9.2.1.1_1.5-1: Test requirement PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value		UE DL category
						Pm-an (%)	SNR (dB)	
1	10 MHz	R.19	OP.1 FDD	EPA5	2 x 1 Low	0.1	9.5	1bis

8.9.2.2.1 TDD PHICH Transmit Diversity for UE category 0

8.9.2.2.1.1 Test purpose

To verify the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.9.2.2.1.2 Test applicability

This test applies to all type of E-UTRA FDD UE release 12 and forward of UE category 0.

8.9.2.2.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.9.2.2.1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.9.2.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.9.2.2.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.9.2.2.1.3-2: Minimum performance PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19	OP.1 TDD	EPA5	2 x 1 Low	0.1	8.6

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2 and 8.9.2.2.1.

8.9.2.2.1.4 Test description

8.9.2.2.1.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: Depending on the bandwidth specified per test number in Table 8.9.2.2.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna..
2. The parameter settings for the cell are set up according to Table 8.9.2.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.9.2.2.1.4.3.

8.9.2.2.1.4.2 Test procedure

Same test procedure as defined in clause 8.5.2.2.1.4.2 with the following exceptions:

- Instead of Table A.2.3.1.1-1 → use Table A.2.3.1.1-1a.

8.9.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.9.2.2.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.9.2.2.1.5 Test requirement

For the parameters specified in Table 8.9.2.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.9.2.2.1.5-1.

Table 8.9.2.2.1.5-1: Test requirement PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19	OP.1 TDD	EPA5	2 x 1 Low	0.1	9.5

8.10 Demodulation (4 receiver antenna ports)

The performance requirements specified in this clause are valid for 4Rx capable UEs.

8.10.1 PDSCH

8.10.1.1 FDD (Fixed Reference Channel)

8.10.1.1.1 FDD PDSCH Transmit Diversity 2x4

8.10.1.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity (SFBC).

8.10.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward UE of Category 2 or higher that supports 4 Rx antenna ports on any FDD band

8.10.1.1.1.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.1.1.3-2, with the addition of the parameters in Table 8.10.1.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.1.1.3-1: Test Parameters for Transmit diversity Performance (FRC) with 4 RX Antenna Ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (NOTE 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
NOTE 1: $P_B = 1$.			

Table 8.10.1.1.1.3-2: Minimum performance Transmit Diversity (FRC) with 4 RX Antenna Ports

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.11 FDD	OP.1 FDD	EVA5	2x4 Medium correlation A, ULA	70	3.9	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.1.

8.10.1.1.1.4 Test description

8.10.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.10.1.1.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.76.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.10.1.1.1.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.1.4.3.

8.10.1.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.10.1.1.1.3-1 and 8.10.1.1.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.10.1.1.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.10.1.1.1.5 Test requirement

Table 8.10.1.1.1.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.10.1.1.1.5-2 for the specified SNR including test tolerances.

Table 8.10.1.1.1.5-1: Test Parameters for Transmit diversity Performance (FRC) with 4 RX Antenna Ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (NOTE 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
NOTE 1: $P_B = 1$.			

Table 8.10.1.1.1.5-2: Minimum performance Transmit Diversity (FRC) with 4 RX Antenna Ports

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.11 FDD	OP.1 FDD	EVA5	2x4 Medium correlation A, ULA	70	4.8	≥2

8.10.1.1.2 FDD PDSCH Open Loop Spatial Multiplexing 2x4

8.10.1.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.10.1.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward UE of Category 2 or higher that supports 4 Rx antenna ports on any FDD band.

8.10.1.1.2.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.1.2.3-2, with the addition of the parameters in Table 8.10.1.1.2.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.1.2.3-1: Test Parameters for Large Delay CDD (FRC) with 4 RX Antenna Ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (NOTE 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
NOTE 1: $P_B = 1$.			

Table 8.10.1.1.2.3-2: Minimum performance Large Delay CDD (FRC) with 4 RX Antenna Ports

Test num	Bandwidth and MCS	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate gory
						Fraction of maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.11 FDD	OP.1 FDD	EVA70	2x4 Low	70	8.0	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.2.

8.10.1.1.2.4 Test description

8.10.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.10.1.1.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.76.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.10.1.1.2.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.2.4.3.

8.10.1.1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.10.1.1.2.3-1 and 8.10.1.1.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.1.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.1.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

8.10.1.1.2.5 Test requirement

Table 8.10.1.1.2.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.10.1.1.2.5-2 for the specified SNR including test tolerances.

Table 8.10.1.1.2.5-1: Test Parameters for Large Delay CDD (FRC) with 4 RX Antenna Ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (NOTE 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
NOTE 1: $P_B = 1$.			

Table 8.10.1.1.2.5-2: Minimum performance Large Delay CDD (FRC) with 4 RX Antenna Ports

Test num	Bandwidth and MCS	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate gory
						Fraction of maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.11 FDD	OP.1 FDD	EVA70	2x4 Low	70	8.9	≥2

8.10.1.1.3 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model – Enhanced Performance Requirement Type A

8.10.1.1.3.1 Test purpose

The purpose of these tests is to verify the closed loop rank one performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 4 interference model defined in clause B.5.3.

8.10.1.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that supports 4 Rx antenna ports and enhanced receiver Type A

8.10.1.1.3.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.1.3-2, with the addition of parameters in Table 8.10.1.1.3.3-1 and the downlink physical channel setup according to Annex C.3.2. In Table 8.10.1.1.3.3-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell.

Table 8.10.1.1.3.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model and 4 RX Antenna Ports

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	1
Number of control OFDM symbols			2	2
PDSCH transmission mode			6	4
Interference model			N/A	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80
	Rank 2	%	N/A	20
Precoding granularity		PRB	50	6
PMI delay (Note 4)		ms	8	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			1111	N/A

Note 1: $P_B = 1$
Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.
Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.
Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 5: All cells are time-synchronous.

Table 8.10.1.1.3.3-2: Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model and 4 RX Antenna Ports

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.47 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x4 Low	70	-2.3	≥1

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.3.

8.10.1.1.3.4 Test description

8.10.1.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.10.1.1.3.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.73.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.10.1.1.3.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.3.4.3.

8.10.1.1.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to Tables 8.10.1.1.3.5-1 and 8.10.1.1.3.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1 and #6 (Table A.2.2.1.2-1).
2. SS sets up parameters for cell 2 according to table 8.10.1.1.3.5-1 as appropriate.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SINR according to Tables 8.10.1.1.3.5-2 as appropriate.
4. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.5.

8.10.1.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.1.3.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.10.1.1.3.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	483	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.10.1.1.3.5 Test requirement

Table 8.10.1.1.3.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.10.1.1.3.5-2 for the specified SINR including test tolerances.

Table 8.10.1.1.3.5-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model and 4 RX Antenna Ports

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.45
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	1
Number of control OFDM symbols			2	2
PDSCH transmission mode			6	4
Interference model			N/A	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80
	Rank 2	%	N/A	20
Precoding granularity		PRB	50	6
PMI delay (Note 4)		ms	8	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			1111	N/A

Note 1: $P_B = 1$
Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.
Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.
Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 5: All cells are time-synchronous.

Table 8.10.1.1.3.5-2: Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model and 4 RX Antenna Ports

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.47 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x4 Low	70	-1.32	≥1

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

8.10.1.1.4 FDD PDSCH Closed Loop Spatial Multiplexing 4x4

8.10.1.1.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using closed-loop spatial multiplexing.

8.10.1.1.4.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward UE of Category 2 or higher that supports 4 Rx antenna ports on any FDD band.

8.10.1.1.4.3 Minimum conformance requirements

For single carrier, the requirements are specified in Table 8.10.1.1.4.3-2, with the addition of the parameters in Table 8.10.1.1.4.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.1.4.3-1: Test Parameters for Dual-Layer Spatial Multiplexing (FRC) with 4 RX Antenna Ports

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000 00001111111111111111100000000000000
PDSCH transmission mode			4
Note 1: $P_B = 1$. Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			

Table 8.10.1.1.4.3-2: Minimum performance Dual-Layer Spatial Multiplexing (FRC) with 4 RX Antenna Ports

Test num.	Bandwidth and MCS	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	DL UE categ ory
						Fraction of maximum throughput (%)	SNR (dB)		
1	10 MHz	R.36 FDD	OP.1 FDD	EPA5	4x4 Low	70	10.1	≥2	≥6
2	10 MHz 256 QAM	R.72 FDD	OP.1 FDD	EPA5	4x4 Low	70	18.0	11-12	≥11

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.4.

8.10.1.1.1.4 Test description

8.10.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.10.1.1.4.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.10.1.1.4.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.4.4.3.

8.10.1.1.4.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2.3-1 and 8.2.1.4.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.10.1.1.4.5-1 and 8.10.1.1.4.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
5. Repeat steps from 1 to 4 for each test interval in Tables 8.10.1.1.4.5-1 and 8.10.1.1.4.5-2 as appropriate.

8.10.1.1.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.1.4.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.10.1.1.4.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.10.1.1.4.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.10.1.1.4.5 Test requirement

Table 8.10.1.1.4.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.10.1.1.4.5-2 for the specified SNR including test tolerances.

Table 8.10.1.1.4.5-1: Test Parameters for Dual-Layer Spatial Multiplexing (FRC) with 4 RX Antenna Ports

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000 00001111111111111111100000000000000000
PDSCH transmission mode			4
Note 1: $P_B = 1$.			
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			

Table 8.10.1.1.4.5-2: Minimum performance Dual-Layer Spatial Multiplexing (FRC) with 4 RX Antenna Ports

Test num.	Bandwidth and MCS	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	DL UE categ ory
						Fraction of maximum throughput (%)	SNR (dB)		
1	10 MHz	R.36 FDD	OP.1 FDD	EPA5	4x4 Low	70	11	≥2	≥6
2	10 MHz 256 QAM	R.72 FDD	OP.1 FDD	EPA5	4x4 Low	70	18.9	11-12	≥11

8.10.1.1.5 FDD PDSCH Single-layer Spatial Multiplexing 2x4 on antenna ports 7 or 8 with TM9 interference model – Enhanced Performance Requirement Type A

Editor's Note: This test case is incomplete. The following items are missing or are incomplete:

- CQI reporting config IEs under message contents are TBD

8.10.1.1.5.1 Test purpose

The purpose of these tests is to verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4.

8.10.1.1.5.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that supports 4 Rx antenna ports and enhanced receiver Type A. Applicability requires support for FGI bit 103.

8.10.1.1.5.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.1.5.3-2, with the addition of the parameters in Table 8.10.1.1.5.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell

applying transmission mode 9 interference model defined in clause B.5.4. In 8.10.1.1.5.3-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2, respectively.

Table 8.10.1.1.5.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model and 4 RX Antenna Ports

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 2	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		Ms	8	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) used for the input signal under test	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 6: These physical resource blocks are assigned to an arbitrary number of virtual UEs

	with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.

Table 8.10.1.1.5.3-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model and 4 RX Antenna Ports

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R. 76 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x4 Low	70	-3.0	≥1
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.5.

8.10.1.1.5.4 Test description

8.10.1.1.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as specified in Table 8.10.1.1.5.5-1, and as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.73.
2. The parameter settings for the cell 1 are set up according to Tables 8.3.1-1 and 8.10.1.1.5.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.5.4.3.

8.10.1.1.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.10.1.1.5.5-1, 8.10.1.1.5.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #4 and #9 (Table A.2.2.1.1-1).
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.1.5.5-2 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in

Annex B.4.3 and precoder update granularity specified in Table 8.10.1.1.5.5-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.3.

3. Set the Cell2 –aggressor cell– as defined in Tables 8.10.1.1.5.5-1, 8.10.1.1.5.5-2 and according to Annex B.5.4.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.1.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.10.1.1.5.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.10.1.1.5.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	001111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.10.1.1.5.4.3-3: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; $T_{\text{CSI-RS}} = 5$; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 8.10.1.1.5.4.3-4: *CQI-ReportPeriodic-r10*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2AC CQI-ReportPeriodic-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	5	FDD	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	483	FDD	
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			

Table 8.10.1.1.5.4.3-5: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT using condition CQI_PERIODIC		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 8.10.1.1.5.4.3-6: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
pmi-RI-Report-r9	setup		
}			

8.10.1.1.5.5 Test requirement

Table 8.10.1.1.5.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.1 for throughput test shall meet or exceed the specified value in Table 8.10.1.1.5.5-2 for the specified SINR including test tolerances.

Table 8.10.1.1.5.5-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model and 4 RX Antenna Ports

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 2	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.45
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		Ms	8	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) used for the input signal under test	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 6: These physical resource blocks are assigned to an arbitrary number of virtual UEs

	with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.

Table 8.10.1.1.5.5-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model and 4 RX Antenna Ports

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R. 76 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x4 Low	70	-2.02	≥1
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

8.10.1.1.6 FDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols)

8.10.1.1.6.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power, and to verify that the UE correctly estimate SNR.

8.10.1.1.6.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward UE of Category 2 or higher that supports 4 Rx antenna ports on any FDD band. Applicability requires support for FGI bit 103.

8.10.1.1.6.3 Minimum conformance requirements

For dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.10.1.1.6.3-2, with the addition of the parameters in Table 8.10.1.1.6.3-1 where Cell 1 is the serving cell and Cell 2 is the interfering cell. The downlink physical channel setup is set according to Annex C.3.2. The purpose of these tests is to verify the rank-2 performance for full RB allocation, to verify rate matching with multiple CSI reference symbol configurations with non-zero and zero transmission power, and to verify that the UE correctly estimate SNR.

Table 8.10.1.1.6.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations with 4 RX Antenna Ports

Parameter		Unit	Test 1	
			Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	4	0
	ρ_B	dB	4 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0 and 1	Antenna ports 0 and 1
Cell ID			0	126
CSI reference signals			Antenna ports 15,16	NA
Beamforming model			Annex B.4.2	NA
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2	NA
CSI reference signal configuration			8	NA
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0010000000000000	NA
N_{oc} at antenna port		dBm/15kHz	-98	NA
$\hat{E}_s / N_{oc}$			Reference Value in Table 8.10.1.1.6-2	7.25dB
Symbols for unused PRBs			OCNG (Note 2)	NA
Number of allocated resource blocks (Note 2)		PRB	50	NA
Simultaneous transmission			No	NA
PDSCH transmission mode			9	Blanked

Note 1: $P_B = 1$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.10.1.1.6.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations and 4 RX Antenna Ports

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern		Propagation Condition		Correlation Matrix and Antenna Configuration	Reference value		UE Category
			Cell1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM ½	R.51 FDD	OP.1 FDD	N/A	ETU5	ETU5	2x4 Low	70	9.2	≥2

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.6.

8.10.1.1.6.4 Test description

8.10.1.1.6.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.10.1.1.6.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.73.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.10.1.1.6.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.6.4.3.

8.10.1.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.10.1.1.6.3-1, 8.10.1.1.6.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.1.6.5-2 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Set Cell 2 as defined in Tables 8.10.1.1.6.5-1 and 8.10.1.1.6.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.1.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.1.6.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB4 for Cell 1 dB0 for Cell 2	According to each Cell in test 1	
}			

Table 8.10.1.1.6.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.10.1.1.6.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.10.1.1.6.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	4 for Cell 1 0 for Cell 2	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.10.1.1.6.5 Test requirement

Table 8.10.1.1.6.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.10.1.1.6.5-2 for the specified SNR including test tolerances.

Table 8.10.1.1.6.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations with 4 RX Antenna Ports

Parameter		Unit	Test 1	
			Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	4	0
	ρ_B	dB	4 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0 and 1	Antenna ports 0 and 1
Cell ID			0	126
CSI reference signals			Antenna ports 15,16	NA
Beamforming model			Annex B.4.2	NA
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2	NA
CSI reference signal configuration			8	NA
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0010000000000000	NA
N_{oc} at antenna port		dBm/15kHz	-98	NA
$\hat{E}_s / N_{oc}$			Reference Value in Table 8.10.1.1.6-2	6.9dB
Symbols for unused PRBs			OCNG (Note 2)	NA
Number of allocated resource blocks (Note 2)		PRB	50	NA
Simultaneous transmission			No	NA
PDSCH transmission mode			9	Blanked
Note 1: $P_B = 1$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.				

Table 8.10.1.1.6.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations and 4 RX Antenna Ports

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern		Propagation Condition		Correlation Matrix and Antenna Configuration	Reference value		UE Category
			Cell1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM ½	R.51 FDD	OP.1 FDD	N/A	ETU5	ETU5	2x4 Low	70	10.0	≥2
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.										

8.10.1.1.7 FDD Open-loop spatial multiplexing, 3 Layer Multiplexing with 4 Tx Antenna Ports

8.10.1.1.7.1 Test purpose

The purpose of these tests is to verify the open loop spatial multiplexing performance using 3 Layer multiplexing with 4Tx antenna ports.

8.10.1.1.7.2 Test applicability

This test applies to all types of E-UTRA FDD release 10 and forward UE of category ≥ 5 that support 4Rx Antenna ports and 3-layer spatial multiplexing for PDSCH transmission mode 3.

8.10.1.1.7.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.1.7.3-2, with the addition of parameters in Table 8.10.1.1.7.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.1.7.3-1: Test parameters for Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	0
Cell-specific reference signals			Antenna ports 0,1,2,3
N_{oc} at antenna port		dBm/15k Hz	-98
PDSCH transmission mode			3
PDSCH rank			3
Number of HARQ processes			8
HARQ redundancy version			{0,0,1,2}
CFI			2
Note 1: $P_B = 1$.			

Table 8.10.1.1.7.3-2: Minimum performance Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.73 FDD	OP.1 FDD	EVA70	4x4 Low	70	15.1	≥5

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.7.

8.10.1.1.7.4 Test description

8.10.1.1.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified in Table 8.10.1.1.7.3-2 and as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.10.1.1. 7.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.7.4.3.

8.10.1.1.7.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.10.1.1.7.3-1 and 8.10.1.1.7.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SINR according to Table 8.10.1.1.7.5-1 as appropriate.
3. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.5.

8.10.1.1.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.1.7.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.10.1.1.7.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm3	0100		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.10.1.1.7.4.3-3: *RRCConnectionReconfiguration*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {	Not present		
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			

8.10.1.1.7.5 Test requirement

Table 8.10.1.1. 7.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.10.1.1.7.5-2 for the specified SINR including test tolerances.

Table 8.10.1.1.7.5-1: Test Config for Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Parameter		**Unit**	**Test 1**
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	0
Cell-specific reference signals			Antenna ports 0,1,2,3
N_{oc} at antenna port		dBm/15k Hz	-98
PDSCH transmission mode			3
PDSCH rank			3
Number of HARQ processes			8
HARQ redundancy version			{0,0,1,2}
CFI			2
Note 1: $P_B = 1$.			

Table 8.10.1.1.7.5-2: Test Requirements for Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Test number	**Band-width**	**Reference Channel**	**OCNG Pattern**	**Propagation Condition**	**Correlation Matrix and Antenna Configuration**	**Reference value**		**UE Category**
						Fraction of Maximum Throughput (%)	**SNR (dB)**	
1	10 MHz	R.73 FDD	OP.1 FDD	EVA70	4x4 Low	70	16.0	≥5

8.10.1.1.8 FDD Closed-loop spatial multiplexing performance, 4 Layers spatial multiplexing 4 Tx antennas

8.10.1.1.8.1 Test purpose

To verify the UE's ability with 4Rx capabilities to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink

Reference Measurement Channel (RMC) not falling below a specified value for transmission on four Tx antenna ports using closed-loop spatial multiplexing.

8.10.1.1.8.2 Test applicability

This test applies to E-UTRA FDD release 10 and forward UE of category ≥ 5 which supports 4Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 4.

8.10.1.1.8.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.1.8.3-2, with the addition of the parameters in Table 8.10.1.1.8.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.1.8.3-1: Test parameters for Closed Loop spatial multiplexing, 4 Layers spatial multiplexing with 4 Tx ports and 4 Rx ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15k Hz	-98
Cell-specific reference signals			Antenna Ports 0,1,2,3
PDSCH transmission mode			4
PDSCH rank			4
Number of HARQ processes			8
HARQ redundancy version			{0,1,2,3}
CFI			2
Precoding granularity		PRB	50
PMI delay		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 3-1
CodeBookSubsetRestriction bitmap			0xFFFF000000000000
Note 1: $P_B = 1$.			

Table 8.10.1.1.8.3-2: Minimum performance for Closed Loop spatial multiplexing, 4 Layers spatial multiplexing with 4 Tx ports and 4 Rx ports

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.74 FDD	OP.1 FDD	EPA5	4x4 Low	70	14.9	≥5

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.8

8.10.1.1.8.4 Test description

8.10.1.1.8.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Tables 8.10.1.1.8.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.10.1.1.8.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.8.4.3.

8.10.1.1.8.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.10.1.1.8.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.10.1.1.8.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Table G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.1.8.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.10.1.1.8.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation for Test numbers 1

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.10.1.1.8.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	0xFFFF000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.10.1.1.8.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.10.1.1.8.4.3-4: *RRCConnectionReconfiguration:* Additional FDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation Test number 1

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {			
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			

8.10.1.1.8.5 Test requirement

Table 8.10.1.1.8.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.10.1.1.8.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.10.1.1.8.5-1: Test requirements for Closed Loop spatial multiplexing, 4 Layers spatial multiplexing with 4 Tx ports and 4 Rx ports

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.74 FDD	OP.1 FDD	EPA5	4x4 Low	70	15.8	≥5

8.10.1.1.9 FDD 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)

8.10.1.1.9.1 Test purpose

To verify the UE's rank-4 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for 4layer transmission on antenna ports 7-10 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.10.1.1.9.2 Test applicability

This test applies to E-UTRA FDD release 10 and forward UE of category ≥ 5 which supports 4Rx antenna ports. Applicability requires support for FGI bit 103.

8.10.1.1.9.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.1.9.3-2, with the addition of the parameters in Table 8.10.1.1.9.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.1.9.3-1: Minimum performance for 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Beamforming model			4 layer precoding based on WB PMI feedback
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
Beamforming model			Annex B.4.3
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2
CSI reference signal configuration			3
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0001000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 3)
Number of allocated resource blocks (Note 2)		PRB	50
Simultaneous transmission			No
PDSCH transmission mode			9
Number of HARQ processes			8
HARQ redundancy version			{0,1,2,3}
CFI			2
Precoding granularity			50
PMI delay			8
Reporting interval			1
Reporting mode			PUSCH 3-1
CodeBookSubsetRestriction bitmap			0xFFFF000000000000

Note 1: $P_B = 1$.
Note 2: 50 resource blocks are allocated in sub-frames 1,2,3,4,6,7,8,9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0.
Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.10.1.1.9.3-2: Minimum performance for 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.75 FDD	OP.1 FDD	EPA5	4x4 Low	70	18.4	≥5

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.1.9

8.10.1.1.9.4 Test description

8.10.1.1.9.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.10.1.1.9.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.1.9.4.3.

8.10.1.1.9.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.10.1.1.9.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.1.9.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna ports 7-10 using four Tx antennas with beam-forming model as specified in Annex B.4.3 and precoder update granularity specified in Table 8.10.1.1.9.3-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.3.
3. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.1.9.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.10.1.1.9.4.3-1: *Void*

Table 8.10.1.1.9.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 8.10.1.1.9.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0xFFFF000000000000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.10.1.1.9.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	An4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	3	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	3	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

Table 8.10.1.1.9.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: TS 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.10.1.1.9.4.3-6: *RRCConnectionReconfiguration*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {	Not present		
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			

8.10.1.1.9.5 Test requirement

Table 8.10.1.1.9.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3. 2 for the throughput test shall meet or exceed the specified value in Table 8.10.1.1.9.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.10.1.1.9.5-1: Test requirements for 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.75 FDD	OP.1 FDD	EPA5	4x4 Low	70	19.3	≥5

8.10.1.2 TDD (Fixed Reference Channel)

8.10.1.2.1 TDD PDSCH Transmit Diversity 2x4

8.10.1.2.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity (SFBC) with 2 transmitter antennas.

8.10.1.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward of Category 2 or higher that supports 4 Rx antenna ports on any TDD band

8.10.1.2.1.3 Minimum conformance requirements

The requirements are specified in Table 8. 10.1.2.1.3-2, with the addition of the parameters in Table 8. 10.1.2.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.2.1.3-1: Test Parameters for Transmit diversity Performance (FRC) with 4Rx Antenna Ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.10.1.2.1.3-2: Minimum performance Transmit Diversity (FRC) with 4Rx Antenna Ports

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.11 TDD	OP.1 TDD	EVA5	2x4 Medium correlation A, ULA	70	3.9	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.2.1.

8.10.1.2.1.4 Test description

8.10.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.10.1.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.76.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.10.1.2.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.2.1.4.3.

8.10.1.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.10.1.2.1.3-1 and 8.10.1.2.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.2.1.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.10.1.2.1.5 Test requirement

Table 8.10.1.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.10.1.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.10.1.2.1.5-1: Test requirement Transmit Diversity (FRC) with 4Rx Antenna Ports

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.11 TDD	OP.1 TDD	EVA5	2x4 Medium correlation A, ULA	70	4.8	≥2

8.10.1.2.2 TDD PDSCH Open Loop Spatial Multiplexing 2x4

8.10.1.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.10.1.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward UE of Category 2 or higher that supports 4 Rx antenna ports on any TDD band.

8.10.1.2.2.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.2.2.3-2, with the addition of the parameters in Table 8.10.1.2.2.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.2.2.3-1: Test Parameters for Large Delay CDD (FRC) with 4Rx Antenna Ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Bundling
PDSCH transmission mode			3
Note 1: $P_B = 1$.			

Table 8.10.1.2.2.3-2: Minimum performance Large Delay CDD (FRC) with 4Rx Antenna Ports

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.11-1 TDD	OP.1 TDD	EVA70	2x4 Low	70	7.7	≥2

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.2.2.

8.10.1.2.2.4 Test description

8.10.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.10.1.2.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.76.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.10.1.2.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.2.2.4.3.

8.10.1.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.10.1.2.2.3-1 and 8.10.1.2.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.2.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.10.1.2.2.5 Test requirement

Table 8.10.1.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.10.1.2.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.10.1.2.2.5-1: Test requirement Large Delay CDD (FRC) with 4Rx Antenna Ports

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.11-1 TDD	OP.1 TDD	EVA70	2x4 Low	70	8.6	≥2

8.10.1.2.3 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model – Enhanced Performance Requirement Type A

8.10.1.2.3.1 Test purpose

To verify the closed loop rank-one performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 4 interference model.

8.10.1.2.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that supports 4 Rx antenna ports and enhanced receiver Type A

8.10.1.2.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.10.1.2.3.3-1 and 8.10.1.2.3.3-2 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.10.1.2.3.3-2 for the specified SINR. For single-layer spatial multiplexing closed loop

rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.10.1.2.3.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model and 4Rx Antenna Ports

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	1
Number of control OFDM symbols			2	2
PDSCH transmission mode			4	N/A
Interference model			N/A	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80
	Rank 2	%	N/A	20
Precoding granularity		PRB	50	6
PMI delay (Note 4)		ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
ACK/NACK feedback mode			Multiplexing	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Table 8.10.1.2.3.3-2: Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model and 4Rx Antenna Ports

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.47 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x4 Low	70	-1.9	≥1

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}$´ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.10.1.2.3.4 Test description

8.10.1.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.10.1.2.3.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.73.
2. The parameter settings for cell1 are set up according to Tables 8.2.2-1, 8.10.1.2.3.5-1 and 8.10.1.2.3.5-2 as appropriate.
3. Downlink signals are initially set up for cell1 according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.2.3.4.3.

8.10.1.2.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to Tables 8.10.1.2.3.5-1 and 8.10.1.2.3.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #4 and #9 (Table A.2.3.1.2-1).
2. SS sets up the parameters for cell 2 and cell 3 according to Tables 8.10.1.2.3.5-1 and Tables 8.10.1.2.3.5-2.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SINR according to Tables 8.10.1.2.3.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Annex G clause G.3.5.

8.10.1.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.2.3.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	Tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	001111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.10.1.2.3.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	4	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	483	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.10.1.2.3.5 Test requirement

Table 8.10.1.2.3.5-1 defines the primary level settings.

Table 8.10.1.2.3.5-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model and 4Rx Antenna Ports

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.45
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	1
Number of control OFDM symbols			2	2
PDSCH transmission mode			6	N/A
Interference model			N/A	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80
	Rank 2	%	N/A	20
Precoding granularity		PRB	50	6
PMI delay (Note 4)		ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
ACK/NACK feedback mode			Multiplexing	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.10.1.2.3.5-2 for the specified SINR including test tolerances for all throughput tests.

Table 8.10.1.2.3.5-2: Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model and 4Rx Antenna Ports

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.47 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x4 Low	70	-0.92	≥1

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}$´ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

8.10.1.2.4 TDD PDSCH Closed Loop Spatial Multiplexing 4x4

8.10.1.2.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using closed loop spatial multiplexing with wideband and frequency selective precoding.

8.10.1.2.4.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward UE of Category 2 or higher that supports 4 Rx antenna ports on any TDD band.

8.10.1.2.4.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.2.4.3-2, with the addition of the parameters in Table 8.10.1.2.4.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.2.4.3-1: Test Parameters for Dual-Layer Spatial Multiplexing (FRC) with 4Rx Antenna Ports

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
ACK/NACK feedback mode			Bundling
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111000000000000000
PDSCH transmission mode			4
Note 1: $P_B = 1$.			
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)			
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.			

Table 8.10.1.2.4-2: Minimum performance Dual-Layer Spatial Multiplexing (FRC) with 4Rx Antenna Ports

	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	DL UE category
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	10 MHz 64 QAM	R.36 TDD	OP.1 TDD	EPA5	4x4 Low	70	10.4	≥2	≥6
2	10 MHz 256QAM	R.72 TDD	OP.1 TDD	EPA5	4x4 Low	70	17.5	11-12	≥11

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.2.4.

8.10.1.2.4.4 Test description

8.10.1.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.10.1.2.4.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.10.1.2.4.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.2.4.3.

8.10.1.2.4.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.10.1.2.4.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.10.1.2.4.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
5. Repeat steps from 1 to 4 for each test interval in Tables 8.10.1.2.4.5-1 as appropriate.

8.10.1.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.2.4.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.10.1.2.4.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 Table 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000111111111111111100000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.10.1.2.4.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.10.1.2.4.4.3-4: *PUCCH-ConfigDedicated-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 Table 4.6.3-9			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
tddAckNackFeedbackMode	bundling		
}			

8.10.1.2.4.5 Test requirement

Table 8.10.1.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.10.1.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.10.1.2.5-1: Test requirement Dual-Layer Spatial Multiplexing (FRC) with 4Rx Antenna Ports

	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	DL UE category
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	10 MHz 64 QAM	R.36 TDD	OP.1 TDD	EPA5	4x4 Low	70	11.3	≥2	≥6
2	10 MHz 256QAM	R.72 TDD	OP.1 TDD	EPA5	4x4 Low	70	18.4	11-12	≥11

8.10.1.2.5 TDD PDSCH Single-layer Spatial Multiplexing 2x4 on antenna ports 7 or 8 with TM9 interference model – Enhanced Performance Requirement Type A

8.10.1.2.5.1 Test purpose

The purpose of these tests is to verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4.

8.10.1.2.5.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward that supports 4 Rx antenna ports and enhanced receiver Type A. Applicability requires support for FGI bit 103.

8.10.1.2.5.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.2.5.3-2, with the addition of the parameters in Table 8.10.1.2.5.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4. In 8.10.1.2.5.3-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2, respectively.

Table 8.10.1.2.5.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model and 4Rx Antenna Ports

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 6: These physical resource blocks are assigned to an arbitrary number of virtual UEs

	with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.

Table 8.10.1.2.5.3-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model and 4Rx Antenna Ports

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.76 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x4 Low	70	-3.3	≥1
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.2.5.

8.10.1.2.5.4 Test description

8.10.1.2.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10 MHz, as specified in Table 8.10.1.2.5.5-1, and as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.73.
2. The parameter settings for the cell 1 are set up according to Tables 8.3.2-1 and 8.10.1.2.5.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.2.5.4.3.

8.10.1.2.5.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.10.1.2.5.5-1, 8.10.1.2.5.5-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #4 and #9 (Table A.2.3.1.1-1).
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.2.5.5-2 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in

Annex B.4.3 and precoder update granularity specified in Table 8.10.1.2.5.5-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.3.

3. Set the Cell2 –aggressor cell– as defined in Tables 8.10.1.2.5.5-1, 8.10.1.2.5.5-2 and according to Annex B.5.4.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.2.5.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.10.1.2.5.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.10.1.2.5.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	001111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.10.1.2.5.4.3-3: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; $T_{\text{CSI-RS}} = 5$; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 8.10.1.2.5.4.3-4: *CQI-ReportPeriodic-r10*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2AC CQI-ReportPeriodic-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	4	TDD	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	484	TDD	
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			

Table 8.10.1.2.5.4.3-5: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT using condition CQI_PERIODIC		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 8.10.1.2.5.4.3-6: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
pmi-RI-Report-r9	setup		
}			

8.10.1.2.5.5 Test requirement

Table 8.10.1.2.5.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.3 for throughput test shall meet or exceed the specified value in Table 8.10.1.2.5.5-2 for the specified SINR including test tolerances.

Table 8.10.1.2.5.5-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model and 4Rx Antenna Ports

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.45
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 6: These physical resource blocks are assigned to an arbitrary number of virtual UEs

	with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.

Table 8.10.1.2.5.5-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model and 4Rx Antenna Ports

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.76 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x4 Low	70	-2.32	≥1
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

8.10.1.2.6 TDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols)

8.10.1.2.6.1 Test purpose

To verify the rank-2 performance for full RB allocation, to verify rate matching with multiple CSI reference symbol configurations with non-zero and zero transmission power, and to verify that the UE correctly estimate SNR.

8.10.1.2.6.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward UE of Category 2 or higher that supports 4 Rx antenna ports on any TDD band. Applicability requires support for FGI bit 103.

8.10.1.2.6.3 Minimum conformance requirements

For dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.10.1.2.6.3-2, with the addition of the parameters in Table 8.10.1.2.6.3-1 where Cell 1 is the serving cell and Cell 2 is the interfering cell. The downlink physical channel setup is set according to Annex C.3.2.

Table 8.10.1.2.6.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations and 4Rx Antenna Ports

Parameter		Unit	Test 1	
			Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	4	0
	ρ_B	dB	4 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0 and 1	Antenna ports 0 and 1
Cell ID			0	126
CSI reference signals			Antenna ports 15,16	NA
Beamforming model			Annex B.4.2	NA
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 4	NA
CSI reference signal configuration			8	NA
Zero-power CSI-RS configuration $I_{CSI\text{-}RS}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4 / 0010000000000000	NA
N_{oc} at antenna port		dBm/15kHz	-98	NA
$\hat{E}_s / N_{oc}$			Reference Value in Table 8.10.1.2.6-2	7.25dB
Symbols for unused PRBs			OCNG (Note 2)	NA
Number of allocated resource blocks (Note 2)		PRB	50	NA
Simultaneous transmission			No	NA
PDSCH transmission mode			9	Blanked

Note 1: $P_B = 1$.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.10.1.2.6.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern		Propagation Condition		Correlation Matrix and Antenna Configuration	Reference value		UE Category
			Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	N/A	ETU5	ETU5	2x4 Low	70	9.5	≥2

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.2.6.

8.10.1.2.6.4 Test description

8.10.1.2.6.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.73.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.10.1.2.6.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.2.6.4.3.

8.10.1.2.6.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.10.1.2.6.5-1 and 8.10.1.2.6.5-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of Cell 1 for the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.2.6.5-2 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.2-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Set Cell 2 as defined in Tables 8.10.1.2.6.5-1 and 8.10.1.2.6.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.2.6.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.10.1.2.6.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.10.1.2.6.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.10.1.2.6.4.3-3: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.10.1.2.6.5 Test requirement

Table 8.10.1.2.6.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.3 for the throughput test shall meet or exceed the specified value in 8.10.1.2.6.5-1 and 8.10.1.2.6.5-2 for the specified SNR including test tolerances for the throughput test.

Table 8.10.1.2.6.5-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations and 4Rx Antenna Ports

Parameter		Unit	Test 1	
			Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	4	0
	ρ_B	dB	4 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0 and 1	Antenna ports 0 and 1
Cell ID			0	126
CSI reference signals			Antenna ports 15,16	NA
Beamforming model			Annex B.4.2	NA
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 4	NA
CSI reference signal configuration			8	NA
Zero-power CSI-RS configuration $I_{CSI\text{-}RS}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4 / 0010000000000000	NA
N_{oc} at antenna port		dBm/15kHz	-98	NA
$\hat{E}_s / N_{oc}$			Reference Value in Table 8.10.1.2.6-2	6.9dB
Symbols for unused PRBs			OCNG (Note 2)	NA
Number of allocated resource blocks (Note 2)		PRB	50	NA
Simultaneous transmission			No	NA
PDSCH transmission mode			9	Blanked

Note 1: $P_B = 1$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.10.1.2.6.5-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern		Propagation Condition		Correlation Matrix and Antenna Configuration	Reference value		UE Category
			Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	N/A	ETU5	ETU5	2x4 Low	70	10.3	≥2

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.

8.10.1.2.7 TDD Open-loop spatial multiplexing, 3 Layer Multiplexing with 4 Tx Antenna Ports

8.10.1.2.7.1 Test purpose

The purpose of these tests is to verify the open loop spatial multiplexing performance using 3 Layer multiplexing with 4Tx antenna ports.

8.10.1.2.7.2 Test applicability

This test applies to all types of E-UTRA TDD release 10 and forward UE of category ≥ 5 that support 4Rx Antenna ports and 3-layer spatial multiplexing for PDSCH transmission mode 3.

8.10.1.2.7.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.2.7.3-2, with the addition of parameters in Table 8.10.1.2.7.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.2.7.3-1: Test parameters for Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Parameter		Unit	
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cell-specific reference signals			Antenna Ports 0,1,2,3
PDSCH transmission mode			3
PDSCH rank			3
Number of HARQ processes			7
HARQ redundancy version			{0,0,1,2}
CFI			2
Uplink-Downlink Configuration			1
Special subframe configuration			4
Note 1: $P_B = 1$.			

Table 8.10.1.2.7.3-2: Minimum performance Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.73 TDD	OP.1 TDD	EVA70	4x4 Low	70	14.9	≥5

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.2.7

8.10.1.2.7.4 Test description

8.10.1.2.7.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified in Table 8.10.1.2.7-2 and as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.10.1.1.3.5-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.2.7.4.3.

8.10.1.2.7.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.10.1.2.7.3-1 and 8.10.1.2.7.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SINR according to Tables 8.10.1.2.7.5-1as appropriate.
3. Measure the average throughput for duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Annex G clause G.3.5.

8.10.1.2.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.2.7.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.10.1.2.7.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm3	0100		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.10.1.2.7.4.3-3: *RRCConnectionReconfiguration*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {	Not present		
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			

8.10.1.2.7.5 Test requirement

Table 8.10.1.2.7.5-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for throughput test shall meet or exceed the specified value in Table 8.10.1.2.7.5-2 for the specified SINR including test tolerances.

Table 8.10.1.2.7.5-1: Test Config for Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Parameter		**Unit**	
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cell-specific reference signals			Antenna Ports 0,1,2,3
PDSCH transmission mode			3
PDSCH rank			3
Number of HARQ processes			7
HARQ redundancy version			{0,0,1,2}
CFI			2
Uplink-Downlink Configuration			1
Special subframe configuration			4
Note 1: $P_B = 1$.			

Table 8.10.1.2.7.5-2: Test Requirements for Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Test number	**Band-width**	**Reference Channel**	**OCNG Pattern**	**Propagation Condition**	**Correlation Matrix and Antenna Configuration**	**Reference value**		**UE Category**
						Fraction of Maximum Throughput (%)	**SNR (dB)**	
1	10 MHz	R.73 TDD	OP.1 TDD	EVA70	4x4 Low	70	15.8	≥5

8.10.1.2.8 TDD Closed-loop spatial multiplexing performance, 4 Layers spatial multiplexing 4 Tx antennas

8.10.1.2.8.1 Test purpose

To verify the UE's ability with 4Rx antenna capabilities to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified

downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using closed loop spatial multiplexing.

8.10.1.2.8.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UE of category ≥ 5 which supports 4Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 4.

8.10.1.2.8.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.2.8.3-2 with the addition of the parameters in Table 8.10.1.2.8.3-1 and the downlink physical channel setup according to Annex C.3.2

Table 8.10.1.2.8.3-1: Test parameters for Closed Loop spatial multiplexing, 4 Layers spatial multiplexing with 4 Tx ports and 4 Rx ports

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15k Hz	-98
Cell-specific reference signals			Antenna ports 0,1,2,3
PDSCH transmission mode			4
PDSCH rank			4
Number of HARQ processes			7
HARQ redundancy version			{0,1,2,3}
CFI			2
Precoding granularity		PRB	50
PMI delay		ms	10 or 11
Reporting interval		ms	1 or 4
Reporting mode			PUSCH 3-1
CodeBookSubsetRestriction bitmap			0x FFFF000000000000
Uplink-Downlink Configuration			1
Special subframe configuration			4
Note 1: $P_B = 1$.			

Table 8.10.1.2.8.3-2: Minimum performance for Closed Loop spatial multiplexing, 4 Layers spatial multiplexing with 4 Tx ports and 4 Rx ports

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.74 TDD	OP.1 TDD	EPA5	4x4 Low	70	14.4	≥5

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.2.8.

8.10.1.2.8.4 Test description

8.10.1.2.8.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.10.1.2.8.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.10.1.2.8.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.2.8.4.3.

8.10.1.2.8.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.10.1.2.8.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.10.1.2.8.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Annex G clause G.3.5.

8.10.1.2.8.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.10.1.2.8.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation for Test numbers 1

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.10.1.2.8.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	0x FFFF000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.10.1.2.8.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.10.1.2.8.4.3-4: *PUCCH-ConfigDedicated-DEFAULT:* Additional TDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 Table 4.6.3-9			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
tddAckNackFeedbackMode	bundling		
}			

Table 8.10.1.2.8.4.3-5: *RRCConnectionReconfiguration:* Additional TDD PDSCH closed loop 4layer spatial multiplexing performance downlink power allocation Test number 1

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {			
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			

8.10.1.2.8.5 Test requirement

Tables 8.10.1.2.8.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.10.1.2.8.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.10.1.2.8.5-1: Minimum performance for Closed Loop spatial multiplexing, 4 Layers spatial multiplexing with 4 Tx ports and 4 Rx ports

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.74 TDD	OP.1 TDD	EPA5	4x4 Low	70	15.3	≥5

8.10.1.2.9 TDD 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)

8.10.1.2.9.1 Test purpose

To verify the UE's rank-4 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for 4layer transmission on antenna ports 7-10 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.10.1.2.9.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UE of category ≥ 5 which supports 4Rx antenna ports. Applicability requires support for FGI bit 103.

8.10.1.2.9.3 Minimum conformance requirements

The requirements are specified in Table 8.10.1.2.9.3-2, with the addition of the parameters in Table 8.10.1.2.9.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.10.1.2.9.3-1: Minimum performance for 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Beamforming model			4 layer precoding based on WB PMI feedback
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
Beamforming model			Annex B.4.3
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 4
CSI reference signal configuration			3
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 3)
Number of allocated resource blocks (Note 2)		PRB	50
Simultaneous transmission			No
PDSCH transmission mode			9
Number of HARQ processes			7
HARQ redundancy version			{0,1,2,3}
CFI			2
Precoding granularity			50
PMI delay			10 or 11
Reporting interval			1 or 4
Reporting mode			PUSCH 3-1
CodeBookSubsetRestriction bitmap			0x FFFF000000000000
Uplink-Downlink Configuration			1
Special subframe configuration			4

Note 1: $P_B = 1$.
Note 2: 50 resource blocks are allocated in sub-frames 4, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0,1 and 6.
Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.10.1.2.9.3-2: Minimum performance for 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.75 TDD	OP.1 TDD	EPA5	4x4 Low	70	19.0	≥5

The normative reference for this requirement is TS 36.101 [2] clause 8.10.1.2.9.

8.10.1.2.9.4 Test description

8.10.1.2.9.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.10.1.2.9.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.1.2.9.4.3.

8.10.1.2.9.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.10.1.2.9.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.10.1.2.9.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7-10 using four Tx antennas with beam-forming model as specified in Annex B.4.3 and precoder update granularity specified in Table 8.10.1.2.9.3-1. CSI-RS are sent on antenna ports 15 -18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.3.
3. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.10.1.2.9.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.10.1.2.9.4.3-1: *Void*

Table 8.10.1.2.9.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 8.10.1.2.9.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0xFFFF000000000000	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.10.1.2.9.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	An4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	3	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

Table 8.10.1.2.9.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: TS 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 8.10.1.2.9.4.3-6: *RRCConnectionReconfiguration*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {	Not present		
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			

8.10.1.2.9.5 Test requirement

Table 8.10.1.2.9.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.3 for the throughput test shall meet or exceed the specified value in Table 8.10.1.2.9.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.10.1.2.9.5-1: Minimum performance for 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.75 TDD	OP.1 TDD	EPA5	4x4 Low	70	19.9	≥5

8.10.2 PCFICH/PDCCH

8.10.2.1 FDD

8.10.2.1.1 FDD PCFICH/PDCCH Single-antenna Port Performance 1x4

8.10.2.1.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for a single-antenna port with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.10.2.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support 4 Rx antenna ports in any FDD RF band.

8.10.2.1.1.3 Minimum conformance requirements

For the parameters specified in Table 8.10.2.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.1.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.2.1.1.3-1: Test Parameters for PDCCH/PCFICH with 4 Rx Antenna Ports

Parameter		Unit	Single antenna port
Number of PDCCH symbols		symbols	2
PHICH Ng (Note 1)			1
PHICH duration			Normal
Unused RE-s and PRB-s (Note 2)			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PDSCH is mapped as OCNG.			

Table 8.10.2.1.1.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 FDD	OP.1 FDD	ETU70	1x4 Low	1	-5.4

The normative reference for this requirement is TS 36.101 [2] clause 8.10.2.

8.10.2.1.1.4 Test description

8.10.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.75.
2. The parameter settings for the cell are set up according to Table 8.10.2.1.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.2.1.1.4.3.

8.10.2.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Table 8.10.2.1.1.3-2. The details of PDCCH and PDSCH are specified in Tables A.3.5.1-1 and A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.2.1.1.5-1 as appropriate.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.10.2.1.1.5-1, pass the UE. Otherwise fail the UE.

8.10.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.10.2.1.1.5 Test requirement

For the parameters specified in Table 8.10.2.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.1.1.5-1.

Table 8.10.2.1.1.5-1: Test requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 FDD	OP.1 FDD	ETU70	1x4 Low	1	4.6

8.10.2.1.2 FDD PCFICH/PDCCH Transmit Diversity 2x4

8.10.2.1.2.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity 2x4 with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.10.2.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support 4 Rx antenna ports in any FDD RF band.

8.10.2.1.2.3 Minimum conformance requirements

For the parameters specified in Table 8.10.2.1.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.1.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.2.1.2.3-1: Test Parameters for PDCCH/PCFICH with 4 Rx Antenna Ports

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
PHICH Ng (Note 1)			1
PHICH duration			Normal
Unused RE-s and PRB-s (Note 2)			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PDSCH is mapped as OCNG.			

Table 8.10.2.1.2.3-2: Minimum performance PDCCH/PCFICH with 4 Rx Antenna Ports

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 FDD	EVA70	2x4 Low	1	-3.5

The normative reference for this requirement is TS 36.101 [2] clause 8.10.2.

8.10.2.1.2.4 Test description

8.10.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76.
2. The parameter settings for the cell are set up according to Table 8.10.2.1.2.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.2.1.2.4.3.

8.10.2.1.2.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.10.2.1.2.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2

respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.2.1.2.5-1.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.10.2.1.2.5-1, pass the UE. Otherwise fail the UE.

8.10.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.10.2.1.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.10.2.1.2.5 Test requirement

For the parameters specified in Table 8.10.2.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.1.2.5-1.

Table 8.10.2.1.2.5-1: Test requirement PDCCH/PCFICH with 4 Rx Antenna Ports

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 FDD	EVA70	2x4 Low	1	-2.5

8.10.2.1.3 FDD PCFICH/PDCCH Transmit Diversity 4x4

8.10.2.1.3.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity 4x4 with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.10.2.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support 4 Rx antenna ports in any FDD RF band.

8.10.2.1.3.3 Minimum conformance requirements

For the parameters specified in Table 8.10.2.1.3.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.1.3.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.2.1.3.3-1: Test Parameters for PDCCH/PCFICH with 4 Rx Antenna Ports

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
PHICH Ng (Note 1)			1
PHICH duration			Normal
Unused RE-s and PRB-s (Note 2)			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PDSCH is mapped as OCNG			

Table 8.10.2.1.3.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 FDD	OP.1 FDD	EPA5	4x4 Medium A Xpol	1	-0.4

The normative reference for this requirement is TS 36.101 [2] clause 8.10.2.

8.10.2.1.3.4 Test description

8.10.2.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Table 8.10.2.1.3.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.2.1.3.4.3.

8.10.2.1.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.10.2.1.3.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.2.1.3.5-1.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.10.2.1.3.5-1, pass the UE. Otherwise fail the UE.

8.10.2.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.10.2.1.3.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000000000000 00000001111111111111 1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.10.2.1.3.5 Test requirement

For the parameters specified in Table 8.10.2.1.3.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.1.3.5-1.

Table 8.10.2.1.3.5-1: Test Requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 FDD	OP.1 FDD	EPA5	4x4 Medium A Xpol	1	0.6

8.10.2.2 TDD

8.10.2.2.1 TDD PCFICH/PDCCH Single-antenna Port Performance 1x4

8.10.2.2.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for a single-antenna port with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.10.2.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support 4 Rx antenna ports in any TDD RF band.

8.10.2.2.1.3 Minimum conformance requirements

For the parameters specified in Table 8.10.2.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.2.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.2.2.1.3-1: Test Parameters for PDCCH/PCFICH with 4 Rx Antenna Ports

Parameter		Unit	Single antenna port
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
PHICH Ng (Note 3)			1
PHICH duration			Normal
Unused RE-s and PRB-s (Note 4)			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8]. Note 3: according to Clause 6.9 in TS 36.211 [8]. Note 4: PDSCH is mapped as OCNG.			

Table 8.10.2.2.1.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 TDD	OP.1 TDD	ETU70	1x4 Low	1	-4.7

The normative reference for this requirement is TS 36.101 [2] clause 8.10.2.

8.10.2.2.1.4 Test description

8.10.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders, and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.75.
2. The parameter settings for the cell are set up according to Table 8.10.2.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.2.2.1.4.3.

8.10.2.2.1.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Table 8.10.2.2.1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.10.2.2.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.10.2.2.1.5-1, pass the UE. Otherwise fail the UE.

8.10.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.10.2.2.1.4.3-1: TDD-Config-DEFAULT

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-23 TDD-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	Ssp4		
}			

8.10.2.2.1.5 Test requirement

For the parameters specified in Table 8.10.2.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.2.1.5-1.

Table 8.10.2.2.1.5-1: Test requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 TDD	OP.1 TDD	ETU70	1x4 Low	1	-3.9

8.10.2.2.2 TDD PCFICH/PDCCH Transmit Diversity 2x4

8.10.2.2.2.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity 2x4 with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.10.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support 4 Rx antenna ports in any TDD RF band.

8.10.2.2.2.3 Minimum conformance requirements

For the parameters specified in Table 8.10.2.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.2.2.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.2.2.2.3-1: Test Parameters for PDCCH/PCFICH with 4 Rx Antenna Ports

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
PHICH Ng (Note 3)			1
PHICH duration			Normal
Unused RE-s and PRB-s (Note 4)			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8]. Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PDSCH is mapped as OCNG.			

Table 8.10.2.2.2.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 TDD	OP.1 TDD	EVA70	2x4 Low	1	-3.2

The normative reference for this requirement is TS 36.101 [2] clause 8.10.2.

8.10.2.2.2.4 Test description

8.10.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders, and AWGN noise sources to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.76.
2. The parameter settings for the cell are set up according to Table 8.10.2.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.2.2.2.4.3.

8.10.2.2.2.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.10.2.2.2.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.10.2.2.2.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in Table 8.10.2.2.2.5-1, pass the UE. Otherwise fail the UE.

8.10.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.10.2.2.2.4.3-1: *TDD-Config-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-23 TDD-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.10.2.2.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.10.2.2.2.5 Test requirement

For the parameters specified in Table 8.10.2.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.2.2.5-1.

Table 8.10.2.2.2.5-1: Test requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 TDD	OP.1 TDD	EVA70	2x4 Low	1	-2.2

8.10.2.2.3 TDD PCFICH/PDCCH Transmit Diversity 4x4

8.10.2.2.3.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity 4x4 with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.10.2.2.3.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support 4 Rx antenna ports in any TDD RF band.

8.10.2.2.3.3 Minimum conformance requirements

For the parameters specified in Table 8.10.2.2.3.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.2.3.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.2.2.3.3-1: Test Parameters for PDCCH/PCFICH with 4 Rx Antenna Ports

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
PHICH Ng (Note 3)			1
PHICH duration			Normal
Unused RE-s and PRB-s (Note 4)			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8]. Note 3: according to Clause 6.9 in TS 36.211 [8]. Note 4: PDSCH is mapped as OCNG.			

Table 8.10.2.2.3.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 TDD	OP.1 TDD	EPA5	4x4 Medium A Xpol	1	0.0

The normative reference for this requirement is TS 36.101 [2] clause 8.10.2.

8.10.2.2.3.4 Test description

8.10.2.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 5 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders, and AWGN noise sources to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Table 8.10.2.2.3.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1, and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.2.2.3.4.3.

8.10.2.2.3.4.2 Test procedure

1. The SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.10.2.2.3.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.10.2.2.3.5-1 as appropriate.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in Table 8.10.2.2.3.5-1, pass the UE. Otherwise fail the UE.

8.10.2.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.10.2.2.3.4.3-1: *TDD-Config-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-23 TDD-Config-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.10.2.2.3.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 5.5.1.2, Table 5.5.1.2-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000000000000 00000001111111111111 1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.10.2.2.3.5 Test requirement

For the parameters specified in Table 8.10.2.2.3.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.2.2.3.5-1.

Table 8.10.2.2.3.5-1: Test requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 TDD	OP.1 TDD	EPA5	4x4 Medium A Xpol	1	1.0

8.10.3 PHICH

8.10.3.1 FDD

8.10.3.1.1 FDD PHICH Single-antenna Port Performance 1x4

8.10.3.1.1.1 Test purpose

This test verifies the demodulation performance of PHICH for a single-antenna port with a given SNR for which the average probability of miss-detection of Hybrid Indicator ("ACK to NACK") of the special reference measurement channels below a specified value.

8.10.3.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support 4 Rx antenna ports in any FDD RF band.

8.10.3.1.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold delection).

Table 8.10.3.1.1.3-1: Test Parameters for PHICH with 4 Rx Antenna Ports

Parameter		Unit	Single antenna port
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	0
PHICH duration			Normal
PHICH Ng (Note 1)			Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.
Unused RE-s and PRB-s (Note 2)			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8]. Note 2: PDSCH is mapped as OCNG.			

For the parameters specified in Table 8.10.3.1.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.1.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.3.1.1.3-2: Minimum performance PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 FDD	ETU70	1 x 4 Low	0.1	1.6

The normative reference for this requirement is TS 36.101 [2] clause 8.10.3.

8.10.3.1.1.4 Test description

8.10.3.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.75.

2. The parameter settings for the cell are set up according to Table 8.10.3.1.1.3-1.

3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.3.1.1.4.3.

8.10.3.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.3.1.1.5-1 as appropriate.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex A.3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.10.3.1.1.4.2-1 indicates the transmissions for one cycle.

Table 8.10.3.1.1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.10.3.1.1.5-1, pass the UE. Otherwise fail the UE.

8.10.3.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

Table 8.10.3.1.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.10.3.1.1.5 Test requirement

For the parameters specified in Table 8.10.3.1.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.1.1.5-1.

Table 8.10.3.1.1.5-1: Test requirement PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 FDD	ETU70	1 x 4 Low	0.1	2.5

8.10.3.1.2 FDD PHICH Transmit Diversity 2x4

8.10.3.1.2.1 Test purpose

This test verifies the demodulation performance of PHICH for a single-antenna port with a given SNR for which the average probability of miss-detection of Hybrid Indicator (“ACK to NACK”) of the special reference measurement channels below a specified value.

8.10.3.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support 4 Rx antenna ports in any FDD RF band.

8.10.3.1.2.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold delection).

Table 8.10.3.1.2.3-1: Test Parameters for PHICH with 4 Rx Antenna Ports

Parameter		Unit	Transmit diversity
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
PHICH duration			Normal
PHICH Ng (Note 1)			Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.
Unused RE-s and PRB-s (Note 2)			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8]. Note 2: PDSCH is mapped as OCNG.			

For the parameters specified in Table 8.10.3.1.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.1.2.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.3.1.2.3-2: Minimum performance PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 FDD	EVA70	2 x 4 Low	0.1	0.6

The normative reference for this requirement is TS 36.101 [2] clause 8.10.3.

8.10.3.1.2.4 Test description

8.10.3.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76.
2. The parameter settings for the cell are set up according to Table 8.10.3.1.2.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.3.1.2.4.3.

8.10.3.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.3.1.2.5-1 as appropriate.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex A.3.6 Table A.3.6-1A. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.10.3.1.2.4.2-1 indicates the transmissions for one cycle.

Table 8.10.3.1.2.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.10.3.1.2.5-1, pass the UE. Otherwise fail the UE.

8.10.3.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

Table 8.10.3.1.2.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.10.3.1.2.5 Test requirement

For the parameters specified in Table 8.10.3.1.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.1.2.5-1.

Table 8.10.3.1.2.5-1: Test requirement PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 FDD	EVA70	2 x 4 Low	0.1	1.7

8.10.3.1.3 FDD PHICH Transmit Diversity 4x4

8.10.3.1.3.1 Test purpose

This test verifies the demodulation performance of PHICH for a single-antenna port with a given SNR for which the average probability of miss-detection of Hybrid Indicator ("ACK to NACK") of the special reference measurement channels below a specified value.

8.10.3.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support 4 Rx antenna ports in any FDD RF band.

8.10.3.1.3.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold delection).

Table 8.10.3.1.3.3-1: Test Parameters for PHICH with 4 Rx Antenna Ports

Parameter		Unit	Transmit diversity
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
PHICH duration			Normal
PHICH Ng (Note 1)			Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.
Unused RE-s and PRB-s (Note 2)			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8]. Note 2: PDSCH is mapped as OCNG.			

For the parameters specified in Table 8.10.3.1.3.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.1.3.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.3.1.3.3-2: Minimum performance PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 FDD	EPA5	4 x 4 Medium correlation A, Cross polarized	0.1	0.1

The normative reference for this requirement is TS 36.101 [2] clause 8.10.3.

8.10.3.1.3.4 Test description

8.10.3.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Table 8.10.3.1.3.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.3.1.3.4.3.

8.10.3.1.3.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.3.1.3.5-1 as appropriate.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex A.3.6 Table A.3.6-1A. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.10.3.1.3.4.2-1 indicates the transmissions for one cycle.

Table 8.10.3.1.3.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
   If Pm-an is less than the value specified in table 8.10.3.1.3.5-1, pass the UE. Otherwise fail the UE.

8.10.3.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

Table 8.10.3.1.3.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.10.3.1.3.5 Test requirement

For the parameters specified in Table 8.10.3.1.3.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.1.3.5-1.

Table 8.10.3.1.3.5-1: Test requirement PHICH with 4 Rx Antenna Ports

Test number	Band width	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 FDD	EPA5	4 x 4 Medium correlation A, Cross polarized	0.1	1.1

8.10.3.2 TDD

8.10.3.2.1 TDD PHICH Single-antenna Port Performance 1x4

8.10.3.2.1.1 Test purpose

This test verifies the demodulation performance of PHICH for a single-antenna port with a given SNR for which the average probability of miss-detection of Hybrid Indicator (“ACK to NACK”) of the special reference measurement channels below a specified value.

8.10.3.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support 4 Rx antenna ports in any TDD RF band.

8.10.3.2.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold delection).

Table 8.10.3.2.1.3-1: Test Parameters for PHICH with 4 Rx Antenna Ports

Parameter		Unit	Single antenna port
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	0
PHICH duration			Normal
PHICH Ng (Note 1)			Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.
Unused RE-s and PRB-s (Note 4)			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8]. Note 3: according to Clause 6.9 in TS 36.211 [8]. Note 4: PDSCH is mapped as OCNG.			

For the parameters specified in Table 8.10.3.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.2.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.3.2.1.3-2: Minimum performance PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 TDD	ETU70	1 x 4 Low	0.1	1.7

The normative reference for this requirement is TS 36.101 [2] clause 8.10.3.

8.10.3.2.1.4 Test description

8.10.3.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.75.
2. The parameter settings for the cell are set up according to Table 8.10.3.2.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.3.2.1.4.3.

8.10.3.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.3.2.1.5-1 as appropriate.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1); SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex A.3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.10.3.2.1.4.2-1 indicates the transmissions for one cycle.

Table 8.10.3.2.1.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE siede is counted as successful ACK reception, while any transmission on these subframe is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.10.3.2.1.5-1, pass the UE. Otherwise fail the UE.

8.10.3.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

Table 8.10.3.2.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.10.3.2.1.5 Test requirement

For the parameters specified in Table 8.10.3.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.2.1.5-1.

Table 8.10.3.2.1.5-1: Test requirement PHICH with 4 Rx Antenna Ports

Test number	Band width	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 TDD	ETU70	1 x 4 Low	0.1	2.6

8.10.3.2.2 TDD PHICH Transmit Diversity 2x4

8.10.3.2.2.1 Test purpose

This test verifies the demodulation performance of PHICH for a single-antenna port with a given SNR for which the average probability of miss-detection of Hybrid Indicator ("ACK to NACK") of the special reference measurement channels below a specified value.

8.10.3.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support 4 Rx antenna ports in any TDD RF band.

8.10.3.2.2.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold delection).

Table 8.10.3.2.2.3-1: Test Parameters for PHICH with 4 Rx Antenna Ports

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
PHICH duration			Normal
PHICH Ng (Note 1)			Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.
Unused RE-s and PRB-s (Note 4)			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8]. Note 3: according to Clause 6.9 in TS 36.211 [8]. Note 4: PDSCH is mapped as OCNG.			

For the parameters specified in Table 8.10.3.2.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.2.2.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.3.2.2.3-2: Minimum performance PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 TDD	EVA70	2 x 4 Low	0.1	0.9

The normative reference for this requirement is TS 36.101 [2] clause 8.10.3.

8.10.3.2.2.4 Test description

8.10.3.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76.
2. The parameter settings for the cell are set up according to Table 8.10.3.2.2.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.3.2.2.4.3.

8.10.3.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.3.2.2.5-1 as appropriate.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1); SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex A.3.6 Table A.3.6-1A. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.10.3.2.2.4.2-1 indicates the transmissions for one cycle.

Table 8.10.3.2.2.4.2-1: PHICH test pattern

Subframe Index	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE siede is counted as successful ACK reception, while any transmission on these subframe is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.10.3.2.2.5-1, pass the UE. Otherwise fail the UE.

8.10.3.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

Table 8.10.3.2.2.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.10.3.2.2.5 Test requirement

For the parameters specified in Table 8.10.3.2.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.2.2.5-1.

Table 8.10.3.2.2.5-1: Test requirement PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 TDD	EVA70	2 x 4 Low	0.1	2.0

8.10.3.2.3 TDD PHICH Transmit Diversity 4x4

8.10.3.2.3.1 Test purpose

This test verifies the demodulation performance of PHICH for a single-antenna port with a given SNR for which the average probability of miss-detection of Hybrid Indicator (“ACK to NACK”) of the special reference measurement channels below a specified value.

8.10.3.2.3.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support 4 Rx antenna ports in any TDD RF band.

8.10.3.2.3.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold delection).

Table 8.10.3.2.3.3-1: Test Parameters for PHICH with 4 Rx Antenna Ports

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
PHICH duration			Normal
PHICH Ng (Note 1)			Ng = 1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.
Unused RE-s and PRB-s (Note 4)			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8]. Note 3: according to Clause 6.9 in TS 36.211 [8]. Note 4: PDSCH is mapped as OCNG.			

For the parameters specified in Table 8.10.3.2.3.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.2.3.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.3.2.3.3-2: Minimum performance PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 TDD	EPA5	4 x 4 Medium cotrrelation A, Cross polarized	0.1	0.3

The normative reference for this requirement is TS 36.101 [2] clause 8.10.3.

8.10.3.2.3.4 Test description

8.10.3.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Table 8.10.3.2.3.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.3.2.3.4.3.

8.10.3.2.3.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.3.2.3.5-1 as appropriate.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1); SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex A.3.6 Table A.3.6-1A. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.10.3.2.3.4.2-1 indicates the transmissions for one cycle.

Table 8.10.3.2.3.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE siede is counted as successful ACK reception, while any transmission on these subframe is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.10.3.2.3.5-1, pass the UE. Otherwise fail the UE.

8.10.3.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

Table 8.10.3.2.3.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.10.3.2.3.5 Test requirement

For the parameters specified in Table 8.10.3.2.3.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.10.3.2.3.5-1.

Table 8.10.3.2.3.5-1: Test requirement PHICH with 4 Rx Antenna Ports

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 TDD	EPA5	4 x 4 Medium cotrrelation A, Cross polarized	0.1	1.3

8.10.4 ePDCCH

8.10.4.1 Distributed Transmission with 4Rx

8.10.4.1.1 FDD distributed EPDCCH performance 2x4

8.10.4.1.1.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH.

8.10.4.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward supporting EPDCCH with 4 Rx antenna ports.

8.10.4.1.1.3 Minimum conformance requirements

The parameters specified in Table 8.10.4.1.1.3-1 are valid for all FDD distributed EPDCCH test with 4Rx unless otherwise stated.

Table 8.10.4.1.1.3-1: Test Parameters for Distributed EPDCCH with 4Rx

Parameter		Unit	Value
Number of PDCCH symbols		symbols	2 (Note 1)
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
	Δ	dB	3
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	1
Beamforming Pre-Coder			Annex B.4.4
Cell Specific Reference Signal			Port 0 and 1
Number of EPDCCH Sets Configured			2 (Note 2)
Number of PRB per EPDCCH Set			4 (1st Set) 8 (2nd Set)
EPDCCH Subframe Monitoring			NA
PDSCH TM			TM3
DCI Format			2A

Note 1: The starting symbol for EPDCCH is derived from the PCFICH. RRC signalling *epdcch-StartSymbol-r11* is not configured.

Note 2: The two sets are distributed EPDCCH sets and non-overlapping with PRB = {3, 17, 31, 45} for the first set and PRB = {0, 7, 14, 21, 28, 35, 42, 49} for the second set. EPDCCH is scheduled in the first set for Test 1 and second set for Test 2, respectively. Both sets are always configured.

For the parameters specified in Table 8.10.4.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.4.1.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.4.1.1.3-2: Minimum performance Distributed EPDCCH with 4Rx

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 FDD	OP.7 FDD	EVA5	2 x 4 Low	1	-0.7
2	10 MHz	16 ECCE	R.56 FDD	OP.7 FDD	EVA70	2 x 4 Low	1	-5.8

The normative reference for this requirement is TS 36.101 [2] clause 8.10.4.1.1.

8.10.4.1.1.4 Test description

8.10.4.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.76 for antenna configuration 2x4.
2. The parameter settings for the cell are set up according to Table 8.10.4.1.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.4.1.1.4.3.

8.10.4.1.1.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.10.4.1.1.3-2. The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.4.1.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.10.4.1.1.5-1, pass the UE. Otherwise fail the UE.

8.10.4.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.10.4.1.1.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, Condition: FDD

8.10.4.1.1.5 Test requirement

For the parameters specified in Table 8.10.4.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.4.1.1.5-1.

Table 8.10.4.1.1.5-1: Test requirement Distributed EPDCCH with 4Rx

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 FDD	OP.7 FDD	EVA5	2 x 4 Low	1	0.2
2	10 MHz	16 ECCE	R.56 FDD	OP.7 FDD	EVA70	2 x 4 Low	1	-4.9

8.10.4.1.2 TDD distributed EPDCCH performance 2x4

8.10.4.1.2.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH.

8.10.4.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward supporting EPDCCH with 4 Rx antenna ports.

8.10.4.1.2.3 Minimum conformance requirements

The parameters specified in Table 8.10.4.1.2.3-1 are valid for all TDD distributed EPDCCH tests with 4Rx unless otherwise stated.

Table 8.10.4.1.2.3-1: Test Parameters for Distributed EPDCCH with 4Rx

Parameter		Unit	Value
Number of PDCCH symbols		symbols	2 (Note 1)
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
	δ	dB	3
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	1
Beamforming Pre-Coder			Annex B.4.4
Cell Specific Reference Signal			Port 0 and 1
Number of EPDCCH Sets Configured			2 (Note 2)
Number of PRB per EPDCCH Set			4 (1st Set) 8 (2nd Set)
EPDCCH Subframe Monitoring			NA
PDSCH TM			TM3
DCI Format			2A
TDD UL/DL Configuration			0
TDD Special Subframe			1 (Note 3)

Note 1: The starting symbol for EPDCCH is derived from the PCFICH. RRC signalling *epdcch-StartSymbol-r11* is not configured.

Note 2: The two sets are distributed EPDCCH sets and non-overlapping with PRB = {3, 17, 31, 45} for the first set and PRB = {0, 7, 14, 21, 28, 35, 42, 49} for the second set. EPDCCH is scheduled in the first set for Test 1 and second set for Test 2, respectively. Both sets are always configured.

Note 3: Demodulation performance is averaged over normal and special subframe.

For the parameters specified in Table 8.10.4.1.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.4.1.2.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.4.1.2.3-2: Minimum performance Distributed EPDCCH with 4Rx

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 TDD	OP.7 TDD	EVA5	2 x 4 Low	1	-0.7
2	10 MHz	TBD ECCE	R.56 TDD	OP.7 TDD	EVA70	2 x 4 Low	1	-5.8

The normative reference for this requirement is TS 36.101 [2] clause 8.10.4.1.2.

8.10.4.1.2.4 Test description

8.10.4.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76 for antenna configuration 2x4.
2. The parameter settings for the cell are set up according to Table 8.10.4.1.2.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.4.1.2.4.3.

8.10.4.1.2.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Table 8.10.4.1.2.3-2. The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.4.1.2.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.10.4.1.2.5-1, pass the UE. Otherwise fail the UE.

8.10.4.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.10.4.1.2.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, Condition: TDD

Table 8.10.4.1.2.4.3-2: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	Ssp1		
}			

8.10.4.1.2.5 Test requirement

For the parameters specified in Table 8.10.4.1.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.4.1.2.5-1.

Table 8.10.4.1.2.5-1: Test requirement Distributed EPDCCH with 4Rx

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 TDD	OP.7 TDD	EVA5	2 x 4 Low	1	0.2
2	10 MHz	TBD ECCE	R.56 TDD	OP.7 TDD	EVA70	2 x 4 Low	1	-4.9

8.10.4.2 Localized Transmission with TM9 2x4

8.10.4.2.1 FDD localized EPDCCH performance with TM9 2x4

8.10.4.2.1.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). In this test, EPDCCH and PCFICH are not tested jointly.

8.10.4.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward supporting EPDCCH and FGI bit 103 with 4Rx antenna ports.

8.10.4.2.1.3 Minimum conformance requirements

The parameters specified in Table 8.10.4.2.1.3-1 are valid for all FDD TM9 localized ePDCCH tests with 4Rx unless otherwise stated.

Table 8.10.4.2.1.3-1: Test Parameters for Localized EPDCCH with TM9 and 4Rx

Parameter		Unit	Value
Number of PDCCH symbols		symbols	1 (Note 1)
EPDCCH starting symbol		symbols	2 (Note 1)
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	-3
	δ	dB	0
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	1
Beamforming Pre-Coder			Annex B.4.5
Cell Specific Reference Signal			Port 0 and 1
CSI-RS Reference Signal			Port 15 and 16
CSI-RS reference signal resource configuration			0
CSI reference signal subframe configuration I_{CSI-RS}			2
ZP-CSI-RS configuration bitmap			0000010000000000
ZP-CSI-RS subframe configuration $I_{ZP-CSI-RS}$			2
Number of EPDCCH Sets			2 (Note 2)
EPDCCH Subframe Monitoring pattern *subframePatternConfig-r11*			1111111110 1111111101 1111111011 1111110111 (Note 3)
PDSCH TM			TM9

Note 1: The starting symbol for EPDCCH is signalled with *epdcch-StartSymbol-r11*. However, CFI is set to 1.

Note 2: The first set is distributed transmission with PRB = {0, 49} and the second set is localized transmission with PRB = {0, 7, 14, 21, 28, 35, 42, 49}. ePDCCH is scheduled in the second set for all tests.

Note 3: EPDCCH is scheduled in every SF. UE is required to monitor ePDCCH for UE-specific search space only in SFs configured by *subframePatternConfig-r11*. Legacy PDCCH is not scheduled.

For the parameters specified in Table 8.10.4.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.4.2.1.3-2. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is statDTX of 99.9%.

The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.4.2.1.3-2: Minimum performance Localized EPDCCH with TM9 and 4Rx

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 FDD	OP.7 FDD	EVA5	2 x 4 Low	1	6.6
2	10 MHz	8 ECCE	R.58 FDD	OP.7 FDD	EVA5	2 x 4 Low	1	-1.5

The normative reference for this requirement is TS 36.101 [2] clause 8.10.4.2.1.

8.10.4.2.1.4 Test description

8.10.4.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.76 for antenna configuration 2x4.
2. The parameter settings for the cell are set up according to Table 8.10.4.2.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.4.2.1.4.3.

8.10.4.2.1.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Table 8.10.4.2.1.3-2. The details of EPDCCH and PDSCH are specified in Table A.3.10.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.10.4.2.1.5-1 as appropriate.
3. Measure the Pm-dsg on monitoring subframes for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval for monitoring subframes. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). Also, count the number of statDTX on the UL PUCCH for unmonitoring subframes and calculate the ratio of (number of statDTX on the UL PUCCH for unmonitoring subframes)/(the number of configured unmonitoring subframes). If Pm-dsg is less than the value specified in table 8.10.4.2.1.5-1 and the ratio of statDTX on the UL PUCCH for unmonitoring subframes is no less than 99.9%+TT, pass the UE. Otherwise fail the UE.

8.10.4.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 8.10.4.2.1.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, condition: FDD, TM9

Table 8.10.4.2.1.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	111111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.10.4.2.1.5 Test requirement

For the parameters specified in Table 8.10.4.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.4.2.1.5-1. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is no less than statDTX of 99.9%+TT.

Table 8.10.4.2.1.5-1: Test requirement localized EPDCCH with TM9 and 4Rx

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 FDD	OP.7 FDD	EVA5	2 x 4 Low	1	7.5
2	10 MHz	8 ECCE	R.58 FDD	OP.7 FDD	EVA5	2 x 4 Low	1	-0.6

8.10.4.2.2 TDD localized EPDCCH performance with TM9 2x4

8.10.4.2.2.1 Test purpose

This test verifies the receiver characteristics of the EPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). In this test, EPDCCH and PCFICH are not tested jointly.

8.10.4.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward supporting EPDCCH and FGI bit 103 with 4Rx antenna ports.

8.10.4.2.2.3 Minimum conformance requirements

The parameters specified in Table 8.10.4.2.2,3-1 are valid for all TDD TM9 localized ePDCCH tests unless otherwise stated.

Table 8.10.4.2.2.3-1: Test Parameters for Localized EPDCCH with TM9 and 4Rx

Parameter		Unit	Value
Number of PDCCH symbols		symbols	1 (Note 1)
EPDCCH starting symbol		symbols	2 (Note 1)
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	-3
	δ	dB	0
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	1
Beamforming Pre-Coder			Annex B.4.5
Cell Specific Reference Signal			Port 0 and 1
CSI-RS Reference Signal			Port 15 and 16
CSI-RS reference signal resource configuration			0
CSI reference signal subframe configuration I_{CSI-RS}			0
ZP-CSI-RS configuration bitmap			0000010000000000
ZP-CSI-RS subframe configuration $I_{ZP-CSI-RS}$			0
Number of EPDCCH Sets			2 (Note 2)
EPDCCH Subframe Monitoring pattern *subframePatternConfig-r11*			1100011000 1100010000 1100011000 1100001000 1100011000 1000011000 1100011000 (Note 3)
PDSCH TM			TM9
TDD UL/DL Configuration			0
TDD Special Subframe			1 (Note 4)

Note 1: The starting symbol for EPDCCH is signalled with *epdcch-StartSymbol-r11*. However, CFI is set to 1.
Note 2: The first set is distributed transmission with PRB = {0, 49} and the second set is localized transmission with PRB = {0, 7, 14, 21, 28, 35, 42, 49}. ePDCCH is scheduled in the second set for all tests.
Note 3: EPDCCH is scheduled in every SF. UE is required to monitor ePDCCH for UE-specific search space only in SFs configured by *subframePatternConfig-r11*. Legacy PDCCH is not scheduled.
Note 4: Demodulation performance is averaged over normal and special subframe.

For the parameters specified in Table 8.10.4.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.4.2.2.3-2. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is statDTX of 99.9%.

The downlink physical setup is in accordance with Annex C.3.2.

Table 8.10.4.2.2.3-2: Minimum performance Localized EPDCCH with TM9 and 4Rx

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 TDD	OP.7 TDD	EVA5	2 x 4 Low	1	6.0
2	10 MHz	8 ECCE	R.58 TDD	OP.7 TDD	EVA5	2 x 4 Low	1	-2.1

The normative reference for this requirement is TS 36.101 [2] clause 8.10.4.2.2.

8.10.4.2.2.4 Test description

8.10.4.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and EPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76 for antenna configuration 2x4.
2. The parameter settings for the cell are set up according to 8.10.4.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.10.4.2.2.4.3.

8.10.4.2.2.4.2 Test procedure

1. SS transmits PDSCH via EPDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Table 8.10.4.2.2.3-2.The details of EPDCCH and PDSCH are specified in Table A.3.10.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.10.4.2.2.5-1 as appropriate.
3. Measure the Pm-dsg on monitoring subframes for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval for monitoring subframes. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). Also, count the number of statDTX on the UL PUCCH for unmonitoring subframes and calculate the ratio of (number of statDTX on the UL PUCCH for unmonitoring subframes)/(the number of configured unmonitoring subframes). If Pm-dsg is less than the value specified in table 8.10.4.2.2.5-1 and the ratio of statDTX on the UL PUCCH for unmonitoring subframes is no less than 99.9%+TT, pass the UE. Otherwise fail the UE.

8.10.4.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.10.4.2.2.4.3-1: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2B, condition: TDD, TM9

Table 8.10.4.2.2.4.3-2: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	ssp1		
}			

Table 8.10.4.2.2.4.3-3: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	111111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.10.4.2.2.5 Test requirement

For the parameters specified in Table 8.10.4.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.10.4.2.2.5-1. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is no less than statDTX of 99.9%+TT.

Table 8.10.4.2.2.5-1: Test requirement Localized EPDCCH with TM9 and 4Rx

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 TDD	OP.7 TDD	EVA5	2 x 4 Low	1	6.9
2	10 MHz	8 ECCE	R.58 TDD	OP.7 TDD	EVA5	2 x 4 Low	1	-1.2

8.11 Demodulation (UE supporting coverage enhancement)

The requirements in this sub-clause are defined based on the simulation results with UE DL Category M1 unless otherwise stated.

8.11.1 PDSCH

8.11.1.1 FDD and half-duplex FDD (Fixed Reference Channel)

The parameters specified in Table 8.11.1.1-1 are valid for FDD and half-duplex FDD tests unless otherwise stated.

Table 8.11.1.1-1: Common Test Parameters (FDD and half-duplex FDD)

Parameter	Unit	CE Mode A	CE Mode B
Number of HARQ processes per component carrier	Processes	8	2
Maximum number of HARQ transmission		4	4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM	{0,0,0,0,1,1,1,1,2,2,2,2,3,3,3,3, …} for QPSK
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths
Cyclic Prefix		Normal	Normal
Beamforming Precoder for MPDCCH		Annex B.4.4	Annex B.4.4
Precoder update granularity for MPDCCH		Frequency domain: 1 PRB Time domain: identical during the hopping period (interval-FDD for CE Mode A)	Frequency domain: 1 PRB Time domain: identical during the hopping period (interval-FDD for CE Mode B)
BL/CE DL subframe comfiguration (fdd-DownlinkOrTddSubframeBitmapBR)		1111111111	1111111111

8.11.1.1.1 FDD and half-duplex FDD Closed-loop spatial multiplexing performance for UE category M1

8.11.1.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.11.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 13 and forward of UE category M1.

8.11.1.1.1.3 Minimum conformance requirements

The requirements are specified in Table 8.11.1.1.1.3-2, with the addition of the parameters in Table 8.11.1.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-one performance with frequency selective precoding.

Table 8.11.1.1.1.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
	δ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10
Reporting interval		ms	10
Reporting mode			PUCCH 1-1
Physical channel for CQI reporting			PUSCH(Note4)
cqi-pmi-ConfigIndex			12
CodeBookSubsetRestriction bitmap			001111
PDSCH transmission mode			6
Coverage enhancement mode			CE Mode A
OFDM starting symbol (startSymbolBR)			2
Maximum number of repetitions (mpdcch-NumRepetition)			1
Frequency hopping (mpdcch-pdsch-HoppingConfig)			Disabled
MPDCCH transmission duration		ms	1
Starting subframe configuration for MPDCCH (mpdcch_startSF_UESS)			1
Narrowband for MPDCCH (mpdcch_Narrowband)			1

Note 1: $P_B = 1$.

Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), This reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: For each test, DC subcarrier puncturing shall be considered.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 6-0A shall be transmitted in downlink SF#1 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5.

Table 8.11.1.1.1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz 16QAM 1/2	R.79 FDD	OP.2 FDD	EPA5	2x1 Low	70%	8.6

The normative reference for this requirement is TS 36.101 [2] clause 8.11.1.1.1.

8.11.1.1.1.4 Test description

8.11.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.11.1.1.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.11.1.1-1 and 8.11.1.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 8.11.1.1.1.4.3.

8.11.1.1.1.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to Tables 8.11.1.1.1.3-1 and 8.11.1.1.1.3-2.

SS sends uplink scheduling information via MPDCCH DCI format 6-0A with CQI request bit set to 0 to schedule UL RMC in subframe #1(Table A.2.2.1.1-1b).2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.11.1.1.1.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.11.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeA and the following exceptions.

Table 8.11.1.1.1.4.3-1: SystemInformationBlockType1-BR-r13

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType1-BR-r13 ::= SEQUENCE {			
startSymbolBR-r13	2		
}			

Table 8.11.1.1.1.4.3-2: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
EPDCCH-Config-r11 ::= SEQUENCE{			
mpdcch-config-r13 CHOICE[1] {			
setup SEQUENCE {			
csi-NumRepetitionCE-r13	sf1		
mpdcch-pdsch-HoppingConfig-r13	off		
mpdcch-StartSF-UESS-r13 CHOICE {			
fdd-r13	v1		
}			
mpdcch-NumRepetition-r13	r1		
mpdcch-Narrowband-r13	1	Narrowband index 0	
}			
}			
}			

Table 8.11.1.1.1.4.3-3: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

Table 8.11.1.1.1.4.3-4: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	12	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.11.1.1.1.5 Test requirement

Table 8.11.1.1.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.11.1.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.11.1.1.1.5-1: Test requirement for Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz 16QAM 1/2	R.79 FDD	OP.2 FDD	EPA5	2x1 Low	70%	9.5

8.11.1.1.2 FDD and half-duplex FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1

8.11.1.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.11.1.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 13 and forward of UE category M1 and supports TM9 in CE Mode A.

8.11.1.1.2.3 Minimum conformance requirements

For single-layer transmission on antenna ports 7 or 8 upon detection of a MPDCCH with DCI format 6-1A, the requirements are specified in Table 8.11.1.1.2.3-2 with the addition of the parameters in Table 8.11.1.1.2.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify rank-1 performance on one of the antenna ports 7 or 8.

Table 8.11.1.1.2.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer)

parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
	δ	dB	3
	MPDCCH_RA	dB	ρ_A + δ + 3
	MPDCCH_RB	dB	ρ_B + δ + 3
Beamforming model			Annex B.4.1
Cell-specific reference signals			Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98 (Note 6)
Symbols for unused PRBs			OCNG (Note 3)
Number of allocated resource blocks (Note 2)		PRB	6
PDSCH transmission mode			9

Coverage enhancement mode		CE Mode A
OFDM starting symbol (startSymbolBR)		2
Maximum number of repetitions		8
Frequency hopping (mpdcch-pdsch-HoppingConfig)		Enabled
Frequency hopping offset (mpdcch-pdsch-HoppingOffset)		1
Frequency hopping interval (interval-FDD)	ms	8
MPDCCH transmission duration (mpdcch-NumRepetition)	ms	8
Number of narrowbands for frequency hopping (mpdcch-pdsch-HoppingNB)		2
Starting subframe configuration for MPDCCH (mpdcch_startSF_UESS)		4
Narrowband for MPDCCH (mpdcch_Narrowband)		7
MPDCCH aggregation level		24
Note 1: $P_B = 1$.		
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.		
Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.		
Note 4: For each test,DC subcarrier puncturing shall be considered.		

Table 8.11.1.1.2.3-2: Minimum performance for CDM-multiplexed DM RS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz QPSK 1/3	R.80 FDD	OP.2 FDD	EPA5	2x1 Low	70	-2.0

The normative reference for this requirement is TS 36.101 [2] clause 8.11.1.1.2.

8.11.1.1.2.4 Test description

8.11.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.11.1.1.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.11.1.1-1 and 8.11.1.1.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 8.11.1.1.2.4.3.

8.11.1.1.2.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to Tables 8.11.1.1.2.3-1 and 8.11.1.1.2.3-2.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.11.1.1.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.11.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeA and the following exceptions

Table 8.11.1.1.2.4.3-1: EPDCCH-Config-r11-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-config-r13 CHOICE {			
mpdcch-pdsch-HoppingConfig-r13	on		
mpdcch-StartSF-UESS-r13 CHOICE {			
fdd-r13	v4		
}			
mpdcch-NumRepetition-r13	r8		
mpdcch-Narrowband-r13	7		
}			

Table 8.11.1.1.2.4.3-2: FreqHoppingParameters-r13-DEFAULT configuration

Derivation Path: 36.508 Table 4.4.3.2-3A			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType1-BR-r13 ::= SEQUENCE {			
freqHoppingParametersDL-r13 SEQUENCE {			
mpdcch-pdsch-HoppingNB-r13	nb2		
interval-DLHoppingConfigCommonModeA-r13 CHOICE {			
interval-FDD-r13	int8		
}			
mpdcch-pdsch-HoppingOffset-r13	1		
}			
}			

Table 8.11.1.1.2.4.3-3: PhysicalConfigDedicated-DEFAULT

Derivation Path: TS 36.508 Table 4.8.2.1.6-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
}			

Table 8.11.1.1.2.4.3-4: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.11.1.1.2.4.3-5: PDSCH-ConfigCommon-v1310-DEFAULT

Derivation Path: 36.508 Table 4.6.3-5A			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigCommon-v1310-DEFAULT ::= SEQUENCE {			
pdsch-maxNumRepetitionCEmodeA-r13	Not present		
}			

8.11.1.1.2.5 Test requirement

Table 8.11.1.1.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.11.1.1.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.11.1.1.2.5-1: Test requirement for CDM-multiplexed DM RS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz QPSK 1/3	R.80 FDD	OP.2 FDD	EPA5	2x1 Low	70	-1.1

8.11.1.1.3

8.11.1.1.3.1 FDD and half-duplex FDD PDSCH Transmit Diversity 2x1 for UE category M1

8.11.1.1.3.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity.

8.11.1.1.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 13 and forward of UE category M1.

8.11.1.1.3.1.3 Minimum conformance requirements

The requirements are specified in Table 8.11.1.1.3.1.3-2, with the addition of the parameters in Table 8.11.1.1.3.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmitter antennas.

Table 8.11.1.1.3.1.3-1: Test Parameters for Transmit diversity performance (FRC)

Parameter		Unit	Test 1 (Note 3)	Test 2 (Note 3)	Test 3 (Note 3)	Test 4 (Note 3)
Downlink power allocation	ρ_A	dB	-3	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0	0	0
	δ	dB	3	3	3	3
	MPDCCH_RA	dB	ρ_A + δ + 3	ρ_A + δ	ρ_A + δ + 3	ρ_A + δ + 3
	MPDCCH_RB	dB	ρ_B + δ + 3	ρ_B + δ	ρ_B + δ + 3	ρ_B + δ + 3
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Coverage enhancement mode			CE Mode B	CE Mode A	CE Mode B	CE Mode B
PDSCH transmission mode			2	2	2	2
OFDM starting symbol (startSymbolBR)			2	2	2	2
Maximum number of repetitions (mpdcch-NumRepetition)			64	1	[32]	[16]
Frequency hopping (mpdcch-pdsch-HoppingConfig)			Enabled	Disabled	Enabled	Enabled
Frequency hopping offset (mpdcch-pdsch-HoppingOffset)			1	N/A	1	1
Frequency hopping interval (interval-FDD)		ms	16	N/A	16	[8]
MPDCCH transmission duration		ms	64	1	[64]	[64]
Number of narrowbands for frequency hopping (mpdcch-pdsch-HoppingNB)			4	N/A	4	4
Starting subframe configuration for MPDCCH (mpdcch_startSF_UESS)			2.5	1	[2.5]	[2.5]
Narrowband for MPDCCH (mpdcch_Narrowband)			7	0	7	7
MPDCCH aggregation level			24	8	24	24

Note 1: $P_B = 1$.
Note 2: For each test, DC subcarrier puncturing shall be considered.
Note 3: Test 1, test 3 and test 4 are applicable for UE supporting CE Mode B. Test 2 is applicable for UE not supporting CE Mode B.
Note 4: If not otherwise stated, the values in this table refer to parameters in TS 36.211 [4] or/and TS 36.213 [6] as appropriate.

Table 8.11.1.1.3.1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10MHz QPSK 1/10	R.81 FDD	OP.2 FDD	ETU1	2x1 Low	70	-13.5	M1
2	10MHz 16QAM 1/2	R.79 FDD	OP.2 FDD	EPA5	2x1 Low	70	9.4	M1
3	10MHz QPSK 1/10	[R.81 FDD]	OP.2 FDD	ETU1	2x2 Low	70	[TBD]	≥1
4	10MHz QPSK 1/10	[R.81 FDD]	OP.2 FDD	ETU1	2x4 Low	70	[TBD]	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.11.1.1.3.1.

8.11.1.1.3.1.4 Test description

8.11.1.1.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified in Table 8.11.1.1.3.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.11.1.1-1 and 8.11.1.1.3.1.3-1 (test 2) as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 8.11.1.1.3.1.4.3.

8.11.1.1.3.1.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A (test2) with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to Tables 8.11.1.1.3.1.3-1 and 8.11.1.1.3.1.3-2.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.11.1.1.3.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.11.1.1.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeA and for Test 2 with the following exception.

Table 8.11.1.1.3.1.4.3-1: EPDCCH-Config-r11-DEFAULT configuration for Test 2

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
setConfigToAddModList-r11 SEQUENCE {	1 entry		
setConfigId-r11[1]	0		
transmissionType-r11[1]	distributed		
resourceBlockAssignment-r11[1] SEQUENCE{			
numberPRB-Pairs-r11	n2		
resourceBlockAssignment-r11	0000		
}			
dmrs-ScramblingSequenceInt-r11[1]	0		
pucch-ResourceStartOffset-r11[1]	0		
re-MappingQCL-ConfigListId-r11[1]	Not present		
numberPRB-Pairs-v1310 CHOICE[1] {	Not present		
}			
}			

8.11.1.1.3.1.5 Test requirement

Table 8.11.1.1.3.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.11.1.1.3.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.11.1.1.3.1.5-1: Test requirement for Transmit diversity performance (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
2	10MHz 16QAM 1/2	R.79 FDD	OP.2 FDD	EPA5	2x1 Low	70	10.3

8.11.1.1.3.1_1 FDD and half-duplex FDD PDSCH Transmit Diversity 2x1 for UE category M1 (CEmodeB)

8.11.1.1.3.1_1.1 Test purpose

Same as in sub-clause 8.11.1.1.3.1.1.

8.11.1.1.3.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 13 and forward of UE category M1 that support operating in CEModeB.

8.11.1.1.3.1_1.3 Minimum conformance requirements

Same as in sub-clause 8.11.1.1.3.1.3.

8.11.1.1.3.1_1.4 Test description

8.11.1.1.3.1_1.4.1 Initial conditions

Same as in sub-clause 8.11.1.1.3.1.4.1 except for step 2, where the parameter settings for the cell are set up according to Tables 8.11.1.1-1 and 8.11.1.1.3.1.3-1 (test 1).

8.11.1.1.3.1_1.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1B (test 1) with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to Tables 8.11.1.1.3.1.3-1 and 8.11.1.1.3.1.3-2.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.11.1.1.3.1_1.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.11.1.1.3.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeB and the following exceptions

Table 8.11.1.1.3.1_1.4.3-1: EPDCCH-Config-r11-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-config-r13 CHOICE {			
mpdcch-pdsch-HoppingConfig-r13	on		
}			

Table 8.11.1.1.3.1_1.4.3-2: FreqHoppingParameters-r13-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2D			
Information Element	**Value/remark**	**Comment**	**Condition**
FreqHoppingParameters-r13-DEFAULT::= SEQUENCE {			
mpdcch-pdsch-HoppingNB-r13	nb4		
interval-DLHoppingConfigCommonModeB-r13 CHOICE {			
interval-FDD-r13	int16		
}			
mpdcch-pdsch-HoppingOffset-r13	1		
}			

8.11.1.1.3.1_1.5 Test requirement

Table 8.11.1.1.3.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.11.1.1.3.1_1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.11.1.1.3.1_1.5-1: Test requirement for Transmit diversity performance (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz QPSK 1/10	R.81 FDD	OP.2 FDD	ETU1	2x1 Low	70	-12.6

8.11.1.2 TDD (Fixed Reference Channel)

The parameters specified in Table 8.11.1.2-1 are valid for all TDD tests unless otherwise stated.

Table 8.11.1.2-1: Common Test Parameters (TDD)

Parameter	Unit	CE Mode A	CE Mode B
Uplink downlink configuration (Note 1)		1	1
Special subframe configuration (Note 2)		4	4
Cyclic prefix		Normal	Normal
Cell ID		0	0
Number of HARQ processes per component carrier	Processes	7	2
Maximum number of HARQ transmission		4	4

Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM	{0,0,0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,1,1,2,2,2,2,2,2,2,2,2,3,3,3,3,3,3,3,3,3} for QPSK
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths
ACK/NACK feedback mode		Multiplexing	Multiplexing
Beamforming Precoder for MPDCCH		Annex B.4.4	Annex B.4.4
Precoder update granularity for MPDCCH		Frequency domain: 1 PRB Time domain: identical during the hopping period (interval-TDD for CE Mode A)	Frequency domain: 1 PRB Time domain: identical during the hopping period (interval-TDD for CE Mode B)
BL/CE DL subframe configuration (fdd-DownlinkOrTddSubframeBitmapBR)		1011110111	1011110111
Note 1: as specified in Table 4.2-2 in TS 36.211 [4]. Note 2: as specified in Table 4.2-1 in TS 36.211 [4].			

8.11.1.2.1 TDD Closed-loop spatial multiplexing performance for UE category M1 (Cell-Specific Reference Symbols)

8.11.1.2.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.11.1.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 13 and forward of UE category M1.

8.11.1.2.1.3 Minimum conformance requirements

The requirements are specified in Table 8.11.1.2.1.3-2, with the addition of the parameters in Table 8.11.1.2.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-one performance with frequency selective precoding

Table 8.11.1.2.1.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
	δ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	5
Reporting mode			PUCCH 1-1
cqi-pmi-ConfigIndex			4
CodeBookSubsetRestriction bitmap			001111

ACK/NACK feedback mode		Multiplexing
Physical channel for CQI reporting		PUSCH (Note 3)
PDSCH transmission mode		6
Coverage enhancement mode		CE Mode A
OFDM starting symbol (startSymbolLC)		2
Maximum number of repetitions		1
Frequency hopping (mpdcch-pdsch-HoppingConfig)		Disabled
MPDCCH transmission duration (mpdcch-NumRepetition)	ms	1
Starting subframe configuration for MPDCCH (mpdcch_startSF_UESS)		1
Narrowband for MPDCCH (mpdcch_Narrowband)		1
Note 1: $P_B = 1$.		
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).		
Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. MPDCCH DCI format 6-0A shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.		
Note 4: For each test,DC subcarrier puncturing shall be considered.		

Table 8.11.1.2.1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz 16QAM 1/2	R.79 TDD	OP.2 TDD	EPA5	2x1 Low	70%	11.4

The normative reference for this requirement is TS 36.101 [2] clause 8.11.1.2.1.

8.11.1.2.1.4 Test description

8.11.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.11.1.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.11.1.2-1 and 8.11.1.2.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 8.11.1.2.1.4.3.

8.11.1.2.1.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to Tables 8.11.1.2.1.3-1 and 8.11.1.2.1.3-2.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via MPDCCH DCI format 6-0A with narrowband index n_{RB} = 0 and with CSI request bit set to 0 to schedule UL RMC in subframe #4 and #9(Table A.2.3.1.1-1b).
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.11.1.2.1.5-1 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.11.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeA and the following exceptions

Table 8.11.1.2.1.4.3-1: EPDCCH-Config-r11-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-NumRepetition-r13	r1		

Table 8.11.1.2.1.4.3-2: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-pmi-ConfigIndex	4		
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.11.1.2.1.5 Test requirement

Table 8.11.1.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.11.1.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.11.1.2.1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz 16QAM 1/2	R.79 TDD	OP.2 TDD	EPA5	2x1 Low	70%	12.3

8.11.1.2.2 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1

8.11.1.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port and multiple CSI reference symbols configurations with non-zero and zero transmission power.

8.11.1.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 13 and forward of UE category M1 and supports TM9 in CE Mode A.

8.11.1.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.1, with the addition of the relevant parameters in Tables 8.11.1.2-1 and 8.11.1.2.2.3-1 and the downlink physical channel setup according to Annex C.3.2.

Using this configuration, the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.11.1.2.2.3-2 for the specified SNR.

Table 8.11.1.2.2.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
	δ	dB	3
	MPDCCH_RA	dB	ρ_A + δ + 3
	MPDCCH_RB	dB	ρ_B + δ + 3
Cell-specific reference signals			Antenna ports 0,1
Beamforming model			Annex B.4.1
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 3)
Number of allocated resource blocks (Note 2)		PRB	6

Simultaneous transmission		No
PDSCH transmission mode		9
Coverage enhancement mode		CE Mode A
OFDM starting symbol (startSymbolBR)		2
Maximum number of repetitions		8
Frequency hopping (mpdcch-pdsch-HoppingConfig)		Enabled
Frequency hopping offset (mpdcch-pdsch-HoppingOffset)		1
Frequency hopping interval (interval-TDD)	ms	10
MPDCCH transmission duration (mpdcch-NumRepetition)	ms	8
Number of narrowbands for frequency hopping (mpdcch-pdsch-HoppingNB)		2
Starting subframe configuration for MPDCCH (mpdcch_startSF_UESS)		1
Narrowband for MPDCCH (mpdcch_Narrowband)		7
MPDCCH aggregation level		24
Note 1: $P_B = 1$.		
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.		
Note 3: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.		
Note 4: For each test, DC subcarrier puncturing shall be considered.		

Table 8.11.1.2.2.3-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz QPSK 1/3	R.80 TDD	OP.2 TDD	EPA5	2x1 Low	70	-2.5

The normative reference for this requirement is TS 36.101 [2] clause 8.11.1.2.2.

8.11.1.2.2.4 Test description

8.11.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.11.1.2.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9 (using only main UE Tx/Rx antenna).
2. The parameter settings for the cell are set up according to Tables 8.11.1.2-1 and 8.11.1.2.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 8.11.1.2.2.4.3.

8.11.1.2.2.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to Tables 8.11.1.2.2.3-1 and 8.11.1.2.2.3-2.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.11.1.2.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.11.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeA and the following exceptions

Table 8.11.1.2.2.4.3-1: EPDCCH-Config-r11-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-NumRepetition-r13	r8		

8.11.1.2.2.5 Test requirement

Table 8.11.1.2.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.4.1] for each throughput test shall meet or exceed the specified value in Table 8.11.1.2.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.11.1.2.2.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz	R.80 TDD	OP.2 TDD	EPA5	2x1 Low	70	-1.6

	QPSK 1/3						

8.11.1.2.3

8.11.1.2.3.1 TDD PDSCH Transmit Diversity for UE category M1

8.11.1.2.3.1.1 Test purpose

The purpose is to verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity.

8.11.1.2.3.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 13 and forward of UE category M1.

8.11.1.2.3.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.11.1.2-1 and 8.11.1.2.3.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

Using this configuration, the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.11.1.2.3.1.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 transmitter antennas (SFBC) as specified.

Table 8.11.1.2.3.1.3-1: Test Parameters for Transmit diversity performance (FRC)

Parameter		Unit	Test 1 (Note 3)	Test 2 (Note 3)	Test 3 (Note 3)	Test 4 (Note 3
Downlink power allocation	ρ_A	dB	-3	-3	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0	0	0
	δ	dB	-3	-3	-3	-3
	MPDCCH_RA	dB	ρ_A + δ + 3	ρ_A + δ	ρ_A + δ + 3	ρ_A + δ + 3
	MPDCCH_RB	dB	ρ_B + δ + 3	ρ_B + δ	ρ_B + δ + 3	ρ_B + δ + 3
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
CK/NACK feedback mode			Multiplexing	Multiplexing	Multiplexing	Multiplexing
DSCH transmission mode			2	2	2	2
overage enhancement mode			CE Mode B	CE Mode A	CE Mode B	CE Mode B
DSCH transmission mode			2	2	2	2
FDM starting symbol (startSymbolBR)			2	2	2	2
laximum number of repetitions npdcch-NumRepetition)			64	1	[32]	[16]
requency hopping npdcch-pdsch-HoppingConfig)			Enabled	Disabled	Enabled	Enabled
requency hopping offset npdcch-pdsch-HoppingOffset)			1	N/A	1	1
requency hopping interval nterval-TDD)		ms	20	N/A	20	[10]
PDCCH transmission duration		ms	64	1	[64]	[64]
umber of narrowbands for frequency hopping npdcch-pdsch-HoppingNB)			4	N/A	4	4
tarting subframe configuration for MPDCCH npdcch-startSF-UESS)			1	1	[1]	[1]
arrowband for MPDCCH npdcch_Narrowband)			7	0	7	7
PDCCH aggregation level			24	8	24	24

ote 1: $P_B = 1$.
ote 2: For each test,DC subcarrier puncturing shall be considered.
ote 3: Test 1, test 3 and test 4 are applicable for UE supporting CE Mode B. Test 2 is applicable for UE not supporting CE Mode B.
ote 4: If not otherwise stated, the values in this table refer to parameters in TS 36.211 [4] or/and TS 36.213 [6] as appropriate.

Table 8.11.1.2.3.1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10MHz QPSK 1/10	R.81 TDD	OP.2 TDD	ETU1	2x1 Low	70	-14.0	M1
2	10MHz 16QAM 1/2	R.79 TDD	OP.2 TDD	EPA5	2x1 Low	70	9.6	M1
3	10MHz QPSK 1/10	[R.81 TDD]	OP.2 TDD	ETU1	2x2 Low	70	[TBD]	≥1
4	10MHz QPSK 1/10	[R.81 TDD]	OP.2 TDD	ETU1	2x4 Low	70	[TBD]	≥1

The normative reference for this requirement is TS 36.101 [2] clause 8.11.1.2.3.1.

8.11.1.2.3.1.4 Test description

8.11.1.2.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.11.1.2.3.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9 (using only main UE Tx/Rx antenna).
2. The parameter settings for the cell are set up according to Tables 8.11.1.2-1 and 8.11.1.2.3.1.3-1 (test 2) as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 8.11.1.2.3.1.4.3.

8.11.1.2.3.1.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to Tables 8.11.1.2.3.1.3-1 and 8.11.1.2.3.1.3-2.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.11.1.2.3.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.11.1.2.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeA and the following exceptions

Table 8.11.1.2.3.1.4.3-1: EPDCCH-Config-r11-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-NumRepetition-r13	r1		

8.11.1.2.3.1.5 Test requirement

Table 8.11.1.2.3.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.4.2] for each throughput test shall meet or exceed the specified value in Table 8.11.1.2.3.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.11.1.2.3.1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
2	10MHz 16QAM 1/2	R.79 TDD	OP.2 TDD	EPA5	2x1 Low	70	10.5

8.11.1.2.3.1_1 TDD PDSCH Transmit Diversity for UE category M1 (CEModeB)

8.11.1.2.3.1_1.1 Test purpose

Same as sub-clause 8.11.1.2.3.1.1.

8.11.1.2.3.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 13 and forward of UE category M1 that support operating in CEModeB.

8.11.1.2.3.1_1.3 Minimum conformance requirements

Same as sub-clause 8.11.1.2.3.1.3.

8.11.1.2.3.1_1.4 Test description

8.11.1.2.3.1_1.4.1 Initial conditions

Same as in sub-clause 8.11.1.2.3.1.4.1 except for step 2, where the parameter settings for the cell are set up according to Tables 8.11.1.1-1 and 8.11.1.2.3.1.3-1 (test 1).

8.11.1.2.3.1_1.4.2 Test procedure

1. SS transmits PDSCH via M-PDCCH DCI format 6-1B with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to Tables 8.11.1.2.3.1_1.3-1 and 8.11.1.2.3.1_1.3-2.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.11.1.2.3.1_1.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.11.1.2.3.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeB and the following exceptions

Table 8.11.1.2.3.1_1.4.3-1: EPDCCH-Config-r11-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-NumRepetition-r13	r64		

8.11.1.2.3.1_1.5 Test requirement

Table 8.11.1.2.3.1_1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause [A.3.4.2] for each throughput test shall meet or exceed the specified value in Table 8.11.1.2.3.1_1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.11.1.2.3.1_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value	
						Fraction of Maximum Throughput (%)	SNR (dB)
1	10MHz QPSK 1/10	R.81 TDD	OP.2 TDD	ETU1	2x1 Low	70	-13.1

8.11.2 MPDCCH

The receiver characteristics of the MPDCCH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

8.11.2.1 FDD and HD-FDD

8.11.2.1.1 FDD and HD-FDD demodulation of MPDCCH in CE Mode A

8.11.2.1.1.1 Test purpose

This test verifies the receiver characteristics of the MPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

8.11.2.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 13 and forward of UE category M1.

8.11.2.1.1.3 Minimum conformance requirements

For the parameters specified in Table 8.11.2.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.1.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.11.2.1.1.3-1: Test Parameters for MPDCCH

Parameter		Unit	CE Mode A
OFDM starting symbol (startSymbolLC)		symbols	2
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
	δ	dB	3
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	4(Note 2)
Beamforming Pre-Coder			Annex B.4.4
Cell Specific Reference Signal			Port 0 and 1
Number of PRB per MPDCCH Set			4
Transmission type			Distributed
Frequency hopping			Disabled
Number of frequency hopping narrowbands			N/A
Frequency hopping offset			N/A
Frequency hopping interval		ms	4
MPDCCH start subframe (*mpdcch-startSF-UESS*)			1.5
Maximum number of repetitions (*mPDCCH-NumRepetition*)			32
MPDCCH repetition number			32
MPDCCH narrowband (*mpdcch-Narrowband*)			1
PDSCH TM			TM2
DCI Format			6-1A
fdd-DownlinkOrTddSubframeBitmapBR			1111111111

Note1: For each test, DC subcarrier puncturing shall be considered.
Note2: Same precoding matrix is used for a PRB across subframes during the frequency hopping interval.
Note 3: For MPDCCH UE-specific search space the formula for the start subframe k0 is given in TS 36.213 [10] clause 9.1.5.
Note 4: If not otherwise stated, the values in this table refer to parameters in TS 36.211 [8] or/and TS 36.213 [10] as appropriate.

Table 8.11.2.1.1.3-2: Minimum performance CE Mode A MPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	16 ECCE	R.82 FDD	OP.2 FDD	EPA5	2 x 1 Low	1	-4.8

The normative reference for this requirement is TS 36.101 [2] clause 8.11.2.1.

8.11.2.1.1.4 Test description

8.11.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to 8.11.2.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.2.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2A.A. Message contents are defined in clause 8.11.2.1.1.4.3.

8.11.2.1.1.4.2 Test procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 8.11.2.1.1.3-2.The details of MPDCCH and PDSCH are specified in Table A.3.11.1-1 and Table A.3.11.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.11.2.1.1.5-1 as appropriate.
3. Measure the Pm-dsg on monitoring subframes for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval for monitoring subframes. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.11.2.1.1.5-1, pass the UE. Otherwise fail the UE.

8.11.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeA and the following exceptions.

Table 8.11.2.1.1.4-1: MPDCCH-Config-r13-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3.-1AA and 4.6.3.-1AB, Condition: FDD

Table 8.11.2.1.1.4-2: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
EPDCCH-Config-r11 ::= SEQUENCE{			
mpdcch-config-r13 CHOICE[1] {			
setup SEQUENCE {			
csi-NumRepetitionCE-r13	sf1		
mpdcch-pdsch-HoppingConfig-r13	off		
mpdcch-StartSF-UESS-r13 CHOICE {			
fdd-r13	v1dot5		
}			
mpdcch-NumRepetition-r13	r32		
mpdcch-Narrowband-r13	1	Narrowband index 0	
}			
}			
}			

8.11.2.1.1.5 Test requirement

For the parameters specified in Table 8.11.2.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.1.1.5-1.

Table 8.11.2.1.1.5-1: Test requirement CE Mode A MPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	16 ECCE	R.82 FDD	OP.2 FDD	EPA5	2 x 1 Low	1	-3.9

8.11.2.1.2 FDD and half-duplex FDD demodulation of MPDCCH in CE Mode B

Editor's notes: The following items are missing or incomplete:

- MNS and MNSF in Annex G need to completed.

8.11.2.1.2.1 Test purpose

Same as in sub-clause 8.11.2.1.1.1.

8.11.2.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 13 and forward of UE category M1 that support operating in CEModeB.

8.11.2.1.2.3 Minimum conformance requirements

For the parameters specified in Table 8.11.2.1.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.1.2.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.11.2.1.2.3-1: Test Parameters for MPDCCH

Parameter		Unit	CE Mode B
OFDM starting symbol (startSymbolLC)		symbols	2
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	-3
	δ	dB	0
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	16 (Note 2)
Beamforming Pre-Coder			Annex B.4.4
Cell Specific Reference Signal			Port 0 and 1
Number of PRB per MPDCCH Set			2+4
Transmission type			Localized
Frequency hopping			Enabled
Number of frequency hopping narrowbands			4
Frequency hopping offset			1
Frequency hopping interval		ms	16
Value of G in MPDCCH start subframe (*mpdcch-startSF-UESS*) Note 3			1.5
Maximum number of repetitions (*mPDCCH-NumRepetition*)			64
MPDCCH repetition number			64
MPDCCH narrowband (*mpdcch-Narrowband*)			7
PDSCH TM			TM2
DCI Format			6-1B
fdd-DownlinkOrTddSubframeBitmapBR			1111111111

Note 1: For each test, DC subcarrier puncturing shall be considered.
Note 2: Same precoding matrix is used for a PRB across subframes during the frequency hopping interval.
Note 3: For MPDCCH UE-specific search space the formula for the start subframe k0 is given in TS 36.213 [10] clause 9.1.5.
Note 4: If not otherwise stated, the values in this table refer to parameters in TS 36.211 [8] or/and TS 36.213 [10] as appropriate.

Table 8.11.2.1.2.3-2: Minimum performance CE Mode B MPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	24 ECCE	R.83 FDD	OP.2 FDD	ETU1	2 x 1 Low	1	-12.0

The normative reference for this requirement is TS 36.101 [2] clauses 8.11.2.1 and 8.11.2.1.2.

8.11.2.1.2.4 Test description

8.11.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to 8.11.2.1.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.2.
5. Ensure the UE is in State 3A-RF-CE with the condition CEModeB according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 8.11.2.1.2.4.3.

8.11.2.1.2.4.2 Test procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1B for C_RNTI to transmit the DL RMC according to Table 8.11.2.1.2.3-2. The details of MPDCCH and PDSCH are specified in Table A.3.11.1-1 and Table A.3.3.2.1-5 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.11.2.1.2.5-1 as appropriate.
3. Measure the Pm-dsg on monitoring subframes for a duration sufficient to achieve statistical significance according to Annex G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval for monitoring subframes. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.11.2.1.2.5-1, pass the UE. Otherwise fail the UE.

8.11.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeB and with the message exceptions as in sub-clause 8.11.2.1.1.4.3 unless superceded by the following exceptions.

Table 8.11.2.1.2.4.3-1: EPDCCH-Config-r11-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
setConfigToAddModList-r11 SEQUENCE {	1 entry		
transmissionType-r11[1]	localised		
}			
mpdcch-config-r13 CHOICE[1] {			
setup SEQUENCE {			
mpdcch-pdsch-HoppingConfig-r13	on		
mpdcch-StartSF-UESS-r13 CHOICE {			
fdd-r13	v1dot5		
}			
mpdcch-NumRepetition-r13	r64		
mpdcch-Narrowband-r13	8	Narrowband index 7	
}			
}			
}			

Table 8.11.2.1.2.4.3-2: FreqHoppingParameters-r13-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2D			
Information Element	**Value/remark**	**Comment**	**Condition**
FreqHoppingParameters-r13-DEFAULT::= SEQUENCE {			
mpdcch-pdsch-HoppingNB-r13	nb4		
interval-DLHoppingConfigCommonModeB-r13 CHOICE {			
interval-FDD-r13	16		
}			
mpdcch-pdsch-HoppingOffset-r13	1		
}			

8.11.2.1.2.5 Test requirement

For the parameters specified in Table 8.11.2.1.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.1.2.5-1.

Table 8.11.2.1.2.5-1: Test requirement CE Mode B MPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	24 ECCE	R.83 FDD	OP.2 FDD	ETU1	2 x 1 Low	1	-11.1

8.11.2.2 TDD

8.11.2.2.1 TDD demodulation of MPDCCH in CE Mode A

Editor's notes: The following items are missing or incomplete:

- Values within brackets in Table. 8.11.2.2.1.3-1.

8.11.2.2.1.1 Test purpose

This test verifies the receiver characteristics of the MPDCCH which are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

8.11.2.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 13 and forward of UE category M1.

8.11.2.2.1.3 Minimum conformance requirements

For the parameters specified in Table 8.11.2.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.2.1.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.11.2.2.1.3-1: Test Parameters for MPDCCH

Parameter		Unit	CE Mode A
OFDM starting symbol (startSymbolLC)		symbols	2
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
	δ	dB	3
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	5 (Note 2)
Beamforming Pre-Coder			Annex B.4.4
Cell Specific Reference Signal			Port 0 and 1
Number of PRB per MPDCCH Set			4
Transmission type			Distributed
Frequency hopping			Disabled
Number of frequency hopping narrowbands			N/A
Frequency hopping offset			N/A
Frequency hopping interval		ms	5
Value of G in MPDCCH start subframe (*mpdcch-startSF-UESS*) Note 4			[5]
Maximum number of repetitions (*mPDCCH-NumRepetition*)			16
MPDCCH repetition number			16
MPDCCH narrowband (*mpdcch-Narrowband*)			1
PDSCH TM			TM2
Reference channel for PDSCH transmission			R.81 TDD
DCI Format			6-1A
TDD UL/DL Configuration			0
TDD Special Subframe			1
fdd-DownlinkOrTddSubframeBitmapBR			1000010000

Note 1: For each test, DC subcarrier puncturing shall be considered.
Note 2: Same precoding matrix is used for a PRB across subframes where MPDCCH is repeated.
Note 3: The special subframes are not supported by MPDCCH, and are assumed as non- BL/CE DL subframes.
Note 4: For MPDCCH UE-specific search space the formula for the start subframe k0 is given in TS 36.213 [10] clause 9.1.5.
Note 5: If not otherwise stated, the values in this table refer to parameters in TS 36.211 [8] or/and TS 36.213 [10] as appropriate.

Table 8.11.2.2.1.3-2: Minimum performance CE Mode A MPDCCH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	16 ECCE	R.82 TDD	OP.2 TDD	EPA5	2 x 1 Low	1	-5.3

The normative reference for this requirement is TS 36.101 [2] clause 8.11.2.2.

8.11.2.2.1.4 Test description

8.11.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to 8.11.2.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.2.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2A.A. Message contents are defined in clause 8.11.2.2.1.4.3.

8.11.2.2.1.4.2 Test procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to Table 8.11.2.2.1.3-2.The details of MPDCCH and PDSCH are specified in Table A.3.10.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.11.2.2.1.5-1 as appropriate.
3. Measure the Pm-dsg on monitoring subframes for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval for monitoring subframes. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.11.2.2.1.5-1, pass the UE. Otherwise fail the UE.

8.11.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeA

Table 8.11.2.2.1.4-1: MPDCCH-Config-r13-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3.-1AA and 4.6.3.-1AB, Condition: TDD

Table 8.11.2.2.1.4-2: *SystemInformationBlockType1-BR-r13*

Derivation Path: 36.508 clause 4.4.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
bandwidthReducedAccessRelatedInfo-r13 SEQUENCE {			
fdd-DownlinkOrTddSubframeBitmapBR-r13 CHOICE {			
subframePattern10-r13	1000010000		
}			
}			

8.11.2.2.1.5 Test requirement

For the parameters specified in Table 8.11.2.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.2.1.5-1.

Table 8.11.2.2.1.5-1: Test requirement Localized MPDCCH with TM9

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
	10 MHz	16 ECCE	R.82 TDD	OP.2 TDD	EPA5	2 x 1 Low	1	-4.4

8.11.2.2.2 TDD demodulation of MPDCCH in CE Mode B

Editor's notes: The following items are missing or incomplete:

- MNS and MNSF in Annex G need to be completed.
- Values within brackets in Table 8.11.2.2.2.3-1.

8.11.2.2.2.1 Test purpose

Same as in sub-clause 8.11.2.2.1.1.

8.11.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 13 and forward of UE category M1 that support operating in CEModeB.

8.11.2.2.2.3 Minimum conformance requirements

For the parameters specified in Table 8.11.2.2.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.2.2.3-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.11.2.2.2.3-1: Test Parameters for MPDCCH

Parameter		Unit	CE Mode B
OFDM starting symbol (startSymbolLC)		symbols	2
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	σ	dB	-3
	δ	dB	0
N_{oc} at antenna port		dBm/15 kHz	-98
Cyclic prefix			Normal
Subframe Configuration			Non-MBSFN
Precoder Update Granularity		PRB	1
		ms	20 (Note 2)
Beamforming Pre-Coder			Annex B.4.4
Cell Specific Reference Signal			Port 0 and 1
Number of PRB per MPDCCH Set			2+4
Transmission type			Localized
Frequency hopping			Enabled
Number of frequency hopping narrowbands			4
Frequency hopping offset			1
Frequency hopping interval		ms	20
Value of G in MPDCCH start subframe (*mpdcch-startSF-UESS*) Note 4			[5]
Maximum number of repetitions (*mPDCCH-NumRepetition*)			32
MPDCCH repetition number			32
MPDCCH narrowband (*mpdcch-Narrowband*)			7
PDSCH TM			TM2
DCI Format			6-1B
TDD UL/DL Configuration			0
TDD Special Subframe			1
fdd-DownlinkOrTddSubframeBitmapBR			1000010000

Note 1: For each test, DC subcarrier puncturing shall be considered.
Note 2: Same precoding matrix is used for a PRB across subframes where MPDCCH is repeated.
Note 3: The special subframes are not supported by MPDCCH, and are assumed as non- BL/CE DL subframes.
Note 4: For MPDCCH UE-specific search space the formula for the start subframe k0 is given in TS 36.213 [10] clause 9.1.5.
Note 5: If not otherwise stated, the values in this table refer to parameters in TS 36.211 [8] or/and TS 36.213 [10] as appropriate.

Table 8.11.2.2.2.3-2: Minimum performance CE Mode B MPDCCH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	24 ECCE	R.83 TDD	OP.2 TDD	ETU1	2 x 1 Low	1	-10.1

The normative reference for this requirement is TS 36.101 [2] clauses 8.11.2.2 and 8.11.2.2.2.

8.11.2.2.2.4 Test description

8.11.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to 8.11.2.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.2.
5. Ensure the UE is in State 3A-RF-CE with the condition CEModeB according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 8.11.2.2.2.4.3.

8.11.2.2.2.4.2 Test procedure

1. SS transmits PDSCH via MPDCCH DCI format 6-1B for C_RNTI to transmit the DL RMC according to Table 8.11.2.2.2.3-2. The details of MPDCCH and PDSCH are specified in Table A.3.11.2-1 and Table A.3.4.2.1-7 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.11.2.2.2.5-1 as appropriate.
3. Measure the Pm-dsg on monitoring subframes for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval for monitoring subframes. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.11.2.2.2.5-1, pass the UE. Otherwise fail the UE.

8.11.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with condition CEModeB with the message exceptions as in sub-clause 8.11.2.2.1.4.3 unless superseded by the following exceptions.

Table 8.11.2.2.2.4.3-1: EPDCCH-Config-r11-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2B			
Information Element	**Value/remark**	**Comment**	**Condition**
setConfigToAddModList-r11 SEQUENCE {	1 entry		
transmissionType-r11[1]	localised		
}			
mpdcch-config-r13 CHOICE[1] {			
setup SEQUENCE {			
mpdcch-pdsch-HoppingConfig-r13	on		
mpdcch-StartSF-UESS-r13 CHOICE {			
tdd-r13	v2		
}			
mpdcch-NumRepetition-r13	r32		
mpdcch-Narrowband-r13	8	Narrowband index 7	
}			
}			
}			

Table 8.11.2.2.2.4.3-2: FreqHoppingParameters-r13-DEFAULT configuration

Derivation Path: 36.508 Table 4.6.3-2D			
Information Element	**Value/remark**	**Comment**	**Condition**
FreqHoppingParameters-r13-DEFAULT::= SEQUENCE {			
mpdcch-pdsch-HoppingNB-r13	nb4		
interval-DLHoppingConfigCommonModeB-r13 CHOICE {			
interval-TDD-r13	20		
}			
mpdcch-pdsch-HoppingOffset-r13	1		
}			

8.11.2.2.2.5 Test requirement

For the parameters specified in Table 8.11.2.2.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.2.2.5-1.

Table 8.11.2.2.2.5-1: Test requirement CE Mode B MPDCCH

Test number	Band width	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	24 ECCE	R.83 TDD	OP.2 TDD	ETU1	2 x 1 Low	1	-9.2

8.11.3 Demodulation of PBCH (enhanced coverage)

TS 36.101 [2] specifies the PBCH performance requirements but there is no way of measuring them because PBCH is a broadcast channel with no feedback information in uplink.

8.12 Demodulation of Narrowband IoT

8.12.1 NPDSCH

8.12.1.1 Half-duplex FDD

Table 8.12.1.1-1: Common Test Parameters

Parameter	Unit	Value
Number of HARQ processes per component carrier (Note 2)	**Processes**	1 or 2
Maximum number of HARQ transmission		4
Cyclic Prefix		Normal
eutraControlRegionSize-r13		3 for In-band and N/A for Standalone/Guard-band unless otherwise stated
downlinkBitmap-r13 and dl-Gap-r13		Not configured
dl-GapNonAnchor-r13 and downlinkBitmapNonAnchor-r13		Not configured
Unused REs or RB (Note 1)		OCNG
OCNG pattern		NB.OP.1
Note 1: For in-band mode, the REs for transmission of LTE signals including PDCCH, CRS should be filled by OCNG. Note 2: 1 is applicable for both UE Category NB1 and NB2; 2 is only applicable for UE Category NB2 if UE supports it.		

Table 8.12.1.1-2: Test Parameters of related NPDCCH and NPUSCH format 2 configurations

Parameter	Unit	Value
DCI format		DCI format N1
scheduling delay field (I_{Delay})		1 for the first HARQ process; 2 for the second HARQ process if configured
N_{Rep}^{AN} (*ack-NACK-NumRepetitions*)		1
ACK/NACK resource field		0
Reference channel for NPDCCH		R.NB.3 for one NRS antenna port; R.NB.4 for two NRS antenna ports
α_{offset} (*npdcch-Offset-USS-r13*)		0

8.12.1.1.1 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in In-band mode for category NB1

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- Annex G might need update.

8.12.1.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports.

8.12.1.1.1.2 Test applicability

This test applies to all types of UE release 13 and forward of category NB1.

8.12.1.1.1.3 Minimum conformance requirements

The requirements are specified in Table 8.12.1.1.1.3-2, with the addition of the parameters in Table 8.12.1.1.1.3-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the performance.

Table 8.12.1.1.1.3-1: Test Parameters for NPDSCH under In-band

Parameter		Unit	Test 1, 2, 3
Downlink power allocation of LTE signal	ρ_A	dB	-3
	ρ_B	dB	-3(Note 1)
	σ	dB	0
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-93 (Note 2)
	N_{oc2}	dBm/15kHz	-99 (Note 3)
LTE CRS port number (eutra-NumCRS-Ports-r13)			4
NPDCCH repetition number		subframe	8 for Test 1; 16 for Test 2; 128 for Test 3.
$R_{\max}$ (*npdcch-NumRepetitions-r13*)		subframe	8 for Test 1; 16 for Test 2; 128 for Test 3.
G (*nPDCCH-startSF-USS-r13*)			4 for Test 1; 2 for Test 2; 1.5 for Test 3

Note 1: $P_B = 1$.
Note 2: This noise is applied to all subframes from the end of the NPDCCH to the end of the following NPDSCH transmission;
Note 3: This noise is applied to all subframes from the end of the NPDSCH to the end of the following NPDCCH transmission.

Table 8.12.1.1.1.3-2: Minimum performance under In-band with 2 NRS ports

Test number	Bandwidth	Carrier Type	Reference Channel	Repetition number	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
							Fraction of Maximum Throughput (%)	SNR (dB)	
1	200kHz	Anchor	R.NB.5 FDD	1	EPA5	2x1 Low	70%	6.9	NB1, NB2
2	200kHz	Anchor	R.NB.5 FDD	32	EPA5	2x1 Low	70%	-4.8	NB1, NB2
3	200kHz	Non-anchor	R.NB.5-1 FDD	256	ETU1	2x1 Low	70%	-9.8	NB1, NB2

The normative reference for this requirement is TS 36.101 [2] clause 8.12.1.1.1.

8.12.1.1.1.4 Test description

8.12.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: K.2.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.12.1.1.1.3-2.

EUTRA Bandwidth is 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1, except for band 31 where 5 MHz bandwidth is used.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.12.1.1-1 and 8.12.1.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.0.1, H.1.1, H.2.1 and Annex H.4.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 8.12.1.1.1.4.3.

8.12.1.1.1.4.2 Test procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Tables 8.12.1.1.1.3-1 and 8.12.1.1.1.3-2.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.12.1.1.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each test interval in Tables 8.12.1.1.1.5-1 as appropriate.

8.12.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 and clause 8.1.4.3 using condition "Inband_Different" with the following exceptions:

Table 8.12.1.1.1.4.3-1: *MasterInformationBlock-NB*

Derivation Path: 36.508 Table 8.1.4.3.2-1: MasterInformationBlock-NB			
Information Element	**Value/remark**	**Comment**	**Condition**
MasterInformationBlock-NB ::= SEQUENCE {			
systemFrameNumber-MSB-r13	A valid value as defined in TS 36.331 [17]		
hyperSFN-LSB-r13	A valid value as defined in TS 36.331 [17]		
schedulingInfoSIB1-r13	2	TBS = 208 bits, 16 repetitions	
systemInfoValueTag-r13	0		
ab-Enabled-r13	FALSE		
operationModeInfo-r13 CHOICE {			
inband-DifferentPCI-r13 SEQUENCE {			Inband_Different
eutra-NumCRS-Ports-r13	four		
rasterOffset-r13	khz-2dot5		
spare	'00'B		
}			
}			
}			

Table 8.12.1.1.1.4.3-2: Configure Non-anchor carrier in subtest 3

Derivation Path: 36.508 Table 8.1.8.2.1.6-1 PhysicalConfigDedicated-NB-DEFAULT			
Information Element	Value/remark	Comment	Condition
PhysicalConfigDedicated-NB-DEFAULT ::= SEQUENCE {			
carrierConfigDedicated-NB-r13 ::= SEQUENCE {		Non-anchor carrier	
dl-CarrierConfig-r13::= SEQUENCE {			
dl-CarrierFreq-r13	Note 1		
downlinkBitmapNonAnchor-r13	NULL		
dl-GapNonAnchor-r13	NULL		
}			
ul-CarrierConfig-r13 ::= SEQUENCE {			
ul-CarrierFreq-r13	Note 1		
}			
}			
npdcch-ConfigDedicated-r13	NPDCCH-ConfigDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
npusch-ConfigDedicated-r13	NPUSCH-ConfigDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
uplinkPowerControlDedicated-r13	UplinkPowerControlDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
}			
Note 1: The frequency of the non-anchor carrier is 180KHz higher than the centre of the anchor carrier.			

8.12.1.1.1.5 Test requirement

Table 8.12.1.1.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause FFS for each throughput test shall meet or exceed the specified value in Table 8.12.1.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.12.1.1.1.5-1: Test Parameters under In-band with 2 NRS ports

Test number	Bandwidth	Carrier Type	Reference Channel	Repetition number	Propagation Condition	Correlation Matrix and Antenna	Reference value	
							Fraction of Maximum	SNR (dB)

						Configuration	Throughput (%)	
1	200kHz	Anchor	R.NB.5 FDD	1	EPA5	2x1 Low	70%	7.8
2	200kHz	Anchor	R.NB.5 FDD	32	EPA5	2x1 Low	70%	-3.9
3	200kHz	Non-anchor	R.NB.5-1 FDD	256	ETU1	2x1 Low	70%	-8.9

8.12.1.1.2 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in standalone and Guard-band mode for category NB1

8.12.1.1.2.1 Test purpose

Same test purpose as in clause 8.12.1.1.1.

8.12.1.1.2.2 Test applicability

This test applies to all types of UE release 13 and forward of category NB1.

8.12.1.1.2.3 Minimum conformance requirements

The requirements are specified in Table 8.12.1.1.2.3-2, with the addition of the parameters in Table 8.12.1.1.2.3-1 and the downlink physical channel setup according to Annex C.3.2. Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.12.1.1.2.3-2 for the specified SNR.

Table 8.12.1.1.2.3-1: Test Parameters for NPDSCH under standalone/Guard-band

Parameter	Unit		Test 1, 2
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-93 (Note 1)
	N_{oc2}	dBm/15kHz	-99 (Note 2)
NPDCCH repetition number		subframe	32 for Test 1; 256 for Test 2.
$R_{\max}$ (*npdcch-NumRepetitions-r13*)		subframe	64 for Test 1; 512 for Test 2.
G (*nPDCCH-startSF-USS-r13*)			1.5
Note 1: This noise is applied to all subframes from the end of the NPDCCH to the end of the following NPDSCH transmission; Note 2: This noise is applied to all subframes from the end of the NPDSCH to the end of the following NPDCCH transmission.			

Table 8.12.1.1.2.3-2: Minimum performance under standalone/Guard-band with 1 NRS ports

Test number	Band width	Carrier Type	Reference Channel	Repetition number	Propagation condition	Number of NRS ports	Reference value		UE Category
							Fraction of Maximum Throughput (%)	SNR (dB)	
1	200kHz	Anchor	R.NB.6 FDD	32	EPA5	1	70%	-3.4	NB1, NB2
2	200kHz	Non-anchor	R.NB.6-1 FDD	256	ETU1	1	70%	-10.2	NB1, NB2

The normative reference for this requirement is TS 36.101 [2] clause 8.12.1.1.2.

8.12.1.1.2.4 Test description

8.12.1.1.2.4.1 Initial conditions

Same initial conditions as in clause 8.12.1.1.1.4.1 with the following exceptions.

- Operation mode: Standalone.
- Instead of Figure A.10→ use Figure A.9.

8.12.1.1.2.4.2 Test procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Tables 8.12.1.1.2.3-1 and 8.12.1.1.2.3-2.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.12.1.1.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each subtest in Table 8.12.1.1.2.5-1 as appropriate.

8.12.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions:

Table 8.12.1.1.2.4.3-1: Configure Non-anchor carrier in subtest 2

Derivation Path: 36.508 Table 8.1.8.2.1.6-1 PhysicalConfigDedicated-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-NB-DEFAULT ::= SEQUENCE {			
carrierConfigDedicated-NB-r13 ::= SEQUENCE {		Non-anchor carrier	
dl-CarrierConfig-r13::= SEQUENCE {			
dl-CarrierFreq-r13	Note 1		
downlinkBitmapNonAnchor-r13	NULL		
dl-GapNonAnchor-r13	NULL		
}			
ul-CarrierConfig-r13 ::= SEQUENCE {			
ul-CarrierFreq-r13	Note 1		
}			
}			
npdcch-ConfigDedicated-r13	NPDCCH-ConfigDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
npusch-ConfigDedicated-r13	NPUSCH-ConfigDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
uplinkPowerControlDedicated-r13	UplinkPowerControlDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
}			
Note 1: The frequency of Non-anchor carrier is located at 180KHz higher from the centre of the anchor carrier.			

8.12.1.1.2.5 Test requirement

Table 8.12.1.1.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.12.2.1 for each throughput test shall meet or exceed the specified value in Table 8.12.1.1.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.12.1.1.2.5-1: Test requirements under standalone with 1 NRS ports

Test number	Bandwidth	Carrier Type	Reference Channel	Repetition number	Propagation condition	Number of NRS ports	Reference value	
							Fraction of Maximum Throughput (%)	SNR (dB)
1	200kHz	Anchor	R.NB.6 FDD	32	EPA5	1	70%	-2.6
2	200kHz	Non-anchor	R.NB.6-1 FDD	256	ETU1	1	70%	-9.4

8.12.2 NPDCCH

8.12.2.1 Half-duplex FDD

The parameters specified in Table 8.12.2.1-1 are valid for all half-duplex FDD tests unless otherwise stated.

Table 8.12.2.1-1: Test Parameters for NPDCCH

Parameter	Unit	Single antenna port	Transmit diversity
Narrowband physical layer Cell ID		0	0
N_{oc} at antenna port	dBm/15kHz	-98	-98
Cyclic prefix		Normal	Normal
Number of CRS ports for in-band deployment mode		4	4
NPDCCH starting position (*eutraControlRegionSize-r13*) (Note 1)		3	3
Maximum number of repetitions $R_{\max}$ (*npdcch-NumRepetitions-r13*)		128 for Test 1; 1024 for Test 2.	64 for Test 1; 512 for Test 2.
NPDCCH start subframe G (*npdcch-startSF-USS-r13*)		2 for test1, 1.5 for test2	2 for test1, 1.5 for test2
NPDCCH fractional period offset of starting subframe α_{offset} (*npdcch-Offset-USS-r13*)		0	0
NB-IoT downlink subframe bitmap for anchor carrier *(downlinkBitmap-r13)*		Not configured	Not configured
NB-IoT downlink subframe bitmap for non-anchor carrier *(downlinkBitmapNonAnchor-r13)*		Not configured	Not configured
Downlink gap configuration for anchor carrier *(dl-Gap-r13)*		Not configured	Not configured
Downlink gap configuration for non-anchor carrier *(dl-GapNonAnchor-r13)*		Not configured	Not configured
Unused REs or RBs (Note 1)		OCNG	OCNG
OCNG pattern		NB.OP.1	NB.OP.1
NOTE 1: Applicable only for in-band deployment mode.			

Table 8.12.2.1-2: Test Parameters of related NPDSCH and NPUSCH format 2 configurations

Parameter	Unit	Value
Scheduling delay field (I_{Delay})		0
NPDSCH Repetition number		1
N_{oc} at antenna port for NPDSCH	dBm/15kHz	-98
N_{Rep}^{AN} (*ack-NACK-NumRepetitions-r13*)		1
ACK/NACK resource field		0
Reference channel for NPDSCH		R.NB.6 and R.NB.6-1 for one NRS antenna port; R.NB.5 and R.NB.5-1 for two NRS antenna ports

8.12.2.1.1 Demodulation of NPDCCH single-antenna performance for category NB1

8.12.2.1.1.1 Test purpose

This test verifies the demodulation performance of NPDCCH for single-antenna scenario with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, remains below a given reference value.

8.12.2.1.1.2 Test applicability

This test applies to all types of UE release 13 and forward of category NB1.

8.12.2.1.1.3 Minimum conformance requirements

The purpose of these tests is to verify the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). The requirements are specified in Table 8.12.2.1.1.3-1, with the parameters in Table 8.12.2.1-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the performance.

Table 8.12.2.1.1.3-1: Minimum performance NPDCCH

Test number	Deployment mode	Repetition number (R)	Carrier Type	Reference Channel	Propagation Condition	Number of NRS ports	Reference value		UE Category
							Pm-dsg (%)	SNR (dB)	
1	Stand-alone/Guard-band	128	Anchor	R.NB.3 FDD	EPA5	1	1	-4.9	NB1, NB2
2	Stand-alone/Guard-band	1024	Non-anchor	R.NB.3 FDD	ETU1	1	1	-11.4	NB1, NB2

The normative reference for this requirement is TS 36.101 [2] clause 8.12.2.1.1.

8.12.2.1.1.4 Test description

8.12.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of NPDSCH and NPDCCH before measurement are specified in TBD.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Operation mode: Standalone.

Frequencies to be tested: K.2.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.12.2.1.1.3-2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.12.2.1-1 and 8.12.2.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.0.1, H.1.1, H.2.1 and Annex H.4.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 8.12.2.1.1.4.3.

8.12.2.1.1.4.2 Test procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Tables 8.12.2.1-1, 8.12.2.1-2 and 8.12.2.1.1.3-1. The details of NPDCCH are specified in Table A.3.13.1. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition and the SNR according to Tables 8.12.2.1.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL NPUSCH during each subtest. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.12.2.1.1.5-1, UE pass the subtest. Otherwise fail the UE.
4. SS release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Configure the Non-anchor carrier according to table 8.12.2.1.1.4.3-1.
5. Repeat steps from 1 to 3 for subtest 2 in Table 8.12.2.1.1.5-1 as appropriate.

8.12.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 with the following exceptions:

Table 8.12.2.1.1.4.3-1: Configure Non-anchor carrier in subtest 2

Derivation Path: 36.508 Table 8.1.8.2.1.6-1 PhysicalConfigDedicated-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-NB-DEFAULT ::= SEQUENCE {			
carrierConfigDedicated-NB-r13 ::= SEQUENCE {		Non-anchor carrier	
dl-CarrierConfig-r13::= SEQUENCE {			
dl-CarrierFreq-r13	Note 1		
downlinkBitmapNonAnchor-r13	NULL		
dl-GapNonAnchor-r13	NULL		
}			
ul-CarrierConfig-r13 ::= SEQUENCE {			
ul-CarrierFreq-r13	Note 1		
}			
}			
npdcch-ConfigDedicated-r13	NPDCCH-ConfigDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
npusch-ConfigDedicated-r13	NPUSCH-ConfigDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
uplinkPowerControlDedicated-r13	UplinkPowerControlDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
}			
Note 1: The frequency of Non-anchor carrier is located at 200KHz higher from the centre of the anchor carrier.			

8.12.2.1.1.5 Test requirement

For the parameters specified in Tables 8.12.2.1-1 and 8.12.2.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.12.2.1.1.5-1.

Table 8.12.2.1.1.5-1: Test Parameters for NPDCCH performance

Test number	Deployment mode	Repetition number (R_{max})	Operated carrier	Reference Channel	Propagation Condition	Number of NRS ports	Reference value	
							Pm-dsg (%)	SNR (dB)
1	Stand-alone	128	Anchor	R.NB.3 FDD	EPA5	1	1	-4.1
2	Stand-alone	1024	Non-anchor	R.NB.3 FDD	ETU1	1	1	-10.6

8.12.2.1.2 Demodulation of NPDCCH Transmit diversity performance for category NB1

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- Annex G might need update.

8.12.2.1.2.1 Test purpose

This test verifies the demodulation performance of NPDCCH for the transmit diversity scenario with a given SNR for which the average probability of misdetection of the Downlink Scheduling Grant, remains below a given reference value.

8.12.2.1.2.2 Test applicability

This test applies to all types of UE release 13 and forward of category NB1.

8.12.2.1.2.3 Minimum conformance requirements

The requirements are specified in Table 8.12.2.1.2.3-1, with the addition of the parameters in Tables 8.12.2.1-1, 8.12.2.1-2 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the performance.

Table 8.12.2.1.2.3-1: Minimum performance NPDCCH

Test number	Deployment mode	Repetition number (R)	Carrier Type	Reference Channel	Propagation Condition	Number of NRS ports	Reference value		UE Category
							Pm-dsg (%)	SNR (dB)	
1	In-band	64	Anchor	R.NB.4 FDD	EPA5	2	1	-3.9	NB1, NB2
2	In-band	512	Non-anchor	R.NB.4 FDD	ETU1	2	1	-10.0	NB1, NB2

The normative reference for this requirement is TS 36.101 [2] clause 8.12.2.1.2.

8.12.2.1.2.4 Test description

8.12.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of NPDSCH and NPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: K.2.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.12.2.1.2.3-1.

EUTRA Bandwidth is 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1 except for band 31 where 5 MHz bandwidth is used.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Tables 8.12.2.1-1, 8.12.2.1-2 and 8.12.2.1.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.0.1, H.1.1, H.2.1 and Annex H.4.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Message contents are defined in clause 8.12.2.1.2.4.3.

8.12.2.1.2.4.2 Test procedure

1. SS transmits NPDSCH via NPDCCH DCI format N1 for C_RNTI to transmit the DL RMC according to Tables 8.12.2.1-1, 8.12.2.1-2 and 8.12.2.1.2.3-1. The details of NPDCCH are specified in Table A.3.13.1. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition and the SNR according to Tables 8.12.2.1.2.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL NPUCCH during each subtest. Pm-dsg is the

radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.12.2.1.2.5-1, UE pass the subtest. Otherwise fail the UE.

4. SS release the connection through State 3A-NB and finally ensure the UE is in State 2A-NB with CP CIoT Optimisation according to TS 36.508 [7] clause 8.1.5. Configure the Non-anchor carrier according to table 8.12.2.1.2.4.3-2.

5. Repeat steps from 1 to 3 for subtest 2 in Table 8.12.2.1.2.5-1 as appropriate.

8.12.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 8.1.6 and clause 8.1.4.3 using condition "Inband_Different" with the following exceptions:

Table 8.12.2.1.2.4.3-1: *MasterInformationBlock-NB*

Derivation Path: 36.508 Table 8.1.4.3.2-1: MasterInformationBlock-NB			
Information Element	**Value/remark**	**Comment**	**Condition**
MasterInformationBlock-NB ::= SEQUENCE {			
systemFrameNumber-MSB-r13	A valid value as defined in TS 36.331 [17]		
hyperSFN-LSB-r13	A valid value as defined in TS 36.331 [17]		
schedulingInfoSIB1-r13	2	TBS = 208 bits, 16 repetitions	
systemInfoValueTag-r13	0		
ab-Enabled-r13	FALSE		
operationModeInfo-r13 CHOICE {			
inband-DifferentPCI-r13 SEQUENCE {			Inband_Different
eutra-NumCRS-Ports-r13	four		
rasterOffset-r13	khz-2dot5		
spare	'00'B		
}			
}			
}			

Table 8.12.2.1.2.4.3-2: Configure Non-anchor carrier in subtest 2

Derivation Path: 36.508 Table 8.1.8.2.1.6-1 PhysicalConfigDedicated-NB-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-NB-DEFAULT ::= SEQUENCE {			
carrierConfigDedicated-NB-r13 ::= SEQUENCE {		Non-anchor carrier	
dl-CarrierConfig-r13::= SEQUENCE {			
dl-CarrierFreq-r13	Note 1		
downlinkBitmapNonAnchor-r13	NULL		
dl-GapNonAnchor-r13	NULL		
}			
ul-CarrierConfig-r13 ::= SEQUENCE {			
ul-CarrierFreq-r13	Note 1		
}			
}			
npdcch-ConfigDedicated-r13	NPDCCH-ConfigDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
npusch-ConfigDedicated-r13	NPUSCH-ConfigDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
uplinkPowerControlDedicated-r13	UplinkPowerControlDedicated-NB-DEFAULT	See subclause 8.1.6.3 in 36.508	
}			
Note 1: The frequency of the non-anchor carrier is 180KHz higher than the centre of the anchor carrier.			

8.12.2.1.2.5 Test requirement

For the parameters specified in Tables 8.12.2.1-1, 8.12.2.1-2 and 8.12.2.1.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.12.2.1.2.5-1.

Table 8.12.2.1.2.5-1: Test Parameters for NPDCCH performance

Test number	Deployment mode	Repetition number (R_{max})	Operated carrier	Reference Channel	Propagation Condition	Number of NRS ports	Reference value	
							Pm-dsg (%)	SNR (dB)
1	In-band	64	Anchor	R.NB.4 FDD	EPA5	2	1	-3.0
2	In-band	512	Non-anchor	R.NB.4 FDD	ETU1	2	1	-9.1

8.13 Demodulation of PDSCH CA and DC (4 receiver antenna ports)

8.13.1 FDD (CA and DC)

8.13.1.2 Dual-Layer Spatial Multiplexing (User-Specific Reference Symbols)

8.13.1.2.1 Minimum Requirement

For CA with 2 DL CCs, for dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.13.1.2.1-3, based on single carrier requirement specified in Table 8.13.1.2.1-2, with the addition of the parameters in Table 8.13.1.2.1-1 and the downlink physical channel setup according to Annex C.3.2.

For CA with 3 DL CCs, for dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.13.1.2.1-4, based on single carrier requirement specified in Table 8.13.1.2.1-2, with the addition of the parameters in Table 8.13.1.2.1-1 and the downlink physical channel setup according to Annex C.3.2.

For CA with 4 DL CCs, for dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.13.1.2.1-5, based on single carrier requirement specified in Table 8.13.1.2.1-2, with the addition of the parameters in Table 8.13.1.2.1-1 and the downlink physical channel setup according to Annex C.3.2.

For CA with 5 DL CCs, for dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.13.1.2.1-6, based on single carrier requirement specified in Table 8.13.1.2.1-2, with the addition of the parameters in Table 8.13.1.2.1-1 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.13.1.2.1-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Values
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0 and 1
Cell ID			0
CSI reference signals			Antenna ports 15,16
Beamforming model			Annex B.4.2
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2
CSI reference signal configuration			8
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
$\hat{E}_s / N_{oc}$			Reference Value in Table 8.13.1.2.1-2
Symbols for unused PRBs			OCNG (Note 2)
Number of allocated resource blocks (Note 2)		PRB	50
Simultaneous transmission			No
PDSCH transmission mode			9

Note 1: $P_B = 1$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.13.1.2.1-2: Single carrier performance for multiple CA configurations

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.51-2 FDD	R.51-2 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.2	9.0
10 MHz	R.51 FDD	R.51 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	13.7	8.8
15MHz	R.51-3 FDD	R.51-3 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	13.6	8.7
20MHz	R.51-4 FDD	R.51-4 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.3	8.8

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.

Table 8.13.1.2.1-3: Minimum performance (FRC) based on single carrier performance for CA with 2 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	2x10 MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
2	2x20 MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
3	2x5 MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
4	20MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
5	10MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.			

Table 8.13.1.2.1-4: Minimum performance (FRC) based on single carrier performance for CA with 3 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
3	20MHz+20MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
4	20MHz+15MHz+15MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
5	20MHz+15MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
6	20MHz+10MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
7	15MHz+15MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
8	20MHz+10MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
9	20MHz+15MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
10	10MHz+10MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
11	5MHz+5MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
12	3x10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
13	5MHz+5MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.			

Table 8.13.1.2.1-5: Minimum performance (FRC) based on single carrier performance for CA with 4 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
2	10MHz+20MHz+20MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
3	10MHz+10MHz+20MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
4	5MHz+10MHz+20MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
5	5MHz+10MHz+10MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
6	15+3x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
7	2x15+2x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
8	10+15+2x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
9	3x10+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
10	2x5+2x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
11	2x5+10+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
12	4x10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.			

Table 8.13.1.2.1-6: Minimum performance (FRC) based on single carrier performance for CA with 5 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	5x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
2	15MHz+4x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
3	10MHz+4x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
4	2x10MHz+3x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
5	5MHz+10MHz+3x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
6	3x10MHz+2x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
7	4x10MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.			

The normative reference for this requirement is TS 36.101 [2] clause 8.13.1.2.1.

8.13.1.2.2 FDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols) (2DL CA)

8.13.1.2.2.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink

Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.13.1.2.2.2 Test applicability

This test applies to E-UTRA FDD release10 and forward UE of category ≥ 5 which supports inter-band OR intra-band contiguous DL CA and 4 Rx antenna ports.

This test also applies to E-UTRA FDD release 11 and forward UE of category ≥ 5 that supports intra-band non-contiguous DL CA and 4 Rx antenna ports.

8.13.1.2.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.13.1.2.1.

8.13.1.2.2.4 Test description

8.13.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: The maximum aggregated bandwidth in the selected CA configuration, as defined in clause 8.1.2.6.5.

CA Capability to be tested: The CA capability containing the maximum number of 4Rx supported CCs, as defined in clause 8.1.2.6.5.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.85 as appropriate.
2. The parameter settings for the cell are set up according to Table 8.13.1.2.1-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.1.2.2.4.3.

8.13.1.2.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.13.1.2.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.13.1.2.1-2 and 8.13.1.2.1-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.13.1.2.2.5-1 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.

7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.13.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions:

Table 8.13.1.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.8.2.1.6 Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.13.1.2.2.4.3-2: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.13.1.2.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			

Table 8.13.1.2.2.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	2	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	3	Parameter: $I_{\text{CSI-RS}}$	
}			
}			
}			

8.13.1.2.2.5 Test requirement

Table 8.13.1.2.1-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.13.1.2.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.1.2.2.5-1: Test requirement single carrier performance for multiple CA configurations

Band-width	Reference channel		OCNG pattern	Propagation condition	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.51-2 FDD	R.51-2 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	15.1	9.9
10 MHz	R.51 FDD	R.51 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.6	9.7
15MHz	R.51-3 FDD	R.51-3 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.5	9.6
20MHz	R.51-4 FDD	R.51-4 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	15.2	9.7
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.									

Table 8.13.1.2.2.5-2: Test requirement (FRC) based on single carrier performance for CA with 2 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	2x10 MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
2	2x20 MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
3	2x5 MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
4	20MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
5	10MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.1.2.3 FDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols) (3DL CA)

8.13.1.2.3.1 Test purpose

Same test purpose as 8.13.1.2.2.1

8.13.1.2.3.2 Test applicability

This test case applies to all types of E-UTRA FDD release 10 and forward UE of category ≥ 5 that support 3DL Intra-band contiguous CA or 3DL Inter-band CA, or 3DL with Intra-band contiguous and Inter-band CA and 4 Rx antenna ports

This test case also applies to all types of E-UTRA FDD release 11 and forward UE of category ≥ 5 that support 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA and 4 Rx antenna ports.

8.13.1.2.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.13.1.2.1.

8.13.1.2.3.4 Test description

8.13.1.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: The maximum aggregated bandwidth in the selected CA configuration, as defined in clause 8.1.2.6.5.

CA Capability to be tested: The CA capability containing the maximum number of 4Rx supported CCs, as defined in clause 8.1.2.6.5.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.85 as appropriate.
2. The parameter settings for the cell are set up according to Table 8.13.1.2.1-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.1.2.3.4.3.

8.13.1.2.3.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.13.1.2.3.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.13.1.2.1-2 and 8.13.1.2.1-3 on both PCC and SCCs. The SS sends downlink MAC padding bits on the DL RMC.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.13.1.2.3.5-1 as appropriate. BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.

7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5 on each of the component carriers. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.13.1.2.3.4.3 Message contents

Same message contents as 8.13.1.2.4.3

8.13.1.2.3.5 Test requirement

Table 8.13.1.2.1-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.13.1.2.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.1.2.3.5-1: Test requirement single carrier performance for multiple CA configurations

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.51-2 FDD	R.51-2 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	15.1	9.9
10 MHz	R.51 FDD	R.51 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.6	9.7
15MHz	R.51-3 FDD	R.51-3 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.5	9.6
20MHz	R.51-4 FDD	R.51-4 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	15.2	9.7
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. Note 3: SNR corresponds to $\hat{E}_s / N_{oc}$ of Cell 1.									

Table 8.13.1.2.3.5-2: Test requirement (FRC) based on single carrier performance for CA with 3 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	3x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
2	20MHz+20MHz+15MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
3	20MHz+20MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
4	20MHz+15MHz+15MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
5	20MHz+15MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
6	20MHz+10MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
7	15MHz+15MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
8	20MHz+10MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
9	20MHz+15MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
10	10MHz+10MHz+5MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
11	5MHz+5MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
12	3x10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
13	5MHz+5MHz+10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.1.2.4 FDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols) (4DL CA)

8.13.1.2.4.1 Test purpose

Same test purpose as 8.13.1.2.2.1

8.13.1.2.4.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of category ≥ 5 that support 4DL Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA, or 4DL with Intra-band non-contiguous and Inter-band CA, or 4DL with Intra-band non-contiguous and Intra-band contiguous CA or 4DL with Intra-band non-contiguous and Intra-band non-contiguous CA and 4 Rx antenna ports.

8.13.1.2.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.13.1.2.1.

8.13.1.2.4.4 Test description

8.13.1.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: The maximum aggregated bandwidth in the selected CA configuration, as defined in clause 8.1.2.6.5.

CA Capability to be tested: The CA capability containing the maximum number of 4Rx supported CCs, as defined in clause 8.1.2.6.5.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.85 as appropriate.
2. The parameter settings for the cell are set up according to Table 8.13.1.2.1-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.1.2.4.4.3.

8.13.1.2.4.4.2 Test procedure

Same test procedure as in clause 8.13.1.2.3.4.2 with the following exceptions:

- Instead of Table 8.13.1.2.3.5-1 → use Table 8.13.1.2.4.5-1

8.13.1.2.4.4.3 Message contents

Same message contents as 8.13.1.2.2.4.3

8.13.1.2.4.5 Test requirement

Table 8.13.1.2.1-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.13.1.2.4.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.1.2.4.5-1: Test requirement single carrier performance for multiple CA configurations

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.51-2 FDD	R.51-2 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	15.1	9.9
10 MHz	R.51 FDD	R.51 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.6	9.7
15MHz	R.51-3 FDD	R.51-3 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.5	9.6
20MHz	R.51-4 FDD	R.51-4 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	15.2	9.7
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. Note 3: SNR corresponds to $\hat{E}_s/N_{oc}$ of Cell 1.									

Table 8.13.1.2.4.5-2: Test requirement (FRC) based on single carrier performance for CA with 4 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	4x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
2	10MHz+20MHz+20MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
3	10MHz+10MHz+20MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
4	5MHz+10MHz+20MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
5	5MHz+10MHz+10MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
6	15+3x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
7	2x15+2x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
8	10+15+2x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
9	3x10+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
10	2x5+2x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
11	2x5+10+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
12	4x10MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	≥8
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.1.2.5 FDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols) (5DL CA)

8.13.1.2.5.1 Test purpose

Same test purpose as 8.13.1.2.2.1

8.13.1.2.5.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of category 8, 11 or higher that support 5DL with Intra-band contiguous and Inter-band CA, or 5DL with Intra-band non-contiguous and Inter-band CA, or 5DL with Intra-band non-contiguous and Intra-band contiguous CA and 4 Rx antenna ports.
This test case also applies to all types of E-UTRA FDD release 12 and forward UE of category 8, 11 or higher that support 5DL with Inter-band CA and 4 Rx antenna ports.

8.13.1.2.5.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 8.13.1.2.1.

8.13.1.2.5.4 Test description

8.13.1.2.5.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: The maximum aggregated bandwidth in the selected CA configuration, as defined in clause 8.1.2.6.5.

CA Capability to be tested: The CA capability containing the maximum number of 4Rx supported CCs, as defined in clause 8.1.2.6.5.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.85 as appropriate.
2. The parameter settings for the cell are set up according to Table 8.13.1.2.1-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.1.2.5.4.3.

8.13.1.2.5.4.2 Test procedure

Same test procedure as in clause 8.13.1.2.3.4.2 with the following exceptions:

- Instead of Table 8.13.1.2.3.5-1 → use Table 8.13.1.2.5.5-1

8.13.1.2.5.4.3 Message contents

Same message contents as 8.13.1.2.2.4.3

8.13.1.2.5.5 Test requirement

Table 8.13.1.2.1-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2.2 for the throughput test shall meet or exceed the specified value in Table 8.13.1.2.5.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.1.2.5.5-1: Test requirement single carrier performance for multiple CA configurations

Band-width	Reference channel		OCNG pattern	Propagation condition	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.51-2 FDD	R.51-2 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	15.1	9.9
10 MHz	R.51 FDD	R.51 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.6	9.7
15MHz	R.51-3 FDD	R.51-3 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	14.5	9.6
20MHz	R.51-4 FDD	R.51-4 FDD	OP.1 FDD	ETU5	2x2 Low	2x4 Low	70	15.2	9.7
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent. Note 2: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. Note 3: SNR corresponds to $\hat{E}_s/N_{oc}$ of Cell 1.									

Table 8.13.1.2.5.5-2: Test requirement (FRC) based on single carrier performance for CA with 5 DL CCs

Test num.	CA Band-width combination	Requirement	UE category
1	5x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
2	15MHz+4x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
3	10MHz+4x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
4	2x10MHz+3x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
5	5MHz+10MHz+3x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
6	3x10MHz+2x20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
7	4x10MHz+20MHz	As specified in Table 8.13.1.2.1-2 per CC depending on either 2Rx CC or 4Rx CC	8, ≥11
NOTE 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.			

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.2

8.13.3

8.13.3.1

8.13.3.2

8.13.3.3 Enhanced Performance Requirements Type A Closed-loop spatial multiplexing

8.13.3.3.1 TDD-FDD CA PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model-Enhanced Performance Requirement Type A for FDD Pcell (2DL CA)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Test requirements including the test tolerance in Annex F

- Minimum test time in Annex G

8.13.3.3.1.1 Test purpose

To verify the closed loop rank-one performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 4 interference model defined in clause B.5.3.

8.13.3.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support 4 Rx antenna ports and enhanced receiver Type A and E-UTRA FDD and TDD and 2DL CA with FDD as PCELL in any FDD or TDD RF band.

8.13.3.3.1.3 Minimum conformance requirements

In Table 8.13.3.3.1.3-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2, respectively.

For TDD FDD CA with FDD PCell and with 2 DL CCs, the requirements are specified in Table 8.13.3.3.1.3-4, based on single carrier requirement specified in Table 8.13.3.3.1.3-2 and Table 8.13.3.3.1.3-3, with the addition of the parameters in Table 8.13.3.3.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.13.3.3.1.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model for CA

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	0

Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
Cell Id			0	1
PDSCH transmission mode			6	4
Interference model			N/A	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80
	Rank 2	%	N/A	20
Precoding granularity		PRB	25 for 5MHz CCs, 50 for 10MHz CCs, 75 for 15MHz and 100 for 20MHz CCs	4 for 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 4)	FDD CC	ms	8	N/A
	TDD CC	ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			1111	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Note 6: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for tests with 2 CCs.

Table 8.13.3.3.1.3-2: Single carrier performance for Enhanced Performance Requirement Type A for FDD PCell and SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC
5MHz	R.47-1 FDD	R.47-1 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-3.0]
10 MHz	R.47 FDD	R.47 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.0]	[-2.7]
15MHz	R.47-2 FDD	R.47-2 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-2.9]
20MHz	R.47-3 FDD	R.47-3 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.1]	[-2.8]

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Table 8.13.3.3.1.3-3: Single carrier performance for Enhanced Performance Requirement Type A for TDD SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
										2Rx CC	4Rx CC
5MHz	R.47-1 TDD	R.47-1 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-2.8]
10 MHz	R.47 TDD	R.47 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.3]	[-2.5]
15MHz	R.47-2 TDD	R.47-2 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.0]	[-2.7]
20MHz	R.47-3 TDD	R.47-3 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.3]	[-2.3]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.3.1.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.3.1.3-2 and Table 8.13.3.3.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.3.1.3-2 and Table 8.13.3.3.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.3.1.3-2 and Table 8.13.3.3.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

The normative reference for this requirement is TS 36.101 [2] clause 8.13.3.3.

8.13.3.3.1.4 Test description

8.13.3.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.13.3.3.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.13.3.3.1.4.1-1.

Table 8.13.3.3.1.4.1-1: Test point selection for TM4 TDD FDD 2DL CA for FDD PCell

CA Capability	Bandwidth Combination		
	20+20	10+20	15+20
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test3

Note 1:	One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.X2.
2. The parameter settings for the cell are set up according to Table [8.13.3-1] and 8.13.3.3.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.3.3.1.4.3.

8.13.3.3.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.13.3.3.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to Tables 8.13.3.3.1.3-1, 8.13.3.3.1.3-2 and 8.13.3.3.1.3-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1, #4, #6 and #9 (Table A.2.2.1.2-1).

5. Set the parameters of the reference channel, MCS, the propagation condition, the correlation matrix and the SNR according to Tables 8.13.3.3.1.5-2 and 8.13.3.3.1.5-3 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.13.3.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.13.3.3.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.13.3.3.1.4.3-2: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm6		
codebookSubsetRestriction-r10	1111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfig-r10-DEFAULT		
}			
}			

Table 8.13.3.3.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r10	Not present		
}			

Table 8.13.3.3.1.4.3-4: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	2		Pcell
	5		Scell
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.13.3.3.1.5 Test requirement

Tables 8.13.3.3.1.5-2 and 8.13.3.3.1.5-3 define the primary level settings.

For TDD FDD CA with FDD PCell and 2DL CCs, the requirements are specified in Table 8.13.3.3.1.5-4 based on single carrier requirement specified in Table 8.13.3.3.1.5-2 and Table 8.13.3.3.1.5-3.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.13.3.3.1.5-2 and 8.13.3.3.1.5-3 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.3.3.1.5-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model for CA

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
Cell Id			0	1
PDSCH transmission mode			6	4
Interference model			N/A	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80
	Rank 2	%	N/A	20
Precoding granularity		PRB	25 for 5MHz CCs, 50 for 10MHz CCs, 75 for 15MHz and 100 for 20MHz CCs	4 for 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 4)	FDD CC	ms	8	N/A
	TDD CC	ms	10 or 11	N/A

Reporting interval	ms	5	N/A
Reporting mode		PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap		1111	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Note 6: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for tests with 2 CCs.

Table 8.13.3.3.1.5-2: Single carrier performance for Enhanced Performance Requirement Type A for FDD PCell and SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
										2Rx CC	4Rx CC
5MHz	R.47-1 FDD	R.47-1 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-3.0]
10 MHz	R.47 FDD	R.47 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.0]	[-2.7]
15MHz	R.47-2 FDD	R.47-2 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-2.9]
20MHz	R.47-3 FDD	R.47-3 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.1]	[-2.8]

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Table 8.13.3.3.1.5-3: Single carrier performance for Enhanced Performance Requirement Type A for TDD SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
										2Rx CC	4Rx CC
5MHz	R.47-1 TDD	R.47-1 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-2.8]
10 MHz	R.47 TDD	R.47 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.3]	[-2.5]
15MHz	R.47-2 TDD	R.47-2 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.0]	[-2.7]
20MHz	R.47-3 TDD	R.47-3 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.3]	[-2.3]

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Table 8.13.3.3.1.5-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.3.1.5-2 and Table 8.13.3.3.1.5-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.3.1.5-2 and Table 8.13.3.3.1.5-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.3.1.5-2 and Table 8.13.3.3.1.5-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.3.3.2 TDD-FDD CA PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model-Enhanced Performance Requirement Type A for TDD Pcell (2DL CA)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Test requirements including the test tolerance in Annex F

- Minimum test time in Annex G

8.13.3.3.2.1 Test purpose

To verify the closed loop rank-one performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 4 interference model defined in clause B.5.3.

8.13.3.3.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support 4 Rx antenna ports and enhanced receiver Type A and E-UTRA FDD and TDD and 2DL CA with TDD as PCELL in any FDD or TDD RF band.

8.13.3.3.2.3 Minimum conformance requirements

In Table 8.13.3.3.2.3-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2, respectively.

For TDD FDD CA with TDD PCell and with 2 DL CCs, the requirements are specified in Table 8.13.3.3.2.3-4, based on single carrier requirement specified in Table 8.13.3.3.2.3-2 and Table 8.13.3.3.2.3-3, with the addition of the parameters in Table 8.13.3.3.2.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.13.3.3.2.3-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model for CA

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	0

Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
Cell Id			0	1
PDSCH transmission mode			6	4
Interference model			N/A	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80
	Rank 2	%	N/A	20
Precoding granularity		PRB	25 for 5MHz CCs, 50 for 10MHz CCs, 75 for 15MHz and 100 for 20MHz CCs	4 for 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 4)	FDD CC	ms	8	N/A
	TDD CC	ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			1111	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Note 6: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for tests with 2 CCs.

Table 8.13.3.3.2.3-2: Single carrier performance for Enhanced Performance Requirement Type A for FDD SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC
5MHz	R.47-1 FDD	R.47-1 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-3.0]
10 MHz	R.47 FDD	R.47 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.0]	[-2.7]
15MHz	R.47-2 FDD	R.47-2 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-2.9]
20MHz	R.47-3 FDD	R.47-3 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.1]	[-2.8]

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Table 8.13.3.3.2.3-3: Single carrier performance for Enhanced Performance Requirement Type A for TDD PCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC
5MHz	R.47-1 TDD	R.47-1 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-2.8]
10 MHz	R.47 TDD	R.47 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.3]	[-2.5]
15MHz	R.47-2 TDD	R.47-2 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.0]	[-2.7]
20MHz	R.47-3 TDD	R.47-3 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.3]	[-2.3]

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Table 8.13.3.3.2.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.3.2.3-2 and Table 8.13.3.3.2.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.3.2.3-2 and Table 8.13.3.3.2.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.3.2.3-2 and Table 8.13.3.3.2.3-3 per CC	≥5

Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.

The normative reference for this requirement is TS 36.101 [2] clause 8.13.3.3.

8.13.3.3.2.4 Test description

8.13.3.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.13.3.3.2.4.1-1.

CA Capability to be tested: Select one according to Table 8.13.3.3.2.4.1-1.

Table 8.13.3.3.2.4.1-1: Test point selection for TM4 TDD FDD 2DL CA for TDD PCell

CA Capability	Bandwidth Combination		
	20+20	10+20	15+20
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test3

Note 1:	One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.X2.
2. The parameter settings for the cell are set up according to Table [8.13.3-1] and 8.13.3.3.2.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.3.3.2.4.3.

8.13.3.3.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.13.3.3.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to Tables 8.13.3.3.2.3-1, 8.13.3.3.2.3-2 and 8.13.3.3.1.3-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1, #4, #6 and #9 (Table A.2.3.1.2-1).

5. Set the parameters of the reference channel, MCS, the propagation condition, the correlation matrix and the SNR according to Tables 8.13.3.3.2.5-2 and 8.13.3.3.2.5-3 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.13.3.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.13.3.3.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 8.13.3.3.2.4.3-2: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm6		
codebookSubsetRestriction-r10	1111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfig-r10-DEFAULT		
}			
}			

Table 8.13.3.3.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r10	Not present		
}			

Table 8.13.3.3.2.4.3-4: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	4		Pcell
	3		Scell
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

8.13.3.3.2.5 Test requirement

Tables 8.13.3.3.2.5-2 and 8.13.3.3.2.5-3 define the primary level settings.

For TDD FDD CA with TDD PCell and 2DL CCs, the requirements are specified in Table 8.13.3.3.2.5-4 based on single carrier requirement specified in Table 8.13.3.3.2.5-2 and Table 8.13.3.3.2.5-3.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.13.3.3.2.5-2 and 8.13.3.3.2.5-3 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.3.3.2.5-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model for CA

Parameter		**Unit**	**Cell 1**	**Cell 2**
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	0
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
Cell Id			0	1
PDSCH transmission mode			6	4
Interference model			N/A	As specified in clause B.5.3
Probability of occurrence of transmission rank in interfering cells	Rank 1	%	N/A	80
	Rank 2	%	N/A	20
Precoding granularity		PRB	25 for 5MHz CCs, 50 for 10MHz CCs, 75 for 15MHz and 100 for 20MHz CCs	4 for 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 4)	FDD CC	ms	8	N/A
	TDD CC	ms	10 or 11	N/A

Reporting interval	ms	5	N/A
Reporting mode		PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap		1111	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: Cell 1 is the serving cell. Cell 2 is the interfering cell.

Note 4: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 5: All cells are time-synchronous.

Note 6: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for tests with 2 CCs.

Table 8.13.3.3.2.5-2: Single carrier performance for Enhanced Performance Requirement Type A for FDD SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC
5MHz	R.47-1 FDD	R.47-1 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-3.0]
10 MHz	R.47 FDD	R.47 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.0]	[-2.7]
15MHz	R.47-2 FDD	R.47-2 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-2.9]
20MHz	R.47-3 FDD	R.47-3 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.1]	[-2.8]

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}$´ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Table 8.13.3.3.2.5-3: Single carrier performance for Enhanced Performance Requirement Type A for TDD PCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC
5MHz	R.47-1 TDD	R.47-1 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.8]	[-2.8]
10 MHz	R.47 TDD	R.47 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.3]	[-2.5]
15MHz	R.47-2 TDD	R.47-2 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.0]	[-2.7]
20MHz	R.47-3 TDD	R.47-3 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[1.3]	[-2.3]

Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.

Note 2: SINR corresponds to $\hat{E}_s / N_{oc}$´ of Cell 1 as defined in clause 8.1.1.

Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.

Table 8.13.3.3.2.5-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.3.2.5-2 and Table 8.13.3.3.2.5-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.3.2.5-2 and Table 8.13.3.3.2.5-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.3.2.5-2 and Table 8.13.3.3.2.5-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.3.4 Enhanced Performance Requirements Type A – Single-layer Spatial Multiplexing (User-Specific Reference Symbols)

8.13.3.4.1 TDD-FDD CA PDSCH Single-layer Spatial Multiplexing 2x4 on antenna ports 7 or 8 with TM9 Interference Model-Enhanced Performance Requirement Type A for FDD Pcell (2DL CA)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Test requirements including the test tolerance in Annex F

- Minimum test time in Annex G

8.13.3.4.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4.

8.13.3.4.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support 4 Rx antenna ports and enhanced receiver Type A and E-UTRA FDD and TDD and 2DL CA with FDD as PCELL in any FDD or TDD RF band. Applicability requires support for FGI bit 103.

8.13.3.4.1.3 Minimum conformance requirements

In Table 8.13.3.4.1.3-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2, respectively.

For TDD FDD CA with FDD PCell with 2 DL CCs, the requirements are specified in Table 8.13.3.4.1.3-4, based on single carrier requirement specified in Table 8.13.3.4.1.3-2 and Table 8.13.3.4.1.3-3, with the addition of the parameters in Table 8.13.3.4.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.13.3.4.1.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model for CA

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3

Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}	FDD CC	Subframes	5 / 2	N/A
	TDD CC		5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
Cell Id			0	126
PDSCH transmission mode			9	9
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30

Precoder update granularity		PRB	25 for 5MHz CCs, 50 for 10MHz CCs, 75 for 15MHz and 100 for 20MHz CCs	4 for 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 5)	FDD CC	Ms	8	N/A
	TDD CC		10 or 11	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) used for the input signal under test	N/A
Physical channel for CQI reporting			PUSCH(Note 8)	N/A
cqi-pmi-ConfigurationIndex	FDD CC		5	N/A
	TDD CC		4	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 6: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 7: All cells are time-synchronous.

Note 8: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3 for TDD CCs, and PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2 for FDD CCs.

Note 9: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for tests with 2 CCs.

Table 8.13.3.4.1.3-2: Single carrier performance for Enhanced Performance Requirement Type A, CDM-multiplexed DM RS for FDD PCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC

5MHz	R.76-1 FDD	R.76-4 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.2]
10 MHz	R.76 FDD	R.76-5 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.1]	[-2.0]
15MHz	R.76-2 FDD	R.76-6 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.2]	[-2.1]
20MHz	R.76-3 FDD	R.76-7 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.0]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.4.1.3-3: Single carrier performance for Enhanced Performance Requirement Type A, CDM-multiplexed DM RS for TDD SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
										2Rx CC	4Rx CC
5MHz	R.76-1 TDD	R.76-4 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.6]	[-2.7]
10 MHz	R.76 TDD	R.76-5 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.1]	[-2.4]
15MHz	R.76-2 TDD	R.76-6 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.2]	[-2.6]
20MHz	R.76-3 TDD	R.76-7 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.5]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.4.1.3-4: Minimum performance (FRC) based on single carrier performance for CA with 2 DL CCs

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.4.1.3-2 and Table 8.13.3.4.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.4.1.3-2 and Table 8.13.3.4.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.4.1.3-2 and Table 8.13.3.4.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

The normative reference for this requirement is TS 36.101 [2] clause 8.13.3.4.

8.13.3.4.1.4 Test description

8.13.3.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.13.3.4.1.4.1-1.

CA Capability to be tested: Select one according to Table 8.13.3.4.1.4.1-1.

Table 8.13.3.4.1.4.1-1: Test point selection for TM9 TDD FDD 2DL CA for FDD PCell

CA Capability	Bandwidth Combination		
	20+20	10+20	15+20
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test3
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.			

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.X2.

2. The parameter settings for the cell are set up according to Table [8.13.3-1] and 8.13.3.4.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.3.4.1.4.3.

8.13.3.4.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.13.3.4.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.13.3.4.1.3-1, 8.13.3.4.1.3-2 and 8.13.3.4.1.3-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3, #4, #8 and #9 (Table A.2.2.1.2-1).

5. Set the parameters of the reference channel, MCS, the propagation condition, the correlation matrix and the SNR according to Tables 8.13.3.4.1.5-2 and 8.13.3.4.1.5-3 as appropriate.
BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.3 and precoder update granularity specified in Table 8.13.3.4.1.5-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.3.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.13.3.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.13.3.4.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.13.3.4.1.4.3-2: *AntennaInfoDedicated-r10-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	001111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.13.3.4.1.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo			
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10-DEFAULT		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.13.3.4.1.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10-DEFAULT		
}			
}			
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfig-r10-DEFAULT		
}			
}			

Table 8.13.3.4.1.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r10	Not present		
}			

Table 8.13.3.4.1.4.3-6: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	5		Pcell
	4		Scell
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 8.13.3.4.1.4.3-7: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; $T_{\text{CSI-RS}} = 5$; Parameter: $I_{\text{CSI-RS}}$	PCell
	4		SCell
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

8.13.3.4.1.5 Test requirement

Tables 8.13.3.4.1.5-2 and 8.13.3.4.1.5-3 define the primary level settings.

For TDD FDD CA with FDD PCell and 2DL CCs, the requirements are specified in Table 8.13.3.4.1.5-4 based on single carrier requirement specified in Table 8.13.3.4.1.5-2 and Table 8.13.3.4.1.5-3.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.13.3.4.1.5-2 and 8.13.3.4.1.5-3 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.3.4.1.5-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model for CA

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3

Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}	FDD CC	Subframes	5 / 2	N/A
	TDD CC		5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
Cell Id			0	126
PDSCH transmission mode			9	9
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30

Precoder update granularity		PRB	25 for 5MHz CCs, 50 for 10MHz CCs, 75 for 15MHz and 100 for 20MHz CCs	4 for 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 5)	FDD CC	Ms	8	N/A
	TDD CC		10 or 11	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) used for the input signal under test	N/A
Physical channel for CQI reporting			PUSCH(Note 8)	N/A
cqi-pmi-ConfigurationIndex	FDD CC		5	N/A
	TDD CC		4	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 6: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 7: All cells are time-synchronous.

Note 8: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3 for TDD CCs, and PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2 for FDD CCs.

Note 9: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for tests with 2 CCs.

Table 8.13.3.4.1.5-2: Single carrier performance for Enhanced Performance Requirement Type A, CDM-multiplexed DM RS for FDD PCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC

5MHz	R.76-1 FDD	R.76-4 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.2]
10 MHz	R.76 FDD	R.76-5 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.1]	[-2.0]
15MHz	R.76-2 FDD	R.76-6 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.2]	[-2.1]
20MHz	R.76-3 FDD	R.76-7 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.0]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.4.1.5-3: Single carrier performance for Enhanced Performance Requirement Type A, CDM-multiplexed DM RS for TDD SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC
5MHz	R.76-1 TDD	R.76-4 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.6]	[-2.7]
10 MHz	R.76 TDD	R.76-5 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.1]	[-2.4]
15MHz	R.76-2 TDD	R.76-6 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.2]	[-2.6]
20MHz	R.76-3 TDD	R.76-7 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.5]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.4.1.5-4: Minimum performance (FRC) based on single carrier performance for CA with 2 DL CCs

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.4.1.5-2 and Table 8.13.3.4.1.5-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.4.1.5-2 and Table 8.13.3.4.1.5-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.4.1.5-2 and Table 8.13.3.4.1.5-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.3.4.2 TDD-FDD CA PDSCH Single-layer Spatial Multiplexing 2x4 on antenna ports 7 or 8 with TM9 Interference Model-Enhanced Performance Requirement Type A for TDD Pcell (2DL CA)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Test requirements including the test tolerance in Annex F

- Minimum test time in Annex G

8.13.3.4.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4.

8.13.3.4.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support 4 Rx antenna ports and enhanced receiver Type A and E-UTRA FDD and TDD and 2DL CA with TDD as PCELL in any FDD or TDD RF band. Applicability requires support for FGI bit 103.

8.13.3.4.2.3 Minimum conformance requirements

In Table 8.13.3.4.2.3-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2, respectively.

For TDD FDD CA with TDD PCell with 2 DL CCs, the requirements are specified in Table 8.13.3.4.2.3-4, based on single carrier requirement specified in Table 8.13.3.4.2.3-2 and Table 8.13.3.4.2.3-3, with the addition of the parameters in Table 8.13.3.4.2.3-1 and the downlink physical channel setup according to Annex C.3.2.

Table 8.13.3.4.2.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model for CA

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}	FDD CC	Subframes	5 / 2	N/A
	TDD CC		5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
Cell Id			0	126
PDSCH transmission mode			9	9
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30

Precoder update granularity		PRB	25 for 5MHz CCs, 50 for 10MHz CCs, 75 for 15MHz and 100 for 20MHz CCs	4 for 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 5)	FDD CC	Ms	8	N/A
	TDD CC		10 or 11	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) used for the input signal under test	N/A
Physical channel for CQI reporting			PUSCH(Note 8)	N/A
cqi-pmi-ConfigurationIndex	FDD CC		3	N/A
	TDD CC		4	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 6: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 7: All cells are time-synchronous.

Note 8: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3 for TDD CCs, and PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2 for FDD CCs.

Note 9: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for tests with 2 CCs.

Table 8.13.3.4.2.3-2: Single carrier performance for Enhanced Performance Requirement Type A, CDM-multiplexed DM RS for FDD SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
										2Rx CC	4Rx CC

5MHz	R.76-1 FDD	R.76-4 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.2]
10 MHz	R.76 FDD	R.76-5 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.1]	[-2.0]
15MHz	R.76-2 FDD	R.76-6 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.2]	[-2.1]
20MHz	R.76-3 FDD	R.76-7 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.0]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.4.2.3-3: Single carrier performance for Enhanced Performance Requirement Type A, CDM-multiplexed DM RS for TDD PCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2			Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
							2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.76-1 TDD	R.76-4 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.6]	[-2.7]
10 MHz	R.76 TDD	R.76-5 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.1]	[-2.4]
15MHz	R.76-2 TDD	R.76-6 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.2]	[-2.6]
20MHz	R.76-3 TDD	R.76-7 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.5]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.4.2.3-4: Minimum performance (FRC) based on single carrier performance for CA with 2 DL CCs

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.4.2.3-2 and Table 8.13.3.4.2.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.4.2.3-2 and Table 8.13.3.4.2.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.4.2.3-2 and Table 8.13.3.4.2.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

The normative reference for this requirement is TS 36.101 [2] clause 8.13.3.4.

8.13.3.4.2.4 Test description

8.13.3.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum WGap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 8.13.3.4.2.4.1-1.

CA Capability to be tested: Select one according to Table 8.13.3.4.2.4.1-1.

Table 8.13.3.4.2.4.1-1: Test point selection for TM9 TDD FDD 2DL CA for TDD PCell

CA Capability	Bandwidth Combination		
	20+20	10+20	15+20
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test3
Note 1: One test point per UE supported CA capability is tested. For each UE supported CA capability, select the largest aggregated CA bandwidth combination supported by the UE within the chosen CA capability.			

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.X2.

2. The parameter settings for the cell are set up according to Table [8.13.3-1] and 8.13.3.4.2.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.3.4.1.4.3.

8.13.3.4.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.13.3.4.2.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.13.3.4.2.3-1, 8.13.3.4.2.3-2 and 8.13.3.4.2.3-3 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1, #4, #6 and #9 (Table A.2.3.1.2-1).

5. Set the parameters of the reference channel, MCS, the propagation condition, the correlation matrix and the SNR according to Tables 8.13.3.4.2.5-2 and 8.13.3.4.2.5-3 as appropriate.
BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.3 and precoder update granularity specified in Table 8.13.3.4.2.5-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.3.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5, on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.13.3.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.13.3.4.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.13.3.4.2.4.3-2: *AntennaInfoDedicated-r10-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	001111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 8.13.3.4.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo			
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10-DEFAULT		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 8.13.3.4.2.4.3-4: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10-DEFAULT		
}			
}			
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfig-r10-DEFAULT		
}			
}			

Table 8.13.3.4.2.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r10	Not present		
}			

Table 8.13.3.4.2.4.3-6: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3		Pcell
	4		Scell
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 8.13.3.4.2.4.3-7: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; $T_{\text{CSI-RS}} = 5$; Parameter: $I_{\text{CSI-RS}}$	PCell
	2		SCell
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

8.13.3.4.2.5 Test requirement

Tables 8.13.3.4.2.5-2 and 8.13.3.4.2.5-3 define the primary level settings.

For TDD FDD CA with TDD PCell and 2DL CCs, the requirements are specified in Table 8.13.3.4.2.5-4 based on single carrier requirement specified in Table 8.13.3.4.2.5-2 and Table 8.13.3.4.2.5-3.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.13.3.4.2.5-2 and 8.13.3.4.2.5-3 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.3.4.2.5-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model for CA

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3

Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}	FDD CC	Subframes	5 / 2	N/A
	TDD CC		5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
Cell Id			0	126
PDSCH transmission mode			9	9
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30

Precoder update granularity		PRB	25 for 5MHz CCs, 50 for 10MHz CCs, 75 for 15MHz and 100 for 20MHz CCs	4 for 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 5)	FDD CC	Ms	8	N/A
	TDD CC		10 or 11	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			001111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) used for the input signal under test	N/A
Physical channel for CQI reporting			PUSCH(Note 8)	N/A
cqi-pmi-ConfigurationIndex	FDD CC		3	N/A
	TDD CC		4	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 6: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 7: All cells are time-synchronous.

Note 8: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3 for TDD CCs, and PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2 for FDD CCs.

Note 9: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured for tests with 2 CCs.

Table 8.13.3.4.2.5-2: Single carrier performance for Enhanced Performance Requirement Type A, CDM-multiplexed DM RS for FDD SCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
										2Rx CC	4Rx CC

5MHz	R.76-1 FDD	R.76-4 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.2]
10 MHz	R.76 FDD	R.76-5 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[0.1]	[-2.0]
15MHz	R.76-2 FDD	R.76-6 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.2]	[-2.1]
20MHz	R.76-3 FDD	R.76-7 FDD	OP.1 FDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.0]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.4.2.5-3: Single carrier performance for Enhanced Performance Requirement Type A, CDM-multiplexed DM RS for TDD PCell (FRC)

Band-width	Reference Channel		OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)		Reference Value		
	2Rx CC	4Rx CC	Cell 1	Cell 2	Cell 1	Cell 2	2Rx CC	4Rx CC	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2) 2Rx CC	SINR (dB) (Note 2) 4Rx CC
5MHz	R.76-1 TDD	R.76-4 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.6]	[-2.7]
10 MHz	R.76 TDD	R.76-5 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.1]	[-2.4]
15MHz	R.76-2 TDD	R.76-6 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.2]	[-2.6]
20MHz	R.76-3 TDD	R.76-7 TDD	OP.1 TDD	N/A	EVA5	EVA5	2x2 Low	2x4 Low	70	[-0.4]	[-2.5]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.											
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.											
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.											

Table 8.13.3.4.2.5-4: Minimum performance (FRC) based on single carrier performance for CA with 2 DL CCs

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.4.2.5-2 and Table 8.13.3.4.2.5-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.4.2.5-2 and Table 8.13.3.4.2.5-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.4.2.5-2 and Table 8.13.3.4.2.5-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.3.5

8.13.3.6 Closed-loop spatial multiplexing performance 4Tx Antenna Port with 256QAM

8.13.3.6.1 TDD-FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x4 with 256QAM for FDD PCell (2DL CA)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Test requirements including the test tolerance in Annex F

- Minimum test time in Annex G

8.13.3.6.1.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.13.3.6.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support 4 Rx antenna ports and E-UTRA FDD and TDD and 2DL CA and 256QAM in DL with FDD as PCell in any FDD or TDD RF band.

8.13.3.6.1.3 Minimum conformance requirements

For TDD FDD CA with FDD PCell and 2DL CCs, the requirements are specified in Table 8.13.3.6.1.3-4 based on single carrier requirement specified in Table 8.13.3.6.1.3-2 and Table 8.13.3.6.1.3-3, with the addition of the parameters in Table 8.13.3.6.1.3-1 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.13.3.6.1.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	Wideband precoding for 1.4MHz, 4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)	FDD CC	ms	8
	TDD CC	ms	10 or 11
Reporting interval	FDD CC	ms	1
	TDD CC	ms	1 or 4 (Note 3)

Reporting mode		PUSCH 1-2
CodeBookSubsetRestriction bitmap		00000000000000000000000000000000111111111111111111100000000000000000
CSI request field (Note 3)		'10'
PDSCH transmission mode		4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.
Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.13.3.6.1.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.72-1 FDD	R.72-1 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[23.4]	[19.3]
10 MHz	R.72 FDD	R.72 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.6]	[18.0]
15MHz	R.72-2 FDD	R.72-2 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.7]	[17.4]
20MHz	R.72-3 FDD	R.72-3 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.8]	[17.5]

Table 8.13.3.6.1.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.72-1 TDD	R.72-1 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[22.4]	[18.0]
10 MHz	R.72 TDD	R.72 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.4]	[17.5]
15MHz	R.72-2 TDD	R.72-2 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.5]	[17.1]
20MHz	R.72-3 TDD	R.72-3 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.6]	[17.2]

Table 8.13.3.6.1.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.6.1.3-2 and Table 8.13.3.6.1.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.6.1.3-2 and Table 8.13.3.6.1.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.6.1.3-2 and Table 8.13.3.6.1.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

The normative reference for this requirement is TS 36.101 [2] clause 8.13.3.6.

8.13.3.6.1.4 Test description

8.13.3.6.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: The maximum aggregated bandwidth in the selected CA configuration, as defined in clause 8.1.2.6.5.

CA Capability to be tested: The CA capability containing the maximum number of 4Rx supported CCs, as defined in clause 8.1.2.6.5.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.87.
2. The parameter settings for Pcell are set up according to Tables [8.13.3-1] and 8.13.3.6.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.3.6.1.4.3.

8.13.3.6.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.13.3.6.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.13.3.6.1.3-1 and 8.13.3.6.1.3-2 or 8.13.3.6.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.
5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to ‘10’ and I_MCS=29 and N_PRB allocated to be less or equal to 20.
6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.13.3.6.1.5-1 or 8.13.3.6.1.5-2 as appropriate.
7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.13.3.6.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions:

Table 8.13.3.6.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.13.3.6.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
cqi-ReportConfigPCell-v1250	CQI-ReportConfig-v1250-DEFAULT		DL 256QAM
}			

Table 8.13.3.6.1.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000 00000000000011111111 11111111000000000000 0000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
cqi-ReportConfigSCell-v1250	CQI-ReportConfig-v1250-DEFAULT		DL 256QAM
}			

Table 8.13.3.6.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.13.3.6.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			RBC
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.13.3.6.1.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.13.3.6.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.13.3.6.1.4.3-7: CQI-ReportConfig-v1250-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1250 ::= SEQUENCE {			
csi-SubframePatternConfig-r12 CHOICE {			
release	NULL		
}			
cqiCQI-ReportBoth-v1250	Not present		
cqi-ReportAperiodic-v1250	Not present		
altCQI-Table-r12	allSubframes		DL 256QAM
}			

Table 8.13.3.6.1.4.3-8: *PUSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.13.3.6.1.5 Test requirement

Tables 8.13.3.6.1.5-1 and 8.13.3.6.1.5-2 define the primary level settings.

For TDD FDD CA with FDD PCell and 2DL CCs, the requirements are specified in Table 8.13.3.6.1.5-3 based on single carrier requirement specified in Table 8.13.3.6.1.5-1 and Table 8.13.3.6.1.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.13.3.6.1.5-1 or 8.13.3.6.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.3.6.1.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD PCell and SCell (FRC)

Band-width	**Reference channel**		**OCNG pattern**	**Propa-gation condi-tion**	**Correlation matrix and antenna config.**		**Reference value**		
							Fraction of maximum throughput (%)	**SNR (dB)**	
	2Rx CC	**4Rx CC**			**2Rx CC**	**4Rx CC**		**2Rx CC**	**4Rx CC**
5MHz	R.72-1 FDD	R.72-1 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[23.4]	[19.3]
10 MHz	R.72 FDD	R.72 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.6]	[18.0]
15MHz	R.72-2 FDD	R.72-2 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.7]	[17.4]
20MHz	R.72-3 FDD	R.72-3 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.8]	[17.5]

Table 8.13.3.6.1.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD SCell (FRC)

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.72-1 TDD	R.72-1 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[22.4]	[18.0]
10 MHz	R.72 TDD	R.72 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.4]	[17.5]
15MHz	R.72-2 TDD	R.72-2 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.5]	[17.1]
20MHz	R.72-3 TDD	R.72-3 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.6]	[17.2]

Table 8.13.3.6.1.5-3: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.6.1.5-1 and Table 8.13.3.6.1.5-2 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.6.1.5-1 and Table 8.13.3.6.1.5-2 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.6.1.5-1 and Table 8.13.3.6.1.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.13.3.6.2 TDD-FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x4 with 256QAM for TDD PCell (2DL CA)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Test requirements including the test tolerance in Annex F

- SNR requirements are still in square brackets

- Minimum test time in Annex G

8.13.3.6.2.1 Test purpose

The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

8.13.3.6.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD Release 12 and forward UE of categories 5 or higher that support 4 Rx antenna ports and E-UTRA FDD and TDD and 2DL CA and 256QAM in DL with TDD as PCell in any FDD or TDD RF band.

8.13.3.6.2.3 Minimum conformance requirements

For TDD FDD CA with TDD PCell and 2DL CCs, the requirements are specified in Table 8.13.3.6.2.3-4 based on single carrier requirement specified in Table 8.13.3.6.2.3-2 and Table 8.13.3.6.2.3-3, with the addition of the parameters in Table 8.13.3.6.2.3-1 and the downlink physical channel setup according to Annex C.3.2.

The test coverage for different number of component carriers is defined in 8.1.2.4.

Table 8.13.3.6.2.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Value
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	Wideband pre-coding for 1.4MHz, 4 for 3MHz and 5MHz CCs, 6 for 10MHz CCs, 8 for 15MHz and 20MHz CCs
PMI delay (Note 2)	FDD CC	ms	8
	TDD CC	ms	10 or 11
Reporting interval	FDD CC	ms	1
	TDD CC	ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000000000000000000000111111111111111111000000000000000
CSI request field (Note 3)			'10'
PDSCH transmission mode			4

Note 1: $P_B = 1$.
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.
Note 4: ACK/NACK bits are transmitted using PUSCH with PUCCH format 3.
Note 5: The same PDSCH transmission mode is applied to each component carrier.

Table 8.13.3.6.2.3-2: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.72-1 FDD	R.72-1 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[23.4]	[19.3]
10 MHz	R.72 FDD	R.72 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.6]	[18.0]
15MHz	R.72-2 FDD	R.72-2 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.7]	[17.4]
20MHz	R.72-3 FDD	R.72-3 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.8]	[17.5]

Table 8.13.3.6.2.3-3: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.72-1 TDD	R.72-1 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[22.4]	[18.0]
10 MHz	R.72 TDD	R.72 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.4]	[17.5]
15MHz	R.72-2 TDD	R.72-2 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.5]	[17.1]
20MHz	R.72-3 TDD	R.72-3 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.6]	[17.2]

Table 8.13.3.6.2.3-4: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.6.2.3-2 and Table 8.13.3.6.2.3-3 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.6.2.3-2 and Table 8.13.3.6.2.3-3 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.6.2.3-2 and Table 8.13.3.6.2.3-3 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

The normative reference for this requirement is TS 36.101 [2] clause 8.13.3.6.

8.13.3.6.2.4 Test description

8.13.3.6.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: The maximum aggregated bandwidth in the selected CA configuration, as defined in clause 8.1.2.6.5.

CA Capability to be tested: The CA capability containing the maximum number of 4Rx supported CCs, as defined in clause 8.1.2.6.5.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.87.
2. The parameter settings for Pcell are set up according to Tables [8.13.3-1] and 8.13.3.6.2.3-1as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.13.3.6.2.4.3.

8.13.3.6.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.13.3.6.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133 [4], clauses 8.3.3.2).
4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.13.3.6.2.3-1 and 8.13.3.6.2.3-2 or 8.13.3.6.2.3-3. The SS sends downlink MAC padding bits on the DL RMC.
5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.
6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.13.3.6.2.5-1 or 8.13.3.6.2.5-2 as appropriate.
7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3A.5. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.

8.13.3.6.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 5.5 and 4.6 with the following exceptions:

Table 8.13.3.6.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.13.3.6.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1, Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
explicitValue ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
cqi-ReportConfigPCell-v1250	CQI-ReportConfig-v1250-DEFAULT		DL 256QAM
}			

Table 8.13.3.6.2.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 SEQUENCE {			
transmissionMode-r10	tm4		
codebookSubsetRestriction-r10	00000000000000000000000000000000000011111111111111110000000000000000	BIT STRING	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
cqi-ReportConfigSCell-v1250	CQI-ReportConfig-v1250-DEFAULT		DL 256QAM
}			

Table 8.13.3.6.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.13.3.6.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			RBC
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.13.3.6.2.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 8.13.3.6.2.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AB			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10	Not present		
pmi-RI-Report-r10	Not present		
}			

Table 8.13.3.6.2.4.3-7: CQI-ReportConfig-v1250-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1250 ::= SEQUENCE {			
csi-SubframePatternConfig-r12 CHOICE {			
release	NULL		
}			
cqiCQI-ReportBoth-v1250	Not present		
cqi-ReportAperiodic-v1250	Not present		
altCQI-Table-r12	allSubframes		DL 256QAM
}			

Table 8.13.3.6.2.4.3-8: *PUSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
betaOffset-ACK-Index	5		
betaOffset-RI-Index	6		
betaOffset-CQI-Index	5		
}			

8.13.3.6.2.5 Test requirement

Tables 8.13.3.6.2.5-1 and 8.13.3.6.2.5-2 define the primary level settings.

For TDD FDD CA with TDD PCell and 2DL CCs, the requirements are specified in Table 8.13.3.6.2.5-3 based on single carrier requirement specified in Table 8.13.3.6.2.5-1 and Table 8.13.3.6.2.5-2.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 and A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.13.3.6.2.5-1 or 8.13.3.6.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.13.3.6.2.5-1: Single carrier performance with different bandwidths for multiple CA configurations for FDD SCell (FRC)

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.72-1 FDD	R.72-1 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[23.4]	[19.3]
10 MHz	R.72 FDD	R.72 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.6]	[18.0]
15MHz	R.72-2 FDD	R.72-2 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.7]	[17.4]
20MHz	R.72-3 FDD	R.72-3 FDD	OP.1 FDD	EPA5	4x2 Low	4x4 Low	70	[21.8]	[17.5]

Table 8.13.3.6.2.5-2: Single carrier performance with different bandwidths for multiple CA configurations for TDD PCell and SCell (FRC)

Band-width	Reference channel		OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.		Reference value		
							Fraction of maximum throughput (%)	SNR (dB)	
	2Rx CC	4Rx CC			2Rx CC	4Rx CC		2Rx CC	4Rx CC
5MHz	R.72-1 TDD	R.72-1 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[22.4]	[18.0]
10 MHz	R.72 TDD	R.72 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.4]	[17.5]
15MHz	R.72-2 TDD	R.72-2 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.5]	[17.1]
20MHz	R.72-3 TDD	R.72-3 TDD	OP.1 TDD	EPA5	4x2 Low	4x4 Low	70	[21.6]	[17.2]

Table 8.13.3.6.2.5-3: Minimum performance for multiple CA configurations with 2DL CCs (FRC)

Test number	Aggregated Bandwidth (MHz)			Minimum performance requirement	UE Category
	Total	FDD CC	TDD CC		
1	2x20	20	20	As defined in Table 8.13.3.6.2.5-1 and Table 8.13.3.6.2.5-2 per CC	≥5
2	20+10	10	20	As defined in Table 8.13.3.6.2.5-1 and Table 8.13.3.6.2.5-2 per CC	≥5
3	20+15	15	20	As defined in Table 8.13.3.6.2.5-1 and Table 8.13.3.6.2.5-2 per CC	≥5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 8.1.2.6.					

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

9 Reporting of Channel State Information

9.1 General

For the cases in this clause it is expected that the UE will not always detect the PDCCH, resulting in a statDTX for the uplink ACK/NACK transmission. The downlink configuration for evaluating CQI performance does not use retransmission. Therefore any BLER and Throughput calculations must exclude any packets where the UE may have attempted to combine data from more than one transmission due to missed new data indicators from lost PDCCH transmissions. Thus in all test cases in which there are not retransmission (Max number of HARQ transmissions = 1), if the number of consecutive discarded statDTX for any one process is an odd number including one, also discard the next response for that HARQ process regardless whether it is an ACK or NACK. In the calculation of Throughput the discarded ACK / NACK is considered as a statDTX.

This section includes requirements for the reporting of channel state information (CSI). For all test cases in this section, the definition of SNR is in accordance with the one given in clause 8.1.1, where $SNR = \frac{\sum \hat{I}_{or}^{(j)}}{\sum N_{oc}^{(j)}}$.

The fading of the signals and the AWGN signals applied to each receiver antenna connector shall be uncorrelated. The levels of the test signal applied to each of the antenna connectors shall be as defined in the respective test cases.

The UE performance in this section is considered to be operating band independent. Therefore, the required performance in the respective test cases can be verified in one of the operating bands supported by the UE under test. All the test points supported by the bands of the multiband UE (based on channel bandwidth, DL and UL configuration) need to be tested.

For CA testing, unless otherwise stated, the logical carriers PCC / SCC are mapped on physical frequencies as defined in Table 9.1-1.

Table 9.1-1: PCC/SCCs frequency mapping

CA Configuration	PCC mapping	Notes
Intra-band CA	CC1	1
Inter-band CA (CA_x-y-z-…-n)	Bx (if not supported by the UE, then any one of the supported bands)	2
Note 1: Notation CCi means PCC on component carrier CCi and SCCs on all remaining component carriers, with frequencies defined in the corresponding intra-band contiguous / non-contiguous CA band in TS 36.508. Note 2: Notation Bi means PCC on component Band i and SCCs on all remaining component carriers, with frequencies defined in TS 36.508.		

9.1.1 Applicability of requirements

9.1.1.1 Applicability of requirements for different channel bandwidths

In Clause 9 the test cases may be defined with different channel bandwidth to verify the same CSI requirement.

Test cases defined for 5MHz channel bandwidth that reference this clause are applicable to UEs that support only Band 31.

9.1.1.2 Applicability and test rules for different CA configurations and bandwidth combination sets

The performance requirement for CA CQI tests in Clause 9 are defined independent of CA configurations and bandwidth combination sets specified in Clause 5.4.2A.1. For UEs supporting different CA configurations and bandwidth combination sets, the applicability and test rules are defined for the tests for 2 DL CCs in Table 9.1.1.2-1 and

3 or more DL CCs in Table 9.1.1.2-2. For simplicity, CA configuration below refers to combination of CA configuration and bandwidth combination set.

Table 9.1.1.2-1: Applicability and test rules for CA UE CQI tests with 2 DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 2CCs in Clause 9.6.1.1_A	Any of one of the supported CA capabilities	Any one of the supported FDD CA configurations	10+10 MHz, 20+20 MHz, 5+5 MHz, 10MHz+5MHz, 15MHz+5MHz
CA tests with 2CCs in Clause 9.6.1.2_A	Any of one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD CA configurations with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
Note 1: The applicability and test rules are specified in this table, unless otherwise stated. Note 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. Note 3: A single Uplink CC is configured for all tests			

Table 9.1.1.2-2: Applicability and test rules for CA UE CQI tests with 3 or more DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 3 ore more CCs in Clause 9.6.1.1_A	Any of one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported FDD CA configurations with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3 or more CCs in Clause 9.6.1.2_A	Any of one of the supported CA capabilities with largest aggregated CA bandwidth combination	Any one of the supported TDD CA configurations with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
Note 1: The applicability and test rules are specified in this table, unless otherwise stated. Note 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. Note 3: A single Uplink CC is configured for all tests			

9.1.1.2A Applicability and test rules for different TDD-FDD CA configurations and bandwidth combination sets

The performance requirement for TDD-FDD CA CQI tests in Clause 9 are defined independent of CA configurations and bandwidth combination sets specified in Clause 5.4.2A.1. For UEs supporting different CA configurations and bandwidth combination sets, the applicability and test rules are defined for the tests for 2 DL TDD-FDD CA in Table 9.1.1.2A-1 and for 3 or more DL TDD-FDD CA in Table 9.1.1.2A-2. For simplicity, CA configuration below refers to combination of CA configuration and bandwidth combination set.

Table 9.1.1.2A-1: Applicability and test rules for CA UE CQI tests for TDD-FDD CA with 2DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 2CCs in Clause 9.6.1.3	Any of one of the supported CA capabilities	Any one of the supported TDD-FDD CA configurations with FDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 2CCs in Clause 9.6.1.4	Any of one of the supported CA capabilities	Any one of the supported TDD-FDD CA configurations with TDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
Note 1: The applicability and test rules are specified in this table, unless otherwise stated. Note 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. Note 3: A single Uplink CC is configured for all tests			

Table 9.1.1.2A-2: Applicability and test rules for CA UE CQI tests for TDD-FDD CA with 3 or more DL CCs

Tests	CA capability where the tests apply	CA configuration from the selected CA capability where the tests apply	CA Bandwidth combination to be tested in priority order
CA tests with 3CCs in Clause 9.6.1.3	Any of one of the supported CA capabilities	Any one of the supported TDD-FDD CA configurations with FDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
CA tests with 3CCs in Clause 9.6.1.4	Any of one of the supported CA capabilities	Any one of the supported TDD-FDD CA configurations with TDD PCell with largest aggregated CA bandwidth combination	Largest aggregated CA bandwidth combination
Note 1: The applicability and test rules are specified in this table, unless otherwise stated. Note 2: Number of the supported bandwidth combinations to be tested from each selected CA configuration is 1. Note 3: A single Uplink CC is configured for all tests			

9.1.1.3 Test coverage for different number of component carriers

For FDD CA tests specified in 9.6.1.1_A, among all supported CA capabilities, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the CA tests with less than the largest number of CCs supported by the UE.

For TDD CA tests specified in 9.6.1.2_A, among all supported CA capabilities, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the CA tests with less than the largest number of CCs supported by the UE.

For TDD FDD CA tests specified in 9.6.1.3 and 9.6.1.4, among all supported CA capabilities, if corresponding CA tests with the largest number of CCs supported by the UE are tested, the test coverage can be considered fulfilled without executing the TDD FDD CA tests with less than the largest number of CCs supported by the UE.

9.1.1.4 Applicability of performance requirements for 4Rx capable UEs

9.1.1.4.1 Applicability rule and antenna connection for single carrier tests with 2Rx

For 4Rx capable UEs all single carrier tests specified in 9.2 to 9.5 with 2Rx are tested on any of the 2Rx supported RF bands by connecting 2 out of the 4Rx with data source from system simulator, and the other 2 Rx are connected with zero input, depending on UE's declaration and AP configuration. Same requirements specified with 2Rx should be applied.

For 4Rx capable UEs without any 2Rx supported RF bands, all single carrier tests specified in 9.2 to 9.5 with 2Rx are tested on any of the 4Rx supported RF bands by duplicating the fading channel from each Tx antenna and add

independent noise for each Rx antenna. Figure 9.1.1.4.1-1 shows an example of antenna connection for 4Rx UE in any one 4Rx supported RF band to perform a 2Rx performance test with antenna configuration as 2x2 without interference for information. The SNR requirements should be applied with 3 dB less than the number specified with 2Rx, unless there are no SNR requirements specified.

For 4Rx capable UEs without any 2Rx supported RF bands, all single carrier tests specified in 9.3.3 with 2Rx are tested on any of the 4Rx supported RF bands by duplicating the fading channel from each Tx antenna and add independent interference for each Rx antenna.

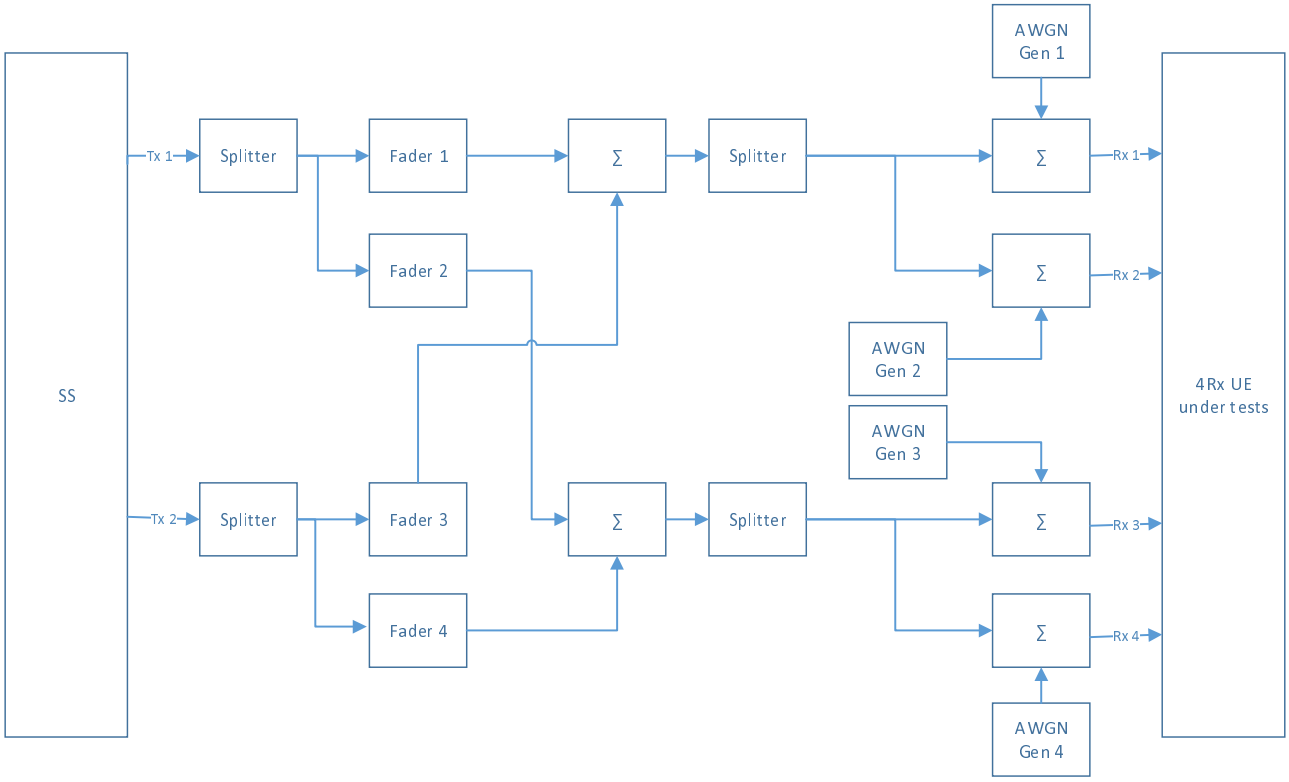


Figure 9.1.1.4.1-1: Antenna connection example for 2Rx tests with antenna configuration as 2x2 without interference (informative)

For 4Rx capable UEs without any 2Rx supported RF bands, for all single carrier tests listed in Table 9.1.1.4.1-1 specified from 9.2 to 9.5 with 2Rx can be skipped.

Table 9.1.1.4.1-1: Requirement lists for 4Rx capable UEs

Requirement lists
Enhanced performance requirements type B
Requirements with demodulation subframe overlaps with aggressor cell ABS
Requirements with demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured

For 4Rx capable UEs, if corresponding tests listed from the 4Rx test lists from Table 9.1.1.4.1-2 are tested, the test coverage can be considered fulfilled without executing the corresponding tests listed from the 2Rx test lists from Table 9.1.1.4.1-2.

Table 9.1.1.4.1-2: Applicability rules for single carrier tests with 2Rx

4Rx test lists	2Rx test lists
9.9.1.1.1 Test 1	9.2.1.1 Test 1
9.9.1.1.1 Test 2	9.2.1.1 Test 2
9.9.1.1.2 Test 1	9.2.1.2 Test 1
9.9.1.1.2 Test 2	9.2.1.2 Test 2
9.9.1.2.1 Test 1	9.2.3.1 Test 1
9.9.1.2.1 Test 2	9.2.3.1 Test 2
9.9.1.2.2 Test 1	9.2.3.2 Test 1
9.9.1.2.2 Test 2	9.2.3.2 Test 2
9.9.2.1.1	9.3.5.1.1
9.9.2.1.2	9.3.5.1.2
9.9.2.2.1	9.3.5.2.1
9.9.2.2.2	9.3.5.2.2
9.9.3.1.1 Test 1	9.4.2.3.2 Test 1
9.9.4.1.1 Test 1	9.5.1.1 Test 1
9.9.4.1.1 Test 2	9.5.1.1 Test 2
9.9.4.1.1 Test 3	9.5.1.1 Test 3
9.9.4.1.2 Test 1	9.5.1.2 Test 1
9.9.4.1.2 Test 2	9.5.1.2 Test 2
9.9.4.1.2 Test 3	9.5.1.2 Test 3
9.9.4.2.1 Test 1	9.5.2.1 Test 1
9.9.4.2.1 Test 2	9.5.2.1 Test 2
9.9.4.2.1 Test 3	9.5.2.1 Test 3
9.9.4.2.2 Test 1	9.5.2.2 Test 1
9.9.4.2.2 Test 2	9.5.2.2 Test 2
9.9.4.2.2 Test 3	9.5.2.2 Test 3

9.1.1.4.2 Applicability rule and antenna connection for CA tests with 2Rx

All tests specified in 9.6 with 2Rx with CA and TDD-FDD CA are tested with 4 Rx capable UEs by connecting all 4Rx with data source from system simulator with the following change on the power level in the test configurations listed in Table 9.1.1.4.2-1.

Table 9.1.1.4.2-1: Power level for 4Rx capable UE to verify CA tests with 2Rx

Number of CCs		$\hat{I}_{or}^{(j)}$ dB[mW/15kHz]
2	PCell	-88
	SCell	-95
3,4	PCell	-85
	SCell1	-92
	SCell2, SCell3	-99
5	PCell	-85
	SCell1	-92
	SCell2, SCell3, SCell4	-99

Within the CA configuration if any of the PCell and/or the SCells is a 2Rx supported RF band, keep the same power level listed in Table 9.1.1.4.2-1. Within the CA configuration if any of the PCell and/or the SCells is a 4Rx supported RF band, configure the power level [3] dB smaller than the number listed in Table 9.1.1.4.2-1. Same requirements specified with 2Rx should be applied.

Same applicability rules defined in 9.1.1.2, 9.1.1.2A for CA and TDD-FDD CA applied for different CA configurations and bandwidth combination sets should be applied for 4 Rx capable UEs.

9.1.1.4.3 Applicability rule and antenna connection for single carrier tests with 4Rx

For 4Rx capable UEs all single carrier tests specified in 9.9 with 4Rx are tested on any of the 4 Rx supported RF bands by connecting all 4Rx with data source from system simulator.

9.2 CQI Reporting under AWGN conditions

The reporting accuracy of the channel quality indicator (CQI) under frequency non-selective conditions is determined by the reporting variance and the BLER performance using the transport format indicated by the reported CQI median. The purpose is to verify that the reported CQI values are in accordance with the CQI definition given in TS 36.213 [10] clause 7.2. To account for sensitivity of the input SNR the reporting definition is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.2.1 CQI Reporting under AWGN conditions - PUCCH 1-0 (Cell-Specific Reference Symbols)

9.2.1.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0

Editor's notes:- Some test parameters for 5MHz in Table 9.2.1.1.3-2 are still in square brackets

9.2.1.1.1 Test purpose

To verify the variance of the wideband CQI reports is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.2.1.1.2 Test applicability

This test applies to E-UTRA FDD UE release 8 and forward.

9.2.1.1.3 Minimum conformance requirements

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.2.1.1.3-1 and Table 9.2.1.1.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.1 FDD / RC.14 FDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI +1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI –1) shall be less than or equal to 0.1

The applicability of the requirement with 5MHz bandwidth as specified in Table 9.2.1.1.3-2 is defined in clause 9.1.1.1.

Table 9.2.1.1.3-1: PUCCH 1-0 static test

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			1			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 2)			
SNR (Note 2)		dB	0	1	6	7
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-97	-92	-91
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUCCH Format 2			
PUCCH Report Type			4			
Reporting periodicity		ms	N_P = 5			
cqi-pmi-ConfigurationIndex			6			
Note 1: Reference measurement channel RC.1 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, except for category 1 UE use RC.4 FDD with two sided dynamic OCNG Pattern OP.2 FDD as described in Annex A.5.1.2. Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.						

Table 9.2.1.1.3-2: PUCCH 1-0 static test (FDD 5MHz)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	5			
PDSCH transmission mode			1			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 2)			
SNR (Note 2)		dB	[0]	[1]	[6]	[7]
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	[-98]	[-97]	[-92]	[-91]
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUCCH Format 2			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			6			
Note 1: Reference measurement channel RC.14 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, except for category 1 UE use RC.15 FDD with two sided dynamic OCNG Pattern OP.2 FDD as described in Annex A.5.1.2. Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.						

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.1.

9.2.1.1.4 Test description

9.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.2.1.1.3-1 and 5MHz for tests defined in Table 9.2.1.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Table 9.2.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.1.1.4.3.

9.2.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.1.1.3-1 for 10MHz tests or Table 9.2.1.1.3-2 for 5MHz tests as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. Continue transmission of the PDSCH until 2000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI values are in the range (Median CQI - 1) ≤ Median CQI ≤ (Median CQI + 1) then continue with step 5, otherwise go to step 8.
5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.
6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) > 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) $\leq$ 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

9. If both tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the table 9.2.1.1.3-1 for 10MHz or table 9.2.1.1.3-2 for 5MHz for the other Test as appropriate. Otherwise pass the UE.

9.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.2.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.2.1.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.1.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.1.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-0

9.2.1.2.1 Test purpose

To verify the variance of the wideband CQI reports is within the limits defined and a PDSCH BLER of 10% falls between the transport format based on wideband median CQI-1 and wideband median CQI or the transport format based on wideband median CQI and wideband median CQI +1.

9.2.1.2.2 Test applicability

This test applies to E-UTRA TDD UE release 8 and forward.

9.2.1.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.2.1.2.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.1 TDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI +1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI –1) shall be less than or equal to 0.1.

Table 9.2.1.2.3-1: PUCCH 1-0 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			1			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 2)			
SNR (Note 2)		dB	0	1	6	7
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-97	-92	-91
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Maximum number of HARQ transmissions			1			
Physical channel for CQI reporting			PUSCH (Note 3)			
PUCCH Report Type			4			
Reporting periodicity		ms	N_P = 5			
cqi-pmi-ConfigurationIndex			3			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.1 TDD according to clause A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1, except for category 1 UE use RC.4 TDD with two sided dynamic OCNG Pattern OP.2 TDD as described in Annex A.5.2.2.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.2.

9.2.1.2.4 Test description

9.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Table 9.2.1.2.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.1.2.4.3.

9.2.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.1.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI values are in the range (Median CQI - 1) ≤ Median CQI ≤ (Median CQI + 1) then continue with step 5, otherwise go to step 8.
5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.
6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2).

The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

If the ratio (NACK /ACK + NACK) > 0.1

then pass the UE for this test and go to step 9, otherwise go to step 8.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) $\leq$ 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

9. If both tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the table 9.2.1.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.2.1.2.4.3-2: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.2.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

9.2.1.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.1.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.1.3

9.2.1.3_C FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for eICIC

9.2.1.3_C.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for eICIC (non-MBSFN ABS)

9.2.1.3_C.1.1 Test purpose

To verify the variance of the wideband CQI reports - in subframes overlapping with aggressor cell ABS and non-ABS subframes - is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.2.1.3_C.1.2 Test applicability

This test applies to E-UTRA FDD UE Category ≥1 - release 10 and forward. Applicability requires support for FGI bit 115.

9.2.1.3_C.1.3 Minimum conformance requirements

For the parameters specified in Table 9.2.1.3_C.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 for Cell 1, C.3.3-1 for Cell 2 and C.3.2-2, the reported CQI value according to RC.2 FDD / RC.6 FDD in Table A.4-1 in subframes overlapping with aggressor cell ABS and non-ABS subframes shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER in non-ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ is less than or equal to 0.1, the BLER in non-ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in non-ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in non-ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1. The value of the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ shall be larger than or equal to 2 and less than or equal to 5 in Test 1 and shall be larger than or equal to 0 and less than or equal to 1 in Test 2.

Table 9.2.1.3_C.1.3-1: PUCCH 1-0 static test (FDD)

Parameter		Unit	Test 1			Test 2		
			Cell 1		Cell 2	Cell 1		Cell 2
Bandwidth		MHz	10			10		
PDSCH transmission mode			2		Note 9	2		Note 9
Downlink power allocation	ρ_A	dB	-3			-3		
	ρ_B	dB	-3			-3		
	σ	dB	0			0		
Propagation condition and antenna configuration			Clause B.1 (2x2)			Clause B.1 (2x2)		
$\hat{E}_s / N_{oc2}$ (Note 1)		dB	4	5	6	4	5	-12
$N_{oc}^{(j)}$ at antenna port	$N_{oc1}^{(j)}$	dBm/15kHz	-102 (Note 6)		N/A	-98(Note 6)		N/A
	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (Note 7)		N/A	-98(Note 7)		N/A
	$N_{oc3}^{(j)}$	dBm/15kHz	-94.8 (Note 8)		N/A	-98(Note 8)		N/A
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93	-92	-94	-93	-110
Subframe Configuration			Non-MBSFN		Non-MBSFN	Non-MBSFN		Non-MBSFN
Cell Id			0		1	0		1
Time Offset between Cells		μs	2.5 (synchronous cells)			2.5 (synchronous cells)		
ABS pattern (Note 2)			N/A		01010101 01010101 01010101 01010101 01010101	N/A		01010101 01010101 01010101 01010101 01010101
RLM/RRM Measurement Subframe Pattern (Note 4)			00000100 00000100 00000100 00000100 00000100		N/A	00000100 00000100 00000100 00000100 00000100		N/A
CSI Subframe Sets (Note 3)	$C_{CSI,0}$		01010101 01010101 01010101 01010101 01010101		N/A	01010101 01010101 01010101 01010101 01010101		N/A
	$C_{CSI,1}$		10101010 10101010 10101010 10101010 10101010		N/A	10101010 10101010 10101010 10101010 10101010		N/A
Number of control OFDM symbols			3			3		
Max number of HARQ transmissions			1			1		
Physical channel for $C_{CSI,0}$ CQI reporting			PUCCH Format 2			PUCCH Format 2		
Physical channel for $C_{CSI,1}$ CQI reporting			PUSCH (Note 11)			PUSCH (Note 11)		
PUCCH Report Type			4			4		
Reporting periodicity		Ms	N_{pd} = 5			N_{pd} = 5		
cqi-pmi-ConfigurationIndex $C_{CSI,0}$ (Note 12)			6		N/A	6		N/A
cqi-pmi-ConfigurationIndex2 $C_{CSI,1}$ (Note 13)			5		N/A	5		N/A

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [14].
Note 3:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 4:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 5:	Cell 1 is the serving cell. Cell 2 is the aggressor cell.
Note 6:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 7:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 8:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 9:	Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5
Note 10:	Reference measurement channel in Cell 1 RC.2 FDD according to Table A.4-1 for UE Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, and RC.6 FDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1 and A.5.1.2.
Note 11:	To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.
Note 12:	*cqi-pmi-ConfigurationIndex* is applied for $C_{CSI,0}$.
Note 13:	*cqi-pmi-ConfigurationIndex2* is applied for $C_{CSI,1}$.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.3.

9.2.1.3_C.1.4 Test description

9.2.1.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40.
2. The parameter settings for the cell are set up according to Table 9.2.1.3_C.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.1.3_C.1.4.3.

9.2.1.3_C.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Tables 9.2.1.3_C.1.3-1 and C.3.3-1 of Annex C.3.3 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. Continue transmission of the PDSCH until 2000 wideband CQI reports, respectively for

subframe set $C_{CSI,0}$ and for subframe set $C_{CSI,1}$, have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values for subframe set $C_{CSI,0}$ and for subframe set $C_{CSI,1}$. Calculate respectively the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). These CQI-values are declared respectively as wideband Median CQI_0 and Median CQI_1.

4. If
Median CQI_0 is not equal to 1 or 15, and 1800 or more of the wideband CQI values for subframe set $C_{CSI,0}$ are in the range (Median CQI_0 - 1) ≤ Median CQI_0 ≤ (Median CQI_0 + 1) AND
Median CQI_1 is not equal to 1 or 15, and 1800 or more of the wideband CQI values for subframe set $C_{CSI,1}$ are in the range (Median CQI_1 - 1) ≤ Median CQI_1 ≤ (Median CQI_1 + 1) AND
the difference Median CQI_0 minus Median CQI_1 is 2 ≤ (Median CQI_0 – Median CQI_1) ≤ 5 for Test 1 and 0 ≤ (Median CQI_0 – Median CQI_1) ≤ 1 for Test 2,
then continue with step 5, otherwise go to step 8.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in non-ABS subframes according to the wideband Median CQI_1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in non-ABS subframes according to the wideband Median CQI_1+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) > 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in non-ABS subframes according to the wideband Median CQI_1-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

9. If both tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the table 9.2.1.3_C.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.1.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.1.3_C.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*Not present*		
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
}			

Table 9.2.1.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {	setup		
setup SEQUENCE {	subframePatternFDD-r10		
subframePatternFDD-r10	'0000010000000100 0000010000000100 00000100'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 9.2.1.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{			
setup SEQUENCE{			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	6		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10 CHOICE{			
setup SEQUENCE{			
cqi-pmi-ConfigIndex2-r10	5		
ri-Configindex2-r10	NULL		
}			
}			
}			
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'0101010101010101 0101010101010101 01010101'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'1010101010101010 1010101010101010 10101010'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

9.2.1.3_C.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.1.3_C.1.4.2.

9.2.1.4

9.2.1.4_C TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for eICIC

9.2.1.4_C.1 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for eICIC (non-MBSFN ABS)

9.2.1.4_C.1.1 Test purpose

To verify the variance of the wideband CQI reports - in subframes overlapping with aggressor cell ABS and non-ABS subframes - is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.2.1.4_C.1.2 Test applicability

This test applies to E-UTRA TDD UE Category ≥1 release 10 and forward. Applicability requires support for FGI bit115.

9.2.1.4_C.1.3 Minimum conformance requirements

For the parameters specified in Table 9.2.1.4_C.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 for Cell 1, C.3.3-1 for Cell2 and C.3.2-2, the reported CQI value according to RC.2 TDD / RC.6 TDD in Table A.4-1 in subframes overlapping with aggressor cell ABS and non-ABS subframes shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER in non-ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ is less than or equal to 0.1, the BLER in non-ABS subframes using the transport format indicated by the (median CQI +1) shall be greater than 0.1. If the PDSCH BLER in non-ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in non-ABS subframes using transport format indicated by (median CQI –1) shall be less than or equal to 0.1. The value of the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ shall be larger than or equal to 2 and less than or equal to 5 in Test 1 and shall be larger than or equal to 0 and less than or equal to 1 in Test 2.

Table 9.2.1.4_C.1.3-1: PUCCH 1-0 static test (TDD)

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
Bandwidth		MHz	10		10	
PDSCH transmission mode			2	Note 9	2	Note 9
Uplink downlink configuration			1		1	
Special subframe configuration			4		4	
Downlink power allocation	ρ_A	dB	-3		-3	
	ρ_B	dB	-3		-3	
	σ	dB	0		0	
Propagation condition and antenna configuration			Clause B.1 (2x2)		Clause B.1 (2x2)	
$\hat{E}_s / N_{oc2}$ (Note 1)		dB	4 5	6	4 5	-12
$N_{oc}^{(j)}$ at antenna port	$N_{oc1}^{(j)}$	dBm/15kHz	-102(Note 6)	N/A	-98(Note 6)	N/A
	$N_{oc2}^{(j)}$	dBm/15kHz	-98(Note 7)	N/A	-98(Note 7)	N/A
	$N_{oc3}^{(j)}$	dBm/15kHz	-94.8(Note 8)	N/A	-98(Note 8)	N/A
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94 -93	-92	-94 -93	-110
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN
Cell Id			0	1	0	1
Time Offset between Cells		μs	2.5 (synchronous cells)		2.5 (synchronous cells)	
ABS pattern (Note 2)			N/A	0100010001 0100010001	N/A	0100010001 0100010001
RLM/RRM Measurement Subframe Pattern (Note 4)			0000000001 0000000001	N/A	0000000001 0000000001	N/A
CSI Subframe Sets (Note 3)	$C_{CSI,0}$		0100010001 0100010001	N/A	0100010001 0100010001	N.A
	$C_{CSI,1}$		1000101000 1000101000	N/A	1000101000 1000101000	N/A
Number of control OFDM symbols			3		3	
Max number of HARQ transmissions			1		1	
Physical channel for $C_{CSI,0}$ CQI reporting			PUCCH Format 2		PUCCH Format 2	
Physical channel for $C_{CSI,1}$ CQI reporting			PUSCH (Note 11)		PUSCH (Note 11)	
PUCCH Report Type			4		4	
Reporting periodicity		ms	N_{pd} = 5		N_{pd} = 5	
cqi-pmi-ConfigurationIndex $C_{CSI,0}$ (Note 12)			3	N/A	3	N/A
*cqi-pmi-ConfigurationIndex*2 $C_{CSI,1}$ (Note 13)			4	N/A	4	N/A
ACK/NACK feedback mode			Multiplexing		Multiplexing	

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [14].
Note 3:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 4:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 5:	Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 6:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 7:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 8:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 9:	Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.2.5.
Note 10:	Reference measurement channel in Cell 1 RC.2 TDD according to Table A.4-1 for UE Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1, and RC.6 TDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1 and Annex A.5.2.2.
Note 11:	To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.
Note 12:	*cqi-pmi-ConfigurationIndex* is applied for $C_{CSI,0}$.
Note 13:	*cqi-pmi-ConfigurationIndex2* is applied for $C_{CSI,1}$.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.4.

9.2.1.4_C.1.4 Test description

9.2.1.4._C.14.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40.
2. The parameter settings for the cell are set up according to Table 9.2.1.4_C.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.1.4_C.1.4.3.

9.2.1.4_C.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.1.4_C.1.3-1 and C.3.3-1 of Annex C.3.3 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF #8 and #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. Continue transmission of the PDSCH until 2000 wideband CQI reports, respectively for

subframe set $C_{CSI,0}$ and for subframe set $C_{CSI,1}$, have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values for subframe set $C_{CSI,0}$ and for subframe set $C_{CSI,1}$. Calculate respectively the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). These CQI-values are declared respectively as wideband Median CQI_0 and Median CQI_1.

4. If
Median CQI_0 is not equal to 1 or 15, and 1800 or more of the wideband CQI values for subframe set $C_{CSI,0}$ are in the range (Median CQI_0 - 1) ≤ Median CQI_0 ≤ (Median CQI_0 + 1) AND
Median CQI_1 is not equal to 1 or 15, and 1800 or more of the wideband CQI values for subframe set $C_{CSI,1}$ are in the range (Median CQI_1 - 1) ≤ Median CQI_1 ≤ (Median CQI_1 + 1) AND
the difference Median CQI_0 minus Median CQI_1 is 2 ≤ (Median CQI_0 – Median CQI_1) ≤ 5 for Test 1 and 0 ≤ (Median CQI_0 – Median CQI_1) ≤ 1 for Test 2,
then continue with step 5, otherwise go to step 8.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in non-ABS subframes according to the wideband Median CQI_1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF #8 and #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in non-ABS subframes according to the wideband Median CQI_1+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF #8 and #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) > 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in non-ABS subframes according to the wideband Median-CQI_1-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF #8 and #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

9. If both tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the table 9.2.1.4_C.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.1.4_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.1.4_C.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*Not present*		
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
}			

Table 9.2.1.4_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE{			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 9.2.1.4_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{			
setup SEQUENCE{			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10 CHOICE{			
setup SEQUENCE{			
cqi-pmi-ConfigIndex2-r10	4		
ri-Configindex2-r10	NULL		
}			
}			
}			
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0100010001 0100010001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'1000101000 1000101000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 9.2.1.4_C.1.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

9.2.1.4_C.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.1.4_C.1.4.2.

9.2.1.5

9.2.1.5_E FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for feICIC

9.2.1.5_E.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for feICIC (non-MBSFN ABS)

9.2.1.5_E.1.1 Test purpose

To verify the variance of the wideband CQI reports - in subframes overlapping with aggressor cell ABS and non-ABS subframes is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.2.1.5_E.1.2 Test applicability

This test applies to E-UTRA FDD UE and CRS interference handling - UE Category ≥2 - release 11 and forward. Applicability requires support of FGI bit 115.

9.2.1.5_E.1.3 Minimum conformance requirements

For the parameters specified in Table 9.2.1.5_E.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 for Cell 1, C.3.3-2 for Cell 2 and Cell 3, and C.3.2-2, the reported CQI value according to RC.2 FDD in Table A.4-1 in subframes overlapping with aggressor cell ABS and non-ABS subframes shall be in the range of ±1 of the reported median more than 90% of the time.

For test 1, if the PDSCH BLER in ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ is less than or equal to 0.1, the BLER in ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

For test 2, if the PDSCH BLER in ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ is less than or equal to 0.1, the BLER in ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

For test 2, if the PDSCH BLER in non-ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ is less than or equal to 0.1, the BLER in non-ABS subframes using the transport format indicated by the (median CQI + 2) shall be greater than 0.1. If the PDSCH BLER in non-ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in non-ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

Table 9.2.1.5_E.1.3-1: PUCCH 1-0 static test (FDD)

Parameter		Unit	Test 1			Test 2		
			Cell 1		Cell 2 and 3	Cell 1		Cell 2 and 3
Bandwidth		MHz	10			10		
PDSCH transmission mode			2		Note 10	2		Note 10
Downlink power allocation	ρ_A	dB	-3			-3		
	ρ_B	dB	-3			-3		
	σ	dB	0			0		
Propagation condition and antenna configuration			Clause B.1 (2x2)			Clause B.1 (2x2)		
$\widehat{E}_s / N_{oc2}$ (Note 1)		dB	4	5	Cell 2: 12 Cell 3: 10	13	14	Cell 2: 12 Cell 3: 10
$N_{oc}^{(j)}$ at antenna port	$N_{oc1}^{(j)}$	dBm/15kHz	-98 (Note 7)		N/A	-98 (Note 7)		N/A
	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (Note 8)		N/A	-98 (Note 8)		N/A
	$N_{oc3}^{(j)}$	dBm/15kHz	-93 (Note 9)		N/A	-93 (Note 9)		N/A
Subframe Configuration			Non-MBSFN		Non-MBSFN	Non-MBSFN		Non-MBSFN
Cell Id			0		Cell 2: 6 Cell 3: 1	0		Cell 2: 6 Cell 3: 1
Time Offset between Cells		µs	Cell 2: 3 usec Cell 3: -1usec			Cell 2: 3 usec Cell 3: -1usec		
Frequency Shift between Cells		Hz	Cell 2: 300Hz Cell 3: -100Hz			Cell 2: 300Hz Cell 3: -100Hz		
ABS pattern (Note 2)			N/A		01010101 01010101 01010101 01010101 01010101	N/A		01010101 01010101 01010101 01010101 01010101
RLM/RRM Measurement Subframe Pattern (Note 4)			00000100 00000100 00000100 00000100 00000100		N/A	00000100 00000100 00000100 00000100 00000100		N/A
CSI Subframe Sets (Note 3)	$C_{CSI,0}$		01010101 01010101 01010101 01010101 01010101		N/A	01010101 01010101 01010101 01010101 01010101		N/A
	$C_{CSI,1}$		10101010 10101010 10101010 10101010 10101010		N/A	10101010 10101010 10101010 10101010 10101010		N/A
Number of control OFDM symbols			3			3		
Max number of HARQ transmissions			1			1		
Physical channel for $C_{CSI,0}$ CQI reporting			PUCCH Format 2			PUCCH Format 2		
Physical channel for $C_{CSI,1}$ CQI reporting			PUSCH (Note 12)			PUSCH (Note 12)		
PUCCH Report Type			4			4		
Reporting periodicity		Ms	N_{pd} = 5			N_{pd} = 5		
cqi-pmi-ConfigurationIndex $C_{CSI,0}$ (Note 13)			6		N/A	6		N/A
cqi-pmi-ConfigurationIndex2 $C_{CSI,1}$ (Note 14)			5		N/A	5		N/A

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [9].
Note 3:	Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 4:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 6:	Cell 1 is the serving cell. Cell 2 and Cell 3 are the aggressor cells. The number of the CRS ports in Cell 1, Cell 2, and Cell 3 are the same.
Note 7:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 8:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 9:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex TS 36.521-1 [10] C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.1.5
Note 11:	Reference measurement channel in Cell 1 RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 12:	To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.
Note 13:	*cqi-pmi-ConfigurationIndex* is applied for $C_{CSI,0}$.
Note 14:	*cqi-pmi-ConfigurationIndex2* is applied for $C_{CSI,1}$.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.5.

9.2.1.5_E.1.4 Test description

9.2.1.5_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 (without faders) for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Table 9.2.1.5_E.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 9.2.1.5_E.1.4.3.

9.2.1.5_E.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.1.5_E.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). The

UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for subframe set $C_{CSI,1}$ using PUSCH. Continue transmission of the PDSCH until 2000 wideband CQI reports, respectively for subframe set $C_{CSI,0}$ and for subframe set $C_{CSI,1}$, have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values for subframe set $C_{CSI,0}$ and for subframe set $C_{CSI,1}$. Calculate respectively the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). These CQI-values are declared as wideband Median CQI_0 and Median CQI_1.

For Test1

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI values for subframe set $C_{CSI,0}$ are in the range (Median CQI_0 - 1) ≤ Median CQI_0 ≤ (Median CQI_0 + 1), then continue with step 5, otherwise go to step 8.5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) > 0.1

   then pass the UE for this test and go to step 13, otherwise go to step 8.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then pass the UE for this test and go to step 13, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

For Test2

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI values for subframe set $C_{CSI,0}$ are in the range (Median CQI_0 - 1) ≤ Median CQI_0 ≤ (Median CQI_0 + 1) AND
   Median CQI_1 is not equal to 1 or 15, and 1800 or more of the wideband CQI values for subframe set $C_{CSI,1}$ are in the range (Median CQI_1 - 1) ≤ Median CQI_1 ≤ (Median CQI_1 + 1), then continue with step 5, otherwise go to step 12.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS subframes according to the wideband median- CQI_0 value and Non-ABS subframes according to the wideband median- CQI_1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For

any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

For the filtered ACK and NACK responses in ABS and Non-ABS subframes if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6.

For the filtered ACK and NACK responses only in Non-ABS subframes if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 7.

For the filtered ACK and NACK responses only in ABS subframes if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 8, otherwise go to step 11.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS subframes according to the wideband median- CQI_0+1 value and Non-ABS subframes according to the wideband median- CQI_1+2 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   For the filtered ACK and NACK responses in ABS and Non-ABS subframes if the ratio (NACK /ACK + NACK) > 0.1 then pass the UE for this test and go to step 13, otherwise go to step 12.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in Non-ABS subframes according to the wideband median- CQI_1+2 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) > 0.1 then pass the UE for this test and in step 10, otherwise go to step 11

8. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0+1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) > 0.1 then pass the UE for this test and in step 9, otherwise go to step 11.

9. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in Non-ABS subframes according to the wideband median- CQI_1-1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) ≤ 0.1 then pass the UE for this test and go to step 13, otherwise go to step 12.

10. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0-1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

    If the ratio (NACK /ACK + NACK) ≤ 0.1 then pass the UE for this test and go to step 13, otherwise go to step 12.

11. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS subframes according to the wideband median- CQI_0-1 value, Non-ABS subframes according to the wideband median- CQI_1-1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in uplink SF#8 and #3 (Table A.4.1-1). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

    For the filtered ACK and NACK responses in ABS and Non-ABS subframes if the ratio (NACK /ACK + NACK) $\leq$ 0.1 then pass the UE for this test and go to step 13, otherwise go to step 12.

12. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 11) for the other SNR point as appropriate. Otherwise fail the UE.

13. If both tests have not been done, then repeat the same procedure (For Test1 steps 1 to 8, For Test2 steps 1 to 12) with test conditions according to the table 9.2.1.5_E.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.1.5_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 9.2.1.5_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PUCCH 1-0 static test performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'0000010000000100 0000010000000100 00000100'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	6		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 9.2.1.5_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT: Additional FDD PUCCH 1-0 static test performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 9.2.1.5_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PUCCH 1-0 static test performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{			
setup SEQUENCE{			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	6		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10 CHOICE{			
setup SEQUENCE{			
cqi-pmi-ConfigIndex2-r10	5		
ri-Configindex2-r10	NULL		
}			
}			
}			
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'0101010101010101 0101010101010101 01010101'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'1010101010101010 1010101010101010 10101010'	BIT STRING (SIZE (40))	
}			
}			
}			

9.2.1.5_E.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.1.5_E.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.1.6

9.2.1.6_E TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for feICIC

9.2.1.6_E.1 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for feICIC (non-MBSFN ABS)

9.2.1.6_E.1.1 Test purpose

To verify the variance of the wideband CQI reports - in subframes overlapping with aggressor cell ABS and non-ABS subframes is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.2.1.6_E.1.2 Test applicability

This test applies to E-UTRA TDD UE and CRS interference handling and ss-CCH interference handling - UE Category ≥2 - release 11 and forward. Applicability requires support of FGI bit 115.

9.2.1.6_E.1.3 Minimum conformance requirements

For the parameters specified in Table 9.2.1.6_E.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 for Cell 1, C.3.3-2 for Cell 2 and Cell 3, and C.3.2-2, the reported CQI value according to RC.2 TDD in Table A.4-1 in subframes overlapping with aggressor cell ABS and non-ABS subframes shall be in the range of ±1 of the reported median more than 90% of the time.

For test 1, if the PDSCH BLER in ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ is less than or equal to 0.1, the BLER in ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

For test 2, if the PDSCH BLER in ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ is less than or equal to 0.1, the BLER in ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

For test 2, if the PDSCH BLER in non-ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ is less than or equal to 0.1, the BLER in non-ABS subframes using the transport format indicated by the (median CQI + 2) shall be greater than 0.1. If the PDSCH BLER in non-ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in non-ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

Table 9.2.1.6_E.1.3-1: PUCCH 1-0 static test (TDD)

Parameter		Unit	Test 1			Test 2		
			Cell 1		Cell 2 and 3	Cell 1		Cell 2 and 3
Bandwidth		MHz	10			10		
PDSCH transmission mode			2		Note 10	2		Note 10
Uplink downlink configuration			1			1		
Special subframe configuration			4			4		
Downlink power allocation	ρ_A	dB	-3			-3		
	ρ_B	dB	-3			-3		
	σ	dB	0			0		
Propagation condition and antenna configuration			Clause B.1 (2x2)			Clause B.1 (2x2)		
$\widehat{E}_s / N_{oc2}$ (Note 1)		dB	4	5	Cell 2: 12 Cell 3: 10	13	14	Cell 2: 12 Cell 3: 10
$N_{oc}^{(j)}$ at antenna port	$N_{oc1}^{(j)}$	dBm/15kHz	-98 (Note 7)		N/A	-98 (Note 7)		N/A
	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (Note 8)		N/A	-98 (Note 8)		N/A
	$N_{oc3}^{(j)}$	dBm/15kHz	-93 (Note 9)		N/A	-93 (Note 9)		N/A
Subframe Configuration			Non-MBSFN		Non-MBSFN	Non-MBSFN		Non-MBSFN
Cell Id			0		Cell 2: 6 Cell 3: 1	0		Cell 2: 6 Cell 3: 1
Time Offset between Cells		µs	Cell 2: 3 usec Cell 3: -1usec			Cell 2: 3 usec Cell 3: -1usec		
Frequency shift between Cells		Hz	Cell 2: 300Hz Cell 3: -100Hz			Cell 2: 300Hz Cell 3: -100Hz		
ABS pattern (Note 2)			N/A		0100010001 0100010001	N/A		0100010001 0100010001
RLM/RRM Measurement Subframe Pattern (Note 4)			0000000001 0000000001		N/A	0000000001 0000000001		N/A
CSI Subframe Sets (Note 3)	$C_{CSI,0}$		0100010001 0100010001		N/A	0100010001 0100010001		N.A
	$C_{CSI,1}$		1000101000 1000101000		N/A	1000101000 1000101000		N/A
Number of control OFDM symbols			3			3		
Max number of HARQ transmissions			1			1		
Physical channel for $C_{CSI,0}$ CQI reporting			PUCCH Format 2			PUCCH Format 2		
Physical channel for $C_{CSI,1}$ CQI reporting			PUSCH (Note 12)			PUSCH (Note 12)		
PUCCH Report Type			4			4		
Reporting periodicity		ms	N_{pd} = 5			N_{pd} = 5		
cqi-pmi-ConfigurationIndex $C_{CSI,0}$ (Note 13)			3		N/A	3		N/A
cqi-pmi-ConfigurationIndex2 $C_{CSI,1}$ (Note 14)			4		N/A	4		N/A
ACK/NACK feedback mode			Multiplexing			Multiplexing		

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [9].
Note 3:	Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 4:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 6:	Cell 1 is the serving cell. Cell 2 and Cell 3 are the aggressor cells. The number of the CRS ports in Cell 1, Cell 2, and Cell 3 is the same.
Note 7:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 8:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 9:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.2.5.
Note 11:	Reference measurement channel in Cell 1 RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 12:	To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.
Note 13:	*cqi-pmi-ConfigurationIndex* is applied for $C_{CSI,0}$.
Note 14:	*cqi-pmi-ConfigurationIndex2* is applied for $C_{CSI,1}$.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.6.

9.2.1.6_E.1.4 Test description

9.2.1.6_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 (without faders) for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Table 9.2.1.6_E.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 9.2.1.6_E.1.4.3.

9.2.1.6_E.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.1.6_E.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 in downlink SF#4 and #9 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report for subframe set $C_{CSI,0}$ using PUCCH and for

subframe set $C_{CSI,1}$ using PUSCH. Continue transmission of the PDSCH until 2000 wideband CQI reports, respectively for subframe set $C_{CSI,0}$ and for subframe set $C_{CSI,1}$, have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values for subframe set $C_{CSI,0}$ and for subframe set $C_{CSI,1}$. Calculate respectively the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). These CQI-values are declared as wideband Median CQI_0 and Median CQI_1.

For Test1

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI values for subframe set $C_{CSI,0}$ are in the range (Median CQI_0 - 1) ≤ Median CQI_0 ≤ (Median CQI_0 + 1) then continue with step 5, otherwise go to step 8.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) > 0.1

   then pass the UE for this test and go to step 13, otherwise go to step 8.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then pass the UE for this test and go to step 13, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

For Test2

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI values for subframe set $C_{CSI,0}$ are in the range (Median CQI_0 - 1) ≤ Median CQI_0 ≤ (Median CQI_0 + 1) AND
   Median CQI_1 is not equal to 1 or 15, and 1800 or more of the wideband CQI values for subframe set $C_{CSI,1}$ are in the range (Median CQI_1 - 1) ≤ Median CQI_1 ≤ (Median CQI_1 + 1), then continue with step 5, otherwise go to step 12.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS subframes according to the wideband median- CQI_0 value and Non-ABS subframes according to the wideband median- CQI_1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses in ABS and Non-ABS subframes if the ratio (NACK / ACK + NACK) $\leq$ 0.1 then go to step 6.

   For the filtered ACK and NACK responses only in Non-ABS subframes if the ratio (NACK / ACK + NACK) $\leq$ 0.1 then go to step 7.

   For the filtered ACK and NACK responses only in ABS subframes if the ratio (NACK / ACK + NACK) $\leq$ 0.1 then go to step 8, otherwise go to step 11.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS subframes according to the wideband median- CQI_0+1 value and Non-ABS subframes according to the wideband median- CQI_1+2 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK.*

   For the filtered ACK and NACK responses in ABS and Non-ABS subframes if the ratio (NACK /ACK + NACK) > 0.1 then pass the UE for this test and go to step 13, otherwise go to step 12.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in Non-ABS subframes according to the wideband median- CQI_1+2 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) > 0.1 then pass the UE for this test and in step 10, otherwise go to step 11

8. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0+1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) > 0.1 then pass the UE for this test and in step 9, otherwise go to step 11.

9. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in Non-ABS subframes according to the wideband median- CQI_1-1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) $\leq$ 0.1 then pass the UE for this test and go to step 13, otherwise go to step 12.

10. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC only in ABS subframes according to the wideband median- CQI_0-1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling

information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

If the ratio (NACK /ACK + NACK) ≤ 0.1 then pass the UE for this test and go to step 13, otherwise go to step 12.

11. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS subframes according to the wideband median- CQI_0-1 value, Non-ABS subframes according to the wideband median- CQI_1-1 value, and the SS shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and subframe #3 (Table A.4.1-2). For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

    For the filtered ACK and NACK responses in ABS and Non-ABS subframes if the ratio (NACK /ACK + NACK) ≤ 0.1 then pass the UE for this test and go to step 13, otherwise go to step 12.

12. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 11) for the other SNR point as appropriate. Otherwise fail the UE.

13. If both tests have not been done, then repeat the same procedure (For Test1 steps 1 to 8, For Test2 steps 1 to 12) with test conditions according to the table 9.2.1.6_E.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.1.6_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 9.2.1.6_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD PUCCH 1-0 static test performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	6		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 9.2.1.6_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT: Additional TDD PUCCH 1-0 static test performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 9.2.1.6_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional TDD PUCCH 1-0 static test performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{			
setup SEQUENCE{			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10 CHOICE{			
setup SEQUENCE{			
cqi-pmi-ConfigIndex2-r10	4		
ri-Configindex2-r10	NULL		
}			
}			
}			
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0100010001 0100010001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'1000101000 1000101000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 9.2.1.6_E.1.4.3-4: TDD-Config-DEFAULT: Additional TDD PUCCH 1-0 static test performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.2.1.6_E.1.4.3-5: PUCCH-ConfigDedicated-DEFAULT: Additional TDD PUCCH 1-0 static test performance downlink power allocation

Derivation Path: 36.508 clause4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing		
}			

9.2.1.6_E.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.16_E.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.1.7 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 256QAM in DL

Editor's note: SNR for 4Rx UE without 2Rx RF bands are still in square brackets

9.2.1.7.1 Test purpose

The same test purpose as in clause 9.2.1.1.1.

9.2.1.7.2 Test applicability

This test applies to E-UTRA FDD UE release 12 and forward of UE Category 11-12 and DL Category ≥11 that support 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports

9.2.1.7.3 Minimum conformance requirements

The following requirements apply to UE Category 11-12 and DL Category ≥11. For the parameters specified in Table 9.2.1.7.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.1A FDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

In this test, 4-bit CQI Table 2 in Table 7.2.3-2 in TS 36.213 [10], and Modulation and TBS index table 2 in Table 7.1.7.1-1A for PDSCH in TS 36.213 [10] are applied.

Table 9.2.1.7.3-1: PUCCH 1-0 static test (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			1			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 2)			
SNR (Note 2)		dB	-1	0	20	21
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-99	-98	-78	-77
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUCCH Format 2			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			6			
Note 1: Reference measurement channel RC.1A FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.						
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.						

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.7.

9.2.1.7.4 Test description

9.2.1.7.4.1 Initial conditions

Same Initial conditions as defined in clause 9.2.1.1.4.1 for 10MHz BW with the following exceptions:

- Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.
- Instead of Table 9.2.1.1.3-1, use Table 9.2.1.7.3-1.
- Instead of Clause 9.2.1.1.4.3, use Clause 9.2.1.7.4.3.

9.2.1.7.4.2 Test procedure

Same test procedure as defined in clause 9.2.1.1.4.2 for 10MHz BW with the following exceptions:

- Instead of Table 9.2.1.1.3-1, use Table 9.2.1.7.5-1.
- The SS shall transmit PDSCH via PDCCH DCI format 1 instead 1A.

9.2.1.7.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.1.7.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
cqi-ReportConfigPCell-v1250 SEQUENCE {			
altCQI-Table-r12	allSubframes		
}			
}			

Table 9.2.1.7.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.2.1.7.5 Test requirement

Table 9.2.1.7.5-1: PUCCH 1-0 static test (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			1			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 2)			
SNR for UE with 2Rx RF band (Note 2)		dB	-1	0	20	21
SNR for 4Rx UE without 2Rx RF band		dB	[-4]	[-3]	[17]	[18]
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-99	-98	-78	-77
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUCCH Format 2			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			6			

Note 1: Reference measurement channel RC.1A FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 3: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB.

The pass fail decision is as specified in the test procedure in clause 9.2.1.7.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.1.8 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 256QAM in DL

Editor's note: SNR for 4Rx UE without 2Rx RF bands are still in square brackets

9.2.1.8.1 Test purpose

The same test purpose as in clause 9.2.1.2.1.

9.2.1.8.2 Test applicability

This test applies to E-UTRA TDD UE release 12 and forward of UE Category 11-12 and DL Category ≥11that supports 256QAM in DL.

Note: This test also applies to UE supporting 4Rx antenna ports

9.2.1.8.3 Minimum conformance requirements

The following requirements apply to UE Category 11-12 and UE DL Category ≥11. For the parameters specified in Table 9.2.1.8.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.1A TDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the

transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

In this test, 4-bit CQI Table 2 in Table 7.2.3-2 in TS 36.213 [10], and Modulation and TBS index table 2 in Table 7.1.7.1-1A for PDSCH in TS 36.213 [10] are applied.

Table 9.2.1.8.3-1: PUCCH 1-0 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	20			
PDSCH transmission mode			1			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 2)			
SNR (Note 2)		dB	-1	0	20	21
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-99	-98	-78	-77
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUSCH (Note 3)			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			3			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.1A TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.8.

9.2.1.8.4 Test description

9.2.1.8.4.1 Initial conditions

Same Initial conditions as in clause 9.2.1.2.4.1 with the following exceptions:

- Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.
- Instead of Table 9.2.1.2.3-1, use Table 9.2.1.8.3-1.
- Instead of Clause 9.2.1.2.4.3, use Clause 9.2.1.8.4.3.

9.2.1.8.4.2 Test procedure

Same test procedure as in clause 9.2.1.2.4.2 with the following exceptions:

- Instead of Table 9.2.1.2.3-1, use Table 9.2.1.8.5-1.

- The SS shall transmit PDSCH via PDCCH DCI format 1 instead 1A

9.2.1.8.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.1.8.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
cqi-ReportConfigPCell-v1250 SEQUENCE {			
altCQI-Table-r12	allSubframes		
}			
}			

Table 9.2.1.8.4.3-2: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.2.1.8.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

9.2.1.8.5 Test requirement

Table 9.2.1.8.5-1: PUCCH 1-0 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	20			
PDSCH transmission mode			1			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 2)			
SNR for UE with 2Rx RF band (Note 2)		dB	-1	0	20	21
SNR for 4Rx UE without 2Rx RF band			[4]	[-3]	[17]	[18]
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-99	-98	-78	-77
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUSCH (Note 3)			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			3			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.1A TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.
Note 4: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB.

The pass fail decision is as specified in the test procedure in clause 9.2.1.8.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.2 CQI Reporting under AWGN conditions - PUCCH 1-1 (Cell-Specific Reference Symbols)

9.2.2.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1

9.2.2.1.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.2.2.1.2 Test applicability

This test applies to E-UTRA FDD release 8 and forward UEs of Category 2 and onwards.

Note: This test also applies to UE supporting 4Rx antenna ports

9.2.2.1.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.2.2.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2.2 in TS 36.213 [10]) shall be used to determine the wideband CQI index for codeword #1 as

$$\text{wideband CQI}_1 = \text{wideband CQI}_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.2.2.1.3-1: PUCCH 1-1 static test (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Downlink power allocation	ρ_A	dB	-3			
	ρ_B	dB	-3			
	σ	dB	0			
Propagation condition and antenna configuration			Clause B.1 (2 x 2)			
CodeBookSubsetRestriction bitmap			010000			
SNR (Note 2)		dB	10	11	16	17
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-87	-82	-81
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUCCH Format 2			
PUCCH Report Type for CQI/PMI			2			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	$N_P = 5$			
cqi-pmi-ConfigurationIndex			6			
ri-ConfigIndex			1 (Note 3)			

Note 1: Reference measurement channel RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: It is intended to have UL collisions between RI reports and HARQ-ACK, since the RI reports shall not be used by the eNB in this test.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.2.1.

9.2.2.1.4 Test description

9.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.2.2.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.2.1.4.3.

9.2.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.2.1.5-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.2.2.1.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≤ 0.1 for both codeword #0 and codeword #1

then and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≥ 0.1 for both codeword #0 and codeword #1

   then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.2.2.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.2.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	010000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.2.2.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.2.2.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.2.2.1.5 Test requirement

Table 9.2.2.1.5-1: PUCCH 1-1 static test (FDD)

Parameter		**Unit**	**Test 1**		**Test 2**	
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Downlink power allocation	ρ_A	dB	-3			
	ρ_B	dB	-3			
	σ	dB	0			
Propagation condition and antenna configuration			Clause B.1 (2 x 2)			
CodeBookSubsetRestriction bitmap			010000			
SNR for UE with 2Rx RF band (Note 2)		dB	10	11	16	17
SNR for 4Rx UE without 2Rx RF band		dB	7	8	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-87	-82	-81
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUCCH Format 2			
PUCCH Report Type for CQI/PMI			2			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	N_P = 5			
cqi-pmi-ConfigurationIndex			6			
ri-ConfigIndex			1 (Note 3)			

Note 1: Reference measurement channel RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: It is intended to have UL collisions between RI reports and HARQ-ACK, since the RI reports shall not be used by the eNB in this test.

Note4: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB.

The pass fail decision is as specified in the test procedure in clause 9.2.2.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.2.1_D.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.2.1_D.4.2.

[TT TBD]

9.2.2.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1

9.2.2.2.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective wideband median $CQI_0 - 1$ and wideband median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective wideband median $CQI_0 + 1$ and wideband median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.2.2.2.2 Test applicability

This test applies to E-UTRA TDD release 8 and forward UEs of Category 2 and onwards.

Note: This test also applies to UE supporting 4Rx antenna ports

9.2.2.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.2.2.2.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2.2 in TS 36.213 [10]) shall be used to determine the wideband CQI index for codeword #1 as:

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.2.2.2.3-1: PUCCH 1-1 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	-3			
	ρ_B	dB	-3			
	σ	dB	0			
Propagation condition and antenna configuration			Clause B.1 (2 x 2)			
CodeBookSubsetRestriction bitmap			010000			
SNR (Note 2)		dB	10	11	16	17
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-87	-82	-81
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Maximum number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note 3)			
PUCCH Report Type			2			
Reporting periodicity		ms	N_P = 5			
cqi-pmi-ConfigurationIndex			3			
ri-ConfigIndex			805 (Note 4)			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 4: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.2.2.

9.2.2.2.4 Test description

9.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.2.2.2.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.2.2.4.3.

9.2.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.2.2.5-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.2.2.2.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then, and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

If the ratio (NACK /ACK + NACK) ≥ 0.1

then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.2.2.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	010000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.2.2.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.2.2.2.4.3-3: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	805		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.2.2.2.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.2.2.2.5 Test requirement

Table 9.2.2.2.5-1: PUCCH 1-1 static test (TDD)

Parameter		**Unit**	**Test 1**		**Test 2**	
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	-3			
	ρ_B	dB	-3			
	σ	dB	0			
Propagation condition and antenna configuration			Clause B.1 (2 x 2)			
CodeBookSubsetRestriction bitmap			010000			
SNR for UE with 2Rx RF band (Note 2)		dB	10	11	16	17
SNR for 4Rx UE without 2Rx RF band		dB	7	8	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-87	-82	-81
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Maximum number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note 3)			
PUCCH Report Type			2			
Reporting periodicity		ms	N_P = 5			
cqi-pmi-ConfigurationIndex			3			
ri-ConfigIndex			805 (Note 4)			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 4: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.

Note 5: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB.

The pass fail decision is as specified in the test procedure in clause 9.2.2.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.3 CQI Reporting under AWGN conditions - PUCCH 1-1 (CSI Reference Symbols)

9.2.3.1_D FDD CQI Reporting under AWGN conditions – PUCCH 1-1 for eDL-MIMO

9.2.3.1_D.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.2.3.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD release 10 and forward UEs of Category 2 and onwards. Applicability requires support for FGI bit 103.

9.2.3.1_D.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.2.3.1_D.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2 -2 in TS 36.213 [10]) shall be used to determine the wideband CQI index for codeword #1 as:

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.2.3.1_D.3-1: PUCCH 1-1 static test (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-3			
	σ	dB	-3			
Cell-specific reference signals			Antenna ports 0, 1			
CSI reference signals			Antenna ports 15,…,18			
Beamforming model			As specified in Annex B.4.3			
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1			
CSI reference signal configuration			0			
Propagation condition and antenna configuration			Clause B.1 (4 x 2)			
CodeBookSubsetRestriction bitmap			0x0000 0000 0100 0000			
SNR (Note 2)		dB	7	8	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-91	-90	-85	-84
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note 3)			
PUCCH Report Type for CQI/PMI			2			
Physical channel for RI reporting			PUCCH Format 2			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	8			
cqi-pmi-ConfigurationIndex			2			
ri-ConfigIndex			1			

Note 1: Reference measurement channel RC.7 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.3.1.

9.2.3.1_D.4 Test description

9.2.3.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.

2. The parameter settings for the cell are set up according to Table 9.2.3.1_D.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.3.1_D.4.3.

9.2.3.1_D.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.3.1_D.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.2.3.1_D.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≤ 0.1 for both codeword #0 and codeword #1

   then and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≥ 0.1 for both codeword #0 and codeword #1

then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.2.3.1_D.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.3.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.3.1_D.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.2.3.1_D.4.3-2: *Void*

Table 9.2.3.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0100 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.2.3.1_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.2.3.1_D.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.2.3.1_D.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.2.3.1_D.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.3.1_D.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.3.2_D TDD CQI Reporting under AWGN conditions – PUCCH 1-1 for eDL-MIMO

9.2.3.2_D.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.2.3.2_D.2 Test applicability

This test applies to all types of E-UTRA TDD release 10 and forward UEs of Category 2 and onwards. Applicability requires support for FGI bit 104.

9.2.3.2_D.3 Minimum conformance requirements

The following requirements apply to UE Category ≥2. The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

For the parameters specified in table 9.2.3.2_D.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2 -2 in TS 36.213 [10]) shall be used to determine the wideband CQI index for codeword #1 as

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.2.3.2_D.3-1: PUCCH 1-1 submode 1 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			9			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-6			
	σ	dB	-3			
CRS reference signals			Antenna ports 0, 1			
CSI reference signals			Antenna ports 15,…,22			
Beamforming model			As specified in Annex B.4.3			
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3			
CSI reference signal configuration			0			
Propagation condition and antenna configuration			Clause B.1 (8 x 2)			
CodeBookSubsetRestriction bitmap			0x0000 0000 0020 0000 0000 0001 0000			
SNR (Note 2)		dB	4	5	10	11
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93	-88	-87
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note 3)			
PUCCH Report Type for CQI/second PMI			2b			
Physical channel for RI reporting			PUSCH			
PUCCH Report Type for RI/ first PMI			5			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	10 or 11			
cqi-pmi-ConfigurationIndex			3			
ri-ConfigIndex			805 (Note 4)			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.7 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7 and #2.

Note 4: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.3.2.

9.2.3.2_D.4 Test description

9.2.3.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure 47.

2. The parameter settings for the cell are set up according to Table 9.2.3.2_D.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.3.2_D.4.3.

9.2.3.2_D.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.3.2_D.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.2.3.2_D.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then, and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports

from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK.* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

If the ratio (NACK /ACK + NACK) ≥ 0.1

then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.2.3.2_D.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.3.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.3.2_D.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.2.3.2_D.4.3-2: *Void*

Table 9.2.3.2_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0020 0000 0000 0001 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.2.3.2_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.2.3.2_D.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	submode1		
}			
ri-ConfigIndex	805	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.2.3.2_D.4.3-6: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

Table 9.2.3.2_D.4.3-7: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.2.3.2_D.4.3-8: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an8	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-6	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.2.3.2_D.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.3.2_D.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.4 CQI Reporting under AWGN conditions - Single CSI Process

9.2.4.1_F FDD CQI Reporting under AWGN conditions - Single CSI Process for CoMP

9.2.4.1_F.1 Test purpose

To verify compliance to the minimum requirements for dual codeword transmission being defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*.

9.2.4.1_F.2 Test applicability

This test applies to all types of E-UTRA FDD category ≥2 UEs release 11 and forward, supporting Maximum CSI processes of One, Three or Four on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.2.4.1_F.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

For the parameters specified in table 9.2.4.1_F-1, and using the downlink physical channels specified in tables C.3.4-1 and C.3.4-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.2.4.1_F.3-1: PUCCH 1-1 static test (FDD)

Parameter		Unit	Test 1			Test 2		
			TP1	TP2		TP1	TP2	
Bandwidth		MHz	10					
PDSCH transmission mode			10					
Downlink power allocation (Note 1)	ρ_A	dB	0	0		0	0	
	ρ_B	dB	0	0		0	0	
	P_c	dB	-3	-3		-3	-3	
	σ	dB	-3	N/A		-3	N/A	
Cell ID			0			0		
Cell-specific reference signals			Antenna ports 0, 1	(Note 2)		Antenna ports 0, 1	(Note 2)	
CSI reference signals			Antenna ports 15,…,18	N/A		Antenna ports 15,…,18	N/A	
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$			5/1	N/A		5/1	N/A	
CSI-RS configuration			0	N/A		0	N/A	
Zero-Power CSI-RS configuration $I_{CSI\text{-}RS}$ / *ZeroPowerCSI-RS* bitmap			1 / 0010000000000000	1 / 1000000000000000		1 / 0010000000000000	1 / 1000000000000000	
CSI-IM configuration $I_{CSI\text{-}RS}$ / *ZeroPowerCSI-RS* bitmap			1 / 0010000000000000	N/A		1 / 0010000000000000	N/A	
CSI process configuration Signal/Interference/Reporting mode			CSI-RS/CSI-IM/PUCCH 1-1			CSI-RS/CSI-IM/PUCCH 1-1		
Propagation condition and antenna configuration			Clause B.1 (4 x 2)	Clause B.1 (2 x 2)		Clause B.1 (4 x 2)	Clause B.1 (2 x 2)	
CodeBookSubsetRestriction bitmap			0x0000 0000 0100 0000	100000		0x0000 0000 0100 0000	100000	
SNR (Note 3)		dB	20	6	7	20	14	15
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-78	-92	-91	-78	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98			-98		
Modulation / Information bit payload			(Note 4)	QPSK / 4392		(Note 4)	QPSK / 4392	
Max number of HARQ transmissions			1	N/A		1	N/A	
Physical channel for CQI/PMI reporting			PUSCH (Note 5)	N/A		PUSCH (Note 5)	N/A	
PUCCH Report Type for CQI/PMI			2	N/A		2	N/A	
PUCCH Report Type for RI			3	N/A		3	N/A	
Reporting periodicity		ms	Npd = 5	N/A		N_{pd} = 5	N/A	
CQI Delay		ms	8	N/A		8	N/A	
cqi-pmi-ConfigurationIndex			2	N/A		2	N/A	
ri-ConfigIndex			1	N/A		1	N/A	
PDSCH scheduled sub-frames			1,2,3,4,6,7,8,9			1,2,3,4,6,7,8,9		
Timing offset between TPs		us	0			0		
Frequency offset between TPs		Hz	0			0		

Note 1: Reference measurement channel RC.10 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 2: REs for antenna ports 0 and 1 CRS have zero transmission power.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4: N/A
Note 5: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

9.2.4.1_F.4 Test description

9.2.4.1_F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and AWGN noise source(s) to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A. Figure 52 (without faders) for UE with 2Rx RF band and Annex A, Figure A.52a (without faders) for 4Rx capable UE without any 2Rx RF bands

2. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.4 and uplink signals according to Annex H.1 and H.3.2.

3. Propagation conditions are set according to Annex B.0.

4. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.4.1_F.4.3.

9.2.4.1_F.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.4.1_F.5-1 as appropriate.

2. The SS shall transmit PDSCH on TP1 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS shall transmit PDSCH not addressed to UE on TP2.The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information on TP1 via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.2.4.1_F.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH on TP1 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median CQI_0 - 1 and the transport format of codeword #1 is according to the wideband median CQI_1 - 1. The SS shall transmit PDSCH not addressed to UE on TP2. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information on TP1 via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process,

discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

If the ratio NACK / (ACK + NACK) ≤ 0.1 for both codeword #0 and codeword #1 then and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH on TP1 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS shall transmit PDSCH not addressed to UE on TP2. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information on TP1 via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio NACK / (ACK + NACK) ≥ 0.1 for both codeword #0 and codeword #1 then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.2.4.1_F.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.4.1_F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 9.2.4.1_F.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.8.2, Condition DL_CoMP			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	PDSCH-ConfigDedicated-DEFAULT		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF {	1 entry		
CSI-RS-ConfigNZP-r11[1]	CSI-RS-ConfigNZP-r11-DEFAULT		
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF {	1 entry		
CSI-RS-ConfigZP-r11[1]	CSI-RS-ConfigZP-r11-DEFAULT		
}			
cqi-ReportConfig-v1130	CQI-ReportConfig-v1130-DEFAULT		
}			

Table 9.2.4.1_F.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3	Due to 4TX	
}			

Table 9.2.4.1_F.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
codebookSubsetRestriction-r10	0x0000 0000 0100 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.2.4.1_F.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT	Using r10 periodic reporting only, since only 1 process	
}			

Table 9.2.4.1_F.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-pmi-ConfigIndex	2	SF#0 and #5 (see Table 7.2.2-1A in TS 36.213)	
ri-ConfigIndex	1	SF#4 and #9 (see Table 7.2.2-1B in TS 36.213)	
}			
}			

Table 9.2.4.1_F.4.3-6: *CSI-RS-ConfigNZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {		Non-Zero Power CSI-RS	
csi-RS-ConfigNZPId-r11	1		
antennaPortsCount-r11	An4		
resourceConfig-r11	0	Parameter: CSI reference signal configuration	
subframeConfig-r11	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
}			

Table 9.2.4.1_F.4.3-7: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {		Zero Power CSI-RS - CSI-IM process must use a ZP CSI-RS resource.	
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	0x0010000000000000	A bitmap because >1 possible	
subframeConfig-r11	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
}			

Table 9.2.4.1_F.4.3-8: *CQI-ReportConfig-v1130-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
cqi-ReportPeriodicProcExtToAddModList-r11	Not present	Using r10 periodic process only, additional extension processes not needed	
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	1 entry	CSI-IM Element	
csi-IM-ConfigId-r11[1]	1		
resourceConfig-r11[1]	2	Has to be one of the ZP configs, 2 corresponds to 0x0010…	
subframeConfig-r11[1]	1		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	1 entry	CSI-RS-Process Element	
csi-ProcessId-r11[1]	1		
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	1		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	-3		
codebookSubsetRestriction-r11[1]	0x0000 0000 0100 0000		
}			
cqi-ReportPeriodicProcId-r11[1]	0	0 is the process defined in CQI-ReportPeriodic.r10	
}			
}			
}			

9.2.4.1_F.5 Test requirement

Table 9.2.4.1_F.5-1: PUCCH 1-1 static test (FDD)

Parameter		Unit	Test 1			Test 2		
			TP1	TP2		TP1	TP2	
Bandwidth		MHz	10					
PDSCH transmission mode			10					
Downlink power allocation (Note 1)	ρ_A	dB	0	0		0	0	
	ρ_B	dB	0	0		0	0	
	P_c	dB	-3	-3		-3	-3	
	σ	dB	-3	N/A		-3	N/A	
Cell ID			0			0		
Cell-specific reference signals			Antenna ports 0, 1	(Note 2)		Antenna ports 0, 1	(Note 2)	
CSI reference signals			Antenna ports 15,…,18	N/A		Antenna ports 15,…,18	N/A	
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A		5/1	N/A	
CSI-RS configuration			0	N/A		0	N/A	
Zero-Power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			1 / 0010000000000000	1 / 1000000000000000		1 / 0010000000000000	1 / 1000000000000000	
CSI-IM configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			1 / 0010000000000000	N/A		1 / 0010000000000000	N/A	
CSI process configuration Signal/Interference/Reporting mode			CSI-RS/CSI-IM/PUCCH 1-1			CSI-RS/CSI-IM/PUCCH 1-1		
Propagation condition and antenna configuration			Clause B.1 (4 x 2)	Clause B.1 (2 x 2)		Clause B.1 (4 x 2)	Clause B.1 (2 x 2)	
CodeBookSubsetRestriction bitmap			0x0000 0000 0100 0000	100000		0x0000 0000 0100 0000	100000	
SNR for UE with 2Rx RF band (Note 3)		dB	20	6	7	20	14	15
SNR for 4Rx UE without 2Rx RF band		dB	17	3	4	17	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-78	-92	-91	-78	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98			-98		
Modulation / Information bit payload			(Note 4)	QPSK / 4392		(Note 4)	QPSK / 4392	
Max number of HARQ transmissions			1	N/A		1	N/A	
Physical channel for CQI/PMI reporting			PUSCH (Note 5)	N/A		PUSCH (Note 5)	N/A	
PUCCH Report Type for CQI/PMI			2	N/A		2	N/A	
PUCCH Report Type for RI			3	N/A		3	N/A	
Reporting periodicity		ms	Npd = 5	N/A		N_{pd} = 5	N/A	
CQI Delay		ms	8	N/A		8	N/A	
cqi-pmi-ConfigurationIndex			2	N/A		2	N/A	
ri-ConfigIndex			1	N/A		1	N/A	
PDSCH scheduled sub-frames			1,2,3,4,6,7,8,9			1,2,3,4,6,7,8,9		
Timing offset between TPs		us	0			0		
Frequency offset between TPs		Hz	0			0		

Note 1:	Reference measurement channel RC.10 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 2:	REs for antenna ports 0 and 1 CRS have zero transmission power.
Note 3:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4:	N/A
Note 5:	To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.
Note 6:	The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB.

The pass fail decision is as specified in the test procedure in clause 9.2.4.1_F.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.4.2_F TDD CQI Reporting under AWGN conditions - Single CSI Process for CoMP

9.2.4.2_F.1 Test purpose

To verify compliance to the minimum requirements for dual codeword transmission being defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*.

9.2.4.2_F.2 Test applicability

This test applies to all types of E-UTRA TDD category ≥2 UEs release 11 and forward, supporting Maximum CSI processes of One, Three or Four on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.2.4.2_F.3 Minimum conformance requirements

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.2.4.2_F.3-1, and using the downlink physical channels specified in tables C.3.4-1 and C.3.4-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213) shall be used to determine the wideband CQI index for codeword #1 as

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.2.4.2_F.3-1: PUCCH 1-1 static test (TDD)

Parameter		Unit	Test 1			Test 2		
			TP1	TP2		TP1	TP2	
Bandwidth		MHz	10					
PDSCH transmission mode			10					
Uplink downlink configuration			2					
Special subframe configuration			4					
Downlink power allocation (Note 1)	ρ_A	dB	0	0		0	0	
	ρ_B	dB	0	0		0	0	
	P_c	dB	-6	-6		-6	-6	
	σ	dB	-3	N/A		-3	N/A	
Cell ID			0			0		
Cell-specific reference signals			Antenna ports 0, 1	(Note 2)		Antenna ports 0, 1	(Note 2)	
CSI reference signals			Antenna ports 15,…,22	N/A		Antenna ports 15,…,22	N/A	
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$			5/3	N/A		5/3	N/A	
CSI-RS configuration			0	N/A		0	N/A	
Zero-Power CSI-RS configuration $I_{CSI\text{-}RS}$ / *ZeroPowerCSI-RS*bitmap			3 / 0010000000000000	3 / 1000010000000000		3 / 0010000000000000	3 / 1000010000000000	
CSI-IM configuration $I_{CSI\text{-}RS}$ / *ZeroPowerCSI-RS* bitmap			3 / 0010000000000000	N/A		3 / 0010000000000000	N/A	
CSI process configuration Signal/Interference/Reporting mode			CSI-RS/CSI-IM/PUCCH 1-1			CSI-RS/CSI-IM/PUCCH 1-1		
Propagation condition and antenna configuration			Clause B.1 (8 x 2)	Clause B.1 (2 x 2)		Clause B.1 (8 x 2)	Clause B.1 (2 x 2)	
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 0000 0000 0001 0000	100000		0x0000 0000 0000 0000 0000 0001 0000	100000	
SNR (Note 3)		dB	17	6	7	17	14	15
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-81	-92	-91	-81	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98			-98		
Modulation / Information bit payload			(Note 4)	QPSK / 4392		(Note 4)	QPSK / 4392	
Max number of HARQ transmissions			1	N/A		1	N/A	
Physical channel for CQI/PMI reporting			PUSCH (Note 5)	N/A		PUSCH (Note 5)	N/A	
PUCCH Report Type for CQI/second PMI			2b	N/A		2b	N/A	
Physical channel for RI reporting			PUSCH	N/A		PUSCH	N/A	
PUCCH Report Type for RI/ first PMI			5	N/A		5	N/A	
Reporting periodicity		ms	N_{pd} = 5	N/A		N_{pd} = 5	N/A	
CQI Delay		ms	10 or 11	N/A		10 or 11	N/A	
cqi-pmi-ConfigurationIndex			3	N/A		3	N/A	
ri-ConfigIndex			805 (Note 6)	N/A		805 (Note 6)	N/A	
ACK/NACK feedback mode			Multiplexing	N/A		Multiplexing	N/A	
PDSCH scheduled sub-frames			3,4,8,9			3,4,8,9		
Timing offset between TPs		us	0			0		
Frequency offset between TPs		Hz	0			0		

Note 1:	Reference measurement channel RC.10 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 2:	REs for antenna ports 0 and 1 CRS have zero transmission power.
Note 3:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4:	N/A
Note 5:	To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7 and #2.
Note 6:	RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.

The normative reference for this requirement is TS 36.101 clause 9.2.4.2.

9.2.4.2_F.4 Test description

9.2.4.2_F.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.53(without faders) for UE with 2Rx RF band and Annex A, Figure A.53a (without faders) for 4Rx capable UE without any 2Rx RF bands.

2. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.4 and uplink signals according to Annex H.1 and H.3.2.

3. Propagation conditions are set according to Annex B.0.

4. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.4.2_F.4.3.

9.2.4.2_F.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.4.2_F.5-1 as appropriate.

2. The SS shall transmit PDSCH on TP1 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS shall transmit PDSCH not addressed to UE on TP2. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information on TP1 via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe # 2 and subframe #7 (Table A.4.1-2). The UE will send periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI0 is defined as Wideband CQI of codeword #0 and wideband CQI1 is calculated according to clause 9.2.4.2_F.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for

each codewords. Wideband Median CQI0 is based on the wideband CQI0 and wideband median CQI1 is based on the wideband CQI1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI1 values are in the range (Median CQI1 - 1) ≤ Median CQI ≤ (Median CQI1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH on TP1 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI0 - 1 and the transport format of codeword #1 is according to the wideband median CQI1 – 1. The SS shall transmit PDSCH not addressed to UE on TP2. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information on TP1 via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio NACK / (ACK + NACK) ≤ 0.1 for both codeword #0 and codeword #1 then go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH on TP1 via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband medianCQI0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI1 + 1. The SS shall transmit PDSCH not addressed to UE on TP2. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information on TP1 via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio NACK / (ACK + NACK) ≥ 0.1 for both codeword #0 and codeword #1 then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.2.4.2_F.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.2.4.2_F.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 9.2.4.2_F.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.8.2, Condition DL_CoMP			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	PDSCH-ConfigDedicated-DEFAULT		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF {	1 entry		
CSI-RS-ConfigNZP-r11[1]	CSI-RS-ConfigNZP-r11-DEFAULT		
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF {	1 entry		
CSI-RS-ConfigZP-r11[1]	CSI-RS-ConfigZP-r11-DEFAULT		
}			
cqi-ReportConfig-v1130	CQI-ReportConfig-v1130-DEFAULT		
}			

Table 9.2.4.2_F.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3	Due to 8TX	
}			

Table 9.2.4.2_F.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
codebookSubsetRestriction-r10	0x0000 0000 0000 0000 0000 0001 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.2.4.2_F.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT	Using r10 periodic reporting only, since only 1 process	
}			

Table 9.2.4.2_F.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-pmi-ConfigIndex	3	SF #2 and #7(see Table 7.2.2-1C in TS 36.213)	
ri-ConfigIndex	805	Maximum 32*5=160ms periodicity for minimal cqi-pmi conflicts(see Table 7.2.2-1B in TS 36.213)	
}			
}			

Table 9.2.4.2_F.4.3-6: *CSI-RS-ConfigNZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {		Non-Zero Power CSI-RS	
csi-RS-ConfigNZPId-r11	1		
antennaPortsCount-r11	An8		
resourceConfig-r11	0	Parameter: CSI reference signal configuration	
subframeConfig-r11	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
}			

Table 9.2.4.2_F.4.3-7: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {		Zero Power CSI-RS - CSI-IM process must use a ZP CSI-RS resource.	
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	0x0010000000000000	A bitmap because >1 possible	
subframeConfig-r11	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
}			

Table 9.2.4.2_F.4.3-8: *CQI-ReportConfig-v1130-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
cqi-ReportPeriodicProcExtToAddModList-r11	Not present	Using r10 periodic process only, additional extension processes not needed	
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	1 entry	CSI-IM Element	
csi-IM-ConfigId-r11[1]	1		
resourceConfig-r11[1]	2	Has to be one of the ZP configs, 2 corresponds to 0x0010…	
subframeConfig-r11[1]	3		
}			
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	1 entry	CSI-RS-Process Element	
csi-ProcessId-r11[1]	1		
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	1		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	-6		
codebookSubsetRestriction-r11[1]	0x0000 0000 0000 0000 0000 0001 0000		
}			
cqi-ReportPeriodicProcId-r11[1]	0	0 is the process defined in CQI-ReportPeriodic.r10	
}			
}			
}			

Table 9.2.4.2_F.4.3-9: *TDD-Config-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.2.4.2_F.5 Test requirement

Table 9.2.4.2_F.5-1: PUCCH 1-1 static test (TDD)

Parameter		Unit	Test 1			Test 2		
			TP1	TP2		TP1	TP2	
Bandwidth		MHz	10					
PDSCH transmission mode			10					
Uplink downlink configuration			2					
Special subframe configuration			4					
Downlink power allocation (Note 1)	ρ_A	dB	0	0		0	0	
	ρ_B	dB	0	0		0	0	
	P_c	dB	-6	-6		-6	-6	
	σ	dB	-3	N/A		-3	N/A	
Cell ID			0			0		
Cell-specific reference signals			Antenna ports 0, 1	(Note 2)		Antenna ports 0, 1	(Note 2)	
CSI reference signals			Antenna ports 15,…,22	N/A		Antenna ports 15,…,22	N/A	
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3	N/A		5/3	N/A	
CSI-RS configuration			0	N/A		0	N/A	
Zero-Power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS*bitmap			3 / 0010000000000000	3 / 1000010000000000		3 / 0010000000000000	3 / 1000010000000000	
CSI-IM configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			3 / 0010000000000000	N/A		3 / 0010000000000000	N/A	
CSI process configuration Signal/Interference/Reporting mode			CSI-RS/CSI-IM/PUCCH 1-1			CSI-RS/CSI-IM/PUCCH 1-1		
Propagation condition and antenna configuration			Clause B.1 (8 x 2)	Clause B.1 (2 x 2)		Clause B.1 (8 x 2)	Clause B.1 (2 x 2)	
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 0000 0000 0001 0000	100000		0x0000 0000 0000 0000 0000 0001 0000	100000	
SNR for UE with 2Rx RF band (Note 3)		dB	17	6	7	17	14	15
SNR for 4Rx UE without 2Rx RF band		dB	14	3	4	14	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-81	-92	-91	-81	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98			-98		
Modulation / Information bit payload			(Note 4)	QPSK / 4392		(Note 4)	QPSK / 4392	
Max number of HARQ transmissions			1	N/A		1	N/A	
Physical channel for CQI/PMI reporting			PUSCH (Note 5)	N/A		PUSCH (Note 5)	N/A	
PUCCH Report Type for CQI/second PMI			2b	N/A		2b	N/A	
Physical channel for RI reporting			PUSCH	N/A		PUSCH	N/A	
PUCCH Report Type for RI/ first PMI			5	N/A		5	N/A	
Reporting periodicity		ms	N_{pd} = 5	N/A		N_{pd} = 5	N/A	
CQI Delay		ms	10 or 11	N/A		10 or 11	N/A	
cqi-pmi-ConfigurationIndex			3	N/A		3	N/A	
ri-ConfigIndex			805 (Note 6)	N/A		805 (Note 6)	N/A	
ACK/NACK feedback mode			Multiplexing	N/A		Multiplexing	N/A	
PDSCH scheduled sub-frames			3,4,8,9			3,4,8,9		
Timing offset between TPs		us	0			0		

Frequency offset between TPs	Hz	0	0

Note 1: Reference measurement channel RC.10 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 2: REs for antenna ports 0 and 1 CRS have zero transmission power.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4: N/A
Note 5: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7 and #2.
Note 6: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.
Note 7: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

The pass fail decision is as specified in the test procedure in clause 9.2.4.2_F.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.5 FFS

9.2.6 CQI Reporting under AWGN Conditions-PUSCH 3-0 – LAA (Cell-Specific Reference Symbols)

9.2.6.1 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with FDD as Pcell (PUSCH 3-0)

9.2.6.1.1 Test purpose

To verify the variance of the wideband CQI reports for LAA SCell is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1. To verify that the UE reports different CQI indices for LAA SCell if the cell experiences different SNR(s) caused by different power boosts.

9.2.6.1.2 Test applicability

This test applies to all types of E-UTRA FDD Release 13 and forward UEs of category ≥ 1 that support LAA with E-UTRA FDD as PCell.

9.2.6.1.3 Minimum conformance requirements

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.2.6.1-1, Table 9.2.6.1-2, and using the downlink physical channels specified in tables C.3.6-1 and C.3.6-2, two sets of CQI reports are obtained for LAA Scell. The first one is obtained by reports whose reference resource is in the downlink subframes with 6 dB transmission power boost, i.e., high power subframes. The second one is obtained by reports whose reference resource is in the downlink subframe with 0 dB transmission power boost, i.e., low power subframe. In the test, PDSCH transport format in high power subframe is determined by first set of CQI reports and PDSCH transport format in low power subframe is determined by second set of CQI reports.

The reported CQI value in the first set of reports shall be in the range of ±1 of the reported median more than 90% of the first set of reports. The reported CQI value in the second set of reports shall be in the range of ±1 of the reported median more than 90% of the second set of reports.

If the PDSCH BLER in the high power subframes using the transport format indicated by wideband CQI median is less than or equal to 0.1, the BLER in high power subframes using the transport format indicated by the (wideband CQI median + 1) shall be greater than 0.1. If the PDSCH BLER in the high power subframes using the transport format

indicated by the wideband CQI median is greater than 0.1, the BLER in high power subframes using transport format indicated by (wideband CQI median – 1) shall be less than or equal to 0.1.

If the PDSCH BLER in the low power subframes using the transport format indicated by wideband CQI median is less than or equal to 0.1, the BLER in low power subframes using the transport format indicated by the (wideband CQI median + 1) shall be greater than 0.1. If the PDSCH BLER in the low power subframes using the transport format indicated by the wideband CQI median is greater than 0.1, the BLER in low power subframes using transport format indicated by (wideband CQI median – 1) shall be less than or equal to 0.1.

The value of the wideband CQI median for first set of CQI reports minus the wideband CQI median for second set of CQI reports shall be larger than or equal to 2 in Test 1 and Test 2.

Table 9.2.6.1.3-1: Parameters for PUSCH 3-0 static test on FDD Pcell

Parameter		Unit	Value
Bandwidth		MHz	20
PDSCH transmission mode			3
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
Propagation condition and antenna configuration			Clause B.1 (2 x 2)
SNR		dB	20
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Max number of HARQ transmissions			1
Reporting mode			PUSCH 3-0
CSI request field			'10'
trigger1 (Note 2)			01000000
trigger2 (Note 2)			00000000

Note 1: PCell is used for HARQ ACK/NACK feedback and aperiodic CSI triggering/reporting. PDSCH is not transmitted on PCell.

Note 2: trigger1 and trigger2 are defined as TS 36.331 for aperiodicCSI-Trigger. They Indicate for which serving cell(s) the aperiodic CSI report is triggered when one or more SCells are configured. PDCCH DCI format 0 with a trigger for aperiodic CQI is transmitted periodically in subframe 1 and subframe 6 with 5ms periodicity.

Table 9.2.6.1.3-2: PUSCH 3-0 static test on LAA Scell

Parameter		Unit	Test 1	Test 2
Bandwidth		MHz	20	
PDSCH transmission mode			3	
Downlink power allocation	ρ_A	dB	-3	
	ρ_B	dB	-3	
	σ	dB	0	
Propagation condition and antenna configuration			Clause B.1 (2x2)	
SNR in subframes with 6 dB power boost (Note 2)		dB	9	10
SNR in subframes with 0 dB power boost (Note 2)		dB	3	4
$\hat{I}_{or}^{(j)}$ in subframes with 6 dB power		dB[mW/15kHz]	-89	-88
$\hat{I}_{or}^{(j)}$ in subframes with 0 dB power		dB[mW/15kHz]	-95	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	
MBSFN subframe Configuration			Non-MBSFN	
Cell Id			0	
dmtc-Periodicity		ms	80	
dmtc-Offset			0	
Number of control OFDM symbols			3	
Max number of HARQ transmissions			1	
Reporting mode			PUSCH 3-0	
PDSCH transmission model	Basic model		As specified in Section B.7	
	subframeStartPosition		s0	
	Number of occupied symbols per subframe		14	
	The number of subframes set ( ) per burst		{3,8}	
	Power configuration for each burst		$\hat{I}_{or}^{(j)}$ is randomly selected from 6 dB power boosting or 0 dB power boosting with equal probability	

Note 1: Reference measurement channel RC.1 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, except for category 1 UE use RC.4 FDD with two sided dynamic OCNG Pattern OP.2 FDD as described in Annex A.5.1.2.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.6.1.

9.2.6.1.4 Test description

9.2.6.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: 20 MHz + 20 MHz, as defined in TS 36.508 [7] clause 4.3.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without faders) as appropriate.

2. The parameter settings for the cell are set up according to Table 9.2.6.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.6.1.4.3.

9.2.6.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. Configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 9.2.6.1.4.3.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, SNR and the power configuration of each burst for LAA SCell according to Table 9.2.6.1.3-2.

5. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. Continue transmission of the PDSCH until at least 2000 wideband CQI reports have been gathered for each, low power subframes and high power subframes. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request field set to 10 and I_MCS=29 and N_PRB allocated to be less or equal to 4.In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI.

6. Set up a relative frequency distribution for the first 2000 reported wideband CQI-values whose reference resource is in the downlink subframe with 6 dB transmission power boost, i.e., high power subframe. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as Median CQI_{high} value.

7. If Median CQI_{high} is equal to 1 or 15, or 1800 or less of the wideband CQI values for high power subframes are in the range (Median CQI_{high} - 1) $\leq$ Median $CQI_{high} \leq$ (Median CQI_{high} + 1), then fail the UE.

8. Set up a relative frequency distribution for the first 2000 reported wideband CQI-values whose reference resource is in the downlink subframe with 0 dB transmission power boost, i.e., low power subframe. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as Median CQI_{low} value.

9. If Median CQI_{low} is equal to 1 or 15, or 1800 or less of the wideband CQI values for low power subframes are in the range (Median CQI_{low} - 1) $\leq$ Median $CQI_{low} \leq$ (Median CQI_{low} + 1), then fail the UE.

10. If Median CQI_{high} - Median $CQI_{low} < 2$ then fail the UE.

11. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband median-CQI value Median CQI_{high} for high power subframes and according to the wideband median-CQI value Median CQI_{low} for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. The responses are then recorded in two sets. The first set is obtained by responses for high power subframes. The second set is obtained by responses for low power subframes. Continue to gather data until the number of filtered ACK+NACK responses reaches at least 1000 for each set.

    For the filtered ACK and NACK responses:

If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then go to step 12.

If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK /ACK + NACK) > 0.1 for low power subframes then go to step 13.

If the ratio (NACK /ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then go to step 14.

If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then go to step 15.

12. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} + 1) for high power subframes and according to wideband CQI value (Median CQI_{low} + 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

13. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} + 1) for high power subframes and according to wideband CQI value (Median CQI_{low} - 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

14. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} - 1) for high power subframes and according to wideband CQI value (Median CQI_{low} + 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

15. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} - 1) for high power subframes and according to wideband CQI value (Median CQI_{low} - 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

16. If both Tests have not been done, then repeat the same procedure (steps 1 to 15) with test conditions according to Table 9.2.6.1.3-1 and Table 9.2.6.1.3-2 for the other Test as appropriate. Otherwise pass the UE.

9.2.6.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.6.1.4.3-1: CQI-ReportConfig-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 9.2.6.1.4.3-2: CQI-ReportAperiodic-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm30		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	01000000	Configure report only for SCell	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 9.2.6.1.4.3-3: PDSCH-ConfigDedicated-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.2.6.1.4.3-4: *MeasDS-Config-DEFAULT*

Derivation Path: 36.508 clause 4.6.6			
Information Element	**Value/remark**	**Comment**	**Condition**
MeasDS-Config-DEFAULT ::= CHOICE {			
release	NULL		
setup SEQUENCE {			
dmtc-PeriodOffset-r12 CHOICE {			
ms80-r12	0		
}			
ds-OccasionDuration-r12 CHOICE {			
durationTDD-r12	1		
}			
}			
}			

9.2.6.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.6.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.6.2 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with TDD as Pcell (PUSCH 3-0)

9.2.6.2.1 Test purpose

To verify the variance of the wideband CQI reports for LAA SCell is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1. To verify that the UE reports different CQI indices for LAA SCell if the cell experiences different SNR(s) caused by different power boosts.

9.2.6.2.2 Test applicability

This test applies to all types of E-UTRA TDD Release 13 and forward UEs of category ≥ 1 that support LAA with E-UTRA TDD as PCell.

9.2.6.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.2.6.2.3-1, Table 9.2.6.2.3-2, and using the downlink physical channels specified in tables C.3.6-1 and C.3.6-2, two sets of CQI reports are obtained for LAA Scell. The first one is obtained by reports whose reference resource is in the downlink subframes with 6 dB transmission power boost, i.e., high power subframes. The second one is obtained by reports whose reference resource is in the downlink subframe with 0 dB transmission power boost, i.e., low power subframe. In the test, PDSCH transport format in high power subframe is determined by first set of CQI reports and PDSCH transport format in low power subframe is determined by second set of CQI reports.

The reported CQI value in the first set of reports shall be in the range of ±1 of the reported median more than 90% of the first set of reports. The reported CQI value in the second set of reports shall be in the range of ±1 of the reported median more than 90% of the second set of reports.

If the PDSCH BLER in the high power subframes using the transport format indicated by wideband CQI median is less than or equal to 0.1, the BLER in high power subframes using the transport format indicated by the (wideband CQI median + 1) shall be greater than 0.1. If the PDSCH BLER in the high power subframes using the transport format indicated by the wideband CQI median is greater than 0.1, the BLER in high power subframes using transport format indicated by (wideband CQI median - 1) shall be less than or equal to 0.1.

If the PDSCH BLER in the low power subframes using the transport format indicated by wideband CQI median is less than or equal to 0.1, the BLER in low power subframes using the transport format indicated by the (wideband CQI median + 1) shall be greater than 0.1. If the PDSCH BLER in the low power subframes using the transport format indicated by the wideband CQI median is greater than 0.1, the BLER in low power subframes using transport format indicated by (wideband CQI median - 1) shall be less than or equal to 0.1.

The value of the wideband CQI median for first set of CQI reports minus the wideband CQI median for second set of CQI reports shall be larger than or equal to 2 in Test 1 and Test 2.

Table 9.2.6.2.3-1: Parmeters for PUSCH 3-0 static test on TDD Pcell

Parameter		Unit	Value
Bandwidth		MHz	20
Uplink downlink configuration			2
Special subframe configuration			4
PDSCH transmission mode			3
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
Propagation condition and antenna configuration			Clause B.1 (2 x 2)
SNR		dB	20
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Max number of HARQ transmissions			1
Reporting mode			PUSCH 3-0
CSI request field			'10'
trigger1 (Note 2)			01000000
trigger2 (Note 2)			00000000

Note 1: PCell is used for HARQ ACK/NACK feedback and aperiodic CSI triggering/reporting. PDSCH is not transmitted on PCell.

Note 2: trigger1 and trigger2 are defined as TS 36.331 for aperiodicCSI-Trigger. They Indicate for which serving cell(s) the aperiodic CSI report is triggered when one or more SCells are configured. PDCCH DCI format 0 with a trigger for aperiodic CQI is transmitted periodically in subframe 3 and subframe 8 with 5ms periodicity.

Table 9.2.6.2.3-2: PUSCH 3-0 static test on LAA Scell

Parameter		Unit	Test 1	Test 2
Bandwidth		MHz	20	
PDSCH transmission mode			3	
Downlink power allocation	ρ_A	dB	-3	
	ρ_B	dB	-3	
	σ	dB	0	
Propagation condition and antenna configuration			Clause B.1 (2x2)	
SNR in subframes with 6 dB power boost (Note 2)		dB	9	10
SNR in subframes with 0 dB power boost (Note 2)		dB	3	4
$\hat{I}_{or}^{(j)}$ in subframes with 6 dB power		dB[mW/15kHz]	-89	-88
$\hat{I}_{or}^{(j)}$ in subframes with 0 dB power		dB[mW/15kHz]	-95	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	
MBSFN subframe Configuration			Non-MBSFN	
Cell Id			0	
dmtc-Periodicity		ms	80	
dmtc-Offset			0	
Number of control OFDM symbols			3	
Max number of HARQ transmissions			1	
Reporting mode			PUSCH 3-0	
PDSCH transmission model	Basic model		As specified in Section B.7	
	subframeStartPosition		s0	
	Number of occupied symbols per subframe		14	
	The number of subframes set ( ) per burst		{3,8}	
	Power configuration for each burst		$\hat{I}_{or}^{(j)}$ is randomly selected from 6 dB power boosting or 0 dB power boosting with equal probability	

Note 1: Reference measurement channel RC.1 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, except for category 1 UE use RC.4 FDD with two sided dynamic OCNG Pattern OP.2 FDD as described in Annex A.5.1.2.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.6.2.

9.2.6.2.4 Test description

9.2.6.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: 20 MHz + 20 MHz, as defined in TS 36.508 [7] clause 4.3.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without faders) as appropriate.
2. The parameter settings for the cell are set up according to Table 9.2.6.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.6.2.4.3.

9.2.6.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. Configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 9.2.6.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, SNR and the power configuration of each burst for LAA SCell according to Table 9.2.6.2.3-2.
5. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. Continue transmission of the PDSCH until at least 2000 wideband CQI reports have been gathered for each, low power subframes and high power subframes. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request field set to 10 and I_MCS=29 and N_PRB allocated to be less or equal to 4.In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI.
6. Set up a relative frequency distribution for the first 2000 reported wideband CQI-values whose reference resource is in the downlink subframe with 6 dB transmission power boost, i.e., high power subframe. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as Median CQI_{high} value.
7. If Median CQI_{high} is equal to 1 or 15, or 1800 or less of the wideband CQI values for high power subframes are in the range (Median CQI_{high} - 1) ≤ Median CQI_{high} ≤ (Median CQI_{high} + 1), then fail the UE.
8. Set up a relative frequency distribution for the first 2000 reported wideband CQI-values whose reference resource is in the downlink subframe with 0 dB transmission power boost, i.e., low power subframe. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as Median CQI_{low} value.
9. If Median CQI_{low} is equal to 1 or 15, or 1800 or less of the wideband CQI values for low power subframes are in the range (Median CQI_{low} - 1) ≤ Median CQI_{low} ≤ (Median CQI_{low} + 1), then fail the UE.
10. If Median CQI_{high} - Median CQI_{low} < 2 then fail the UE.
11. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband median-CQI value Median CQI_{high} for high power subframes and according to the wideband median-CQI value Median CQI_{low} for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. The responses are then recorded in two sets. The first set is obtained by responses for high power subframes. The second set is obtained by responses for low power subframes. Continue to gather data until the number of filtered ACK+NACK responses reaches at least 1000 for each set.

    For the filtered ACK and NACK responses:

If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then go to step 12.

If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK /ACK + NACK) > 0.1 for low power subframes then go to step 13.

If the ratio (NACK /ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then go to step 14.

If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then go to step 15.

12. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} + 1) for high power subframes and according to wideband CQI value (Median CQI_{low} + 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

13. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} + 1) for high power subframes and according to wideband CQI value (Median CQI_{low} - 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

14. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} - 1) for high power subframes and according to wideband CQI value (Median CQI_{low} + 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

15. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} - 1) for high power subframes and according to wideband CQI value (Median CQI_{low} - 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

16. If both Tests have not been done, then repeat the same procedure (steps 1 to 15) with test conditions according to Table 9.2.6.2.3-1 and Table 9.2.6.2.3-2 for the other Test as appropriate. Otherwise pass the UE.

9.2.6.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.6.2.4.3-1: CQI-ReportConfig-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 9.2.6.2.4.3-2: CQI-ReportAperiodic-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm30		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	01000000	Configure report only for SCell	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 9.2.6.2.4.3-3: PDSCH-ConfigDedicated-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.2.6.2.4.3-4: *MeasDS-Config-DEFAULT*

Derivation Path: 36.508 clause 4.6.6			
Information Element	**Value/remark**	**Comment**	**Condition**
MeasDS-Config-DEFAULT ::= CHOICE {			
release	NULL		
setup SEQUENCE {			
dmtc-PeriodOffset-r12 CHOICE {			
ms80-r12	0		
}			
ds-OccasionDuration-r12 CHOICE {			
durationTDD-r12	1		
}			
}			
}			

Table 9.2.6.2.4.3-5: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3-23			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
}			

9.2.6.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.6.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.7 CQI Reporting under AWGN Conditions-PUSCH 3-1 - LAA

9.2.7.1 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with FDD as Pcell (PUSCH 3-1)

9.2.7.1.1 Test purpose

To verify the variance of the wideband CQI reports for LAA SCell is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1. To verify that the UE reports different CQI indices for LAA SCell if the cell experiences different SNR(s) caused by different power boosts.

9.2.7.1.2 Test applicability

This test applies to all types of E-UTRA FDD Release 13 and forward UEs that support LAA with E-UTRA FDD as PCell. Applicability requires support for FGI bit 103.

9.2.7.1.3 Minimum conformance requirements

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.2.7.1.3-1, Table 9.2.7.1.3-2 and using the downlink physical channels specified in tables C.3.6-1 and C.3.6-2, two sets of CQI reports are obtained for LAA Scell, The first one is obtained by reports whose reference resource is in the downlink subframes with 6 dB transmission power boost, i.e., high power subframes. The second one is obtained by reports whose reference resource is in the downlink subframe with 0 dB transmission power boost, i.e., low power subframe. In the test, PDSCH transport format in high power subframe is determined by first set of CQI reports and PDSCH transport format in low power subframe is determined by second set of CQI reports.

The reported CQI value in the first set of reports shall be in the range of ±1 of the reported median more than 90% of the first set of reports. The reported CQI value in the second set of reports shall be in the range of ±1 of the reported median more than 90% of the second set of reports.

If the PDSCH BLER in the high power subframes using the transport format indicated by wideband CQI median is less than or equal to 0.1, the BLER in high power subframes using the transport format indicated by the (wideband CQI median + 1) shall be greater than 0.1. If the PDSCH BLER in high power subframes using the transport format indicated by the wideband CQI median is greater than 0.1, the BLER in high power subframes using transport format indicated by (wideband CQI median – 1) shall be less than or equal to 0.1.

If the PDSCH BLER in the low power subframes using the transport format indicated by wideband CQI median is less than or equal to 0.1, the BLER in low power subframes using the transport format indicated by the (wideband CQI median + 1) shall be greater than 0.1. If the PDSCH BLER in the low power subframes using the transport format indicated by the wideband CQI median is greater than 0.1, the BLER in low power subframes using transport format indicated by (wideband CQI median – 1) shall be less than or equal to 0.1.

The value of the wideband CQI for the first set of CQI report minus the wideband CQI median for second set of CQI shall be larger than or equal to 2 in Test 1 and Test 2.

Table 9.2.7.1.3-1: Parameters for PUSCH 3-1 static test on FDD Pcell

Parameter		Unit	Value
Bandwidth		MHz	20
PDSCH transmission mode			9
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	P_C	dB	0
	σ	dB	0
Propagation condition and antenna configuration			Clause B.1 (2 x 2)
SNR		dB	20
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Beamforming Model			As specified in Section B.4.3
CRS reference signals			Antenna ports 0
CSI reference signals			Antenna ports 15, 16
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 1
CSI-RS reference signal configuration			4
CodeBookSubsetRestriction bitmap			000001
Number of control OFDM symbols			3
Max number of HARQ transmissions			1
Reporting mode			PUSCH 3-1
CSI request field			'10'
trigger1 (Note 2)			01000000
trigger2 (Note 2)			00000000

Note 1: PCell is used for HARQ ACK/NACK feedback and aperiodic CSI triggering/reporting. PDSCH is not transmitted on PCell.

Note 2: trigger1 and trigger2 are defined as TS 36.331 for aperiodicCSI-Trigger. They Indicate for which serving cell(s) the aperiodic CSI report is triggered when one or more SCells are configured. PDCCH DCI format 0 with a trigger for aperiodic CQI is transmitted periodically in subframe 1 and subframe 6 with 5ms periodicity.

Table 9.2.7.1.3-2: PUSCH 3-1 static test on LAA Scell

Parameter		Unit	Test 1	Test 2
Bandwidth		MHz	20 MHz	
Transmission mode			9	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	P_C	dB	0	
	σ	dB	0	
SNR in subframes with 6 dB power boost (Note 3)		dB	9	10
SNR in subframes with 0 dB power boost (Note 3)			3	4
$\hat{I}_{or}^{(j)}$ in subframes with 6 dB power			-89	-88
$\hat{I}_{or}^{(j)}$ in subframes with 0 dB power		dB[mW/15kHz]	-95	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
MBSFN subframe Configuration			Non-MBSFN	
Cell Id			0	
dmtc-Periodicity		ms	80	
dmtc-Offset			0	
Propagation condition and antenna configuration			Clause B.1 (2x2)	
Beamforming Model			As specified in Section B.4.3	
CRS reference signals			Antenna ports 0	
CSI reference signals			Antenna ports 15, 16	
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/ 1	
CSI-RS reference signal configuration			4	
CodeBookSubsetRestriction bitmap			000001	
Number of control OFDM symbols			3	
Max number of HARQ transmissions			1	
Reporting mode			PUSCH 3-1	
PDSCH transmission model	Basic model		As specified in Section B.7	
	subframeStartPosition		s0	
	Number of occupied symbols per subframe		14	
	The number of subframes set ( ) per burst		{3, 8}	
	Power configuration for each burst		$\hat{I}_{or}^{(j)}$ is randomly selected from 6 dB power boosting or 0 dB power boosting with equal probability	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.8 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.7.1.

9.2.7.1.4 Test description

9.2.7.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: 20MHz, as defined in TS 36.508 [7] clause 4.3.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without faders) as appropriate.
2. The parameter settings for the cell are set up according to Table 9.2.7.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.7.1.4.3.

9.2.7.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. Configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 9.2.7.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, SNR and the power configuration of each burst for LAA SCell according to Table 9.2.7.1.3-2.
5. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. Continue transmission of the PDSCH until at least 2000 wideband CQI reports have been gathered for each, low power subframes and high power subframes. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request field set to 10 and I_MCS=29 and N_PRB allocated to be less or equal to 4.In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI.
6. Set up a relative frequency distribution for the first 2000 reported wideband CQI-values whose reference resource is in the downlink subframe with 6 dB transmission power boost, i.e., high power subframe. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as Median CQI_{high} value.
7. If Median CQI_{high} is equal to 1 or 15, or 1800 or less of the wideband CQI values for high power subframes are in the range (Median CQI_{high} - 1) ≤ Median CQI_{high} ≤ (Median CQI_{high} + 1), then fail the UE.
8. Set up a relative frequency distribution for the first 2000 reported wideband CQI-values whose reference resource is in the downlink subframe with 0 dB transmission power boost, i.e., low power subframe. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as Median CQI_{low} value.
9. If Median CQI_{low} is equal to 1 or 15, or 1800 or less of the wideband CQI values for low power subframes are in the range (Median CQI_{low} - 1) ≤ Median CQI_{low} ≤ (Median CQI_{low} + 1), then fail the UE.
10. If Median CQI_{high} - Median CQI_{low} < 2 then fail the UE.
11. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband median-CQI value Median CQI_{high} for high power subframes and according to the wideband median-CQI value Median CQI_{low} for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of

responses for each HARQ process, discard all the statDTX responses. The responses are then recorded in two sets. The first set is obtained by responses for high power subframes. The second set is obtained by responses for low power subframes. Continue to gather data until the number of filtered ACK+NACK responses reaches at least 1000 for each set.

For the filtered ACK and NACK responses:

If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then go to step 12.

If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK /ACK + NACK) > 0.1 for low power subframes then go to step 13.

If the ratio (NACK /ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then go to step 14.

If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then go to step 15.

12. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} + 1) for high power subframes and according to wideband CQI value (Median CQI_{low} + 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

13. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} + 1) for high power subframes and according to wideband CQI value (Median CQI_{low} - 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

14. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} - 1) for high power subframes and according to wideband CQI value (Median CQI_{low} + 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

15. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} - 1) for high power subframes and according to wideband CQI value (Median CQI_{low} - 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

16. If both Tests have not been done, then repeat the same procedure (steps 1 to 15) with test conditions according to Table 9.2.7.1.3-1 and Table 9.2.7.1.3-2 for the other Test as appropriate. Otherwise pass the UE.

9.2.7.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.7.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Table 9.2.7.1.4.3-2: PhysicalConfigDedicatedSCell-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10	AntennaInfoDedicated-r10		
crossCarrierSchedulingConfig-r10	Not present		
csi-RS-Config- r10 ::= SEQUENCE {	CSI-RS-Config-r10		
pdsch-ConfigDedicated-r10	PDSCH-ConfigDedicated-DEFAULT		
}			
ul-Configuration-r10	Not present		
}			

Table 9.2.7.1.4.3-3: AntennaInfoDedicated-r10

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000001		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.2.7.1.4.3-4: CQI-ReportConfig-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 9.2.7.1.4.3-5: CQI-ReportAperiodic-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm31		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	01000000	Configure report only for SCell	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 9.2.7.1.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	2 antenna ports for transmission of CSI reference signals	
resourceConfig-r10	4		
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}}$ = $I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 9.2.7.1.4.3-7: PDSCH-ConfigDedicated-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

9.2.7.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.7.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.2.7.2 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with TDD as Pcell (PUSCH 3-1)

9.2.7.2.1 Test purpose

To verify the variance of the wideband CQI reports for LAA SCell is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1. To verify that the UE reports different CQI indices for LAA SCell if the cell experiences different SNR(s) caused by different power boosts.

9.2.7.2.2 Test applicability

This test applies to all types of E-UTRA TDD Release 13 and forward UEs that support LAA with E-UTRA TDD as PCell. Applicability requires support for FGI bit 103.

9.2.7.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.2.7.2.3-1, Table 9.2.7.2.3-2 and using the downlink physical channels specified in tables C.3.6-1 and C.3.6-2, two sets of CQI reports are obtained for LAA Scell, The first one is obtained by reports whose reference resource is in the downlink subframes with 6 dB transmission power boost, i.e., high power subframes. The second one is obtained by reports whose reference resource is in the downlink subframe with 0 dB transmission power boost, i.e., low power subframe. In the test, PDSCH transport format in high power subframe is determined by first set of CQI reports and PDSCH transport format in low power subframe is determined by second set of CQI reports.

The reported CQI value in the first set of reports shall be in the range of ±1 of the reported median more than 90% of the first set of reports. The reported CQI value in the second set of reports shall be in the range of ±1 of the reported median more than 90% of the second set of reports.

If the PDSCH BLER in the high power subframes using the transport format indicated by wideband CQI median is less than or equal to 0.1, the BLER in high power subframes using the transport format indicated by the (wideband CQI median + 1) shall be greater than 0.1. If the PDSCH BLER in high power subframes using the transport format indicated by the wideband CQI median is greater than 0.1, the BLER in high power subframes using transport format indicated by (wideband CQI median – 1) shall be less than or equal to 0.1.

If the PDSCH BLER in the low power subframes using the transport format indicated by wideband CQI median is less than or equal to 0.1, the BLER in low power subframes using the transport format indicated by the (wideband CQI median + 1) shall be greater than 0.1. If the PDSCH BLER in the low power subframes using the transport format indicated by the wideband CQI median is greater than 0.1, the BLER in low power subframes using transport format indicated by (wideband CQI median – 1) shall be less than or equal to 0.1.

The value of the wideband CQI for the first set of CQI report minus the wideband CQI median for second set of CQI shall be larger than or equal to 2 in Test 1 and Test 2.

Table 9.2.7.2.3-1: Parameters for PUSCH 3-1 static test on TDD Pcell

Parameter		Unit	Value
Bandwidth		MHz	20
PDSCH transmission mode			9
Uplink downlink configuration			2
Special subframe configuration			4
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	P_C	dB	0
	σ	dB	0
Propagation condition and antenna configuration			Clause B.1 (2 x 2)
SNR		dB	20
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Beamforming Model			As specified in Section B.4.3
CRS reference signals			Antenna ports 0
CSI reference signals			Antenna ports 15, 16
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 1
CSI-RS reference signal configuration			4
CodeBookSubsetRestriction bitmap			000001
Number of control OFDM symbols			3
Max number of HARQ transmissions			1
Reporting mode			PUSCH 3-1
CSI request field			'10'
trigger1 (Note 2)			01000000
trigger2 (Note 2)			00000000

Note 1: PCell is used for HARQ ACK/NACK feedback and aperiodic CSI triggering/reporting. PDSCH is not transmitted on PCell.

Note 2: trigger1 and trigger2 are defined as TS 36.331 for aperiodicCSI-Trigger. They Indicate for which serving cell(s) the aperiodic CSI report is triggered when one or more SCells are configured. PDCCH DCI format 0 with a trigger for aperiodic CQI is transmitted periodically in subframe 3 and subframe 8 with 5ms periodicity.

Table 9.2.7.2.3-2: PUSCH 3-1 static test on LAA Scell

Parameter		Unit	Test 1	Test 2
Bandwidth		MHz	20 MHz	
Transmission mode			9	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	P_C	dB	0	
	σ	dB	0	
SNR in subframes with 6 dB power boost (Note 3)		dB	9	10
SNR in subframes with 0 dB power boost (Note 3)			3	4
$\hat{I}_{or}^{(j)}$ in subframes with 6 dB power			-89	-88
$\hat{I}_{or}^{(j)}$ in subframes with 0 dB power		dB[mW/15kHz]	-95	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
MBSFN subframe Configuration			Non-MBSFN	
Cell Id			0	
dmtc-Periodicity		ms	80	
dmtc-Offset			0	
Propagation condition and antenna configuration			Clause B.1 (2x2)	
Beamforming Model			As specified in Section B.4.3	
CRS reference signals			Antenna ports 0	
CSI reference signals			Antenna ports 15, 16	
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/ 3	
CSI-RS reference signal configuration			4	
CodeBookSubsetRestriction bitmap			000001	
Number of control OFDM symbols			3	
Max number of HARQ transmissions			1	
Reporting mode			PUSCH 3-1	
PDSCH transmission model	Basic model		As specified in Section B.7	
	subframeStartPosition		s0	
	Number of occupied symbols per subframe		14	
	The number of subframes set ( ) per burst		{3, 8}	
	Power configuration for each burst		$\hat{I}_{or}^{(j)}$ is randomly selected from 6 dB power boosting or 0 dB power boosting with equal probability	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.8 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

The normative reference for this requirement is TS 36.101 [2] clause 9.2.7.2.

9.2.7.2.4 Test description

9.2.7.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: 20MHz, as defined in TS 36.508 [7] clause 4.3.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without faders) as appropriate.
2. The parameter settings for the cell are set up according to Table 9.2.7.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.2.7.2.4.3.

9.2.7.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. Configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 9.2.7.2.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, SNR and the power configuration of each burst for LAA SCell according to Table 9.2.7.2.3-2.
5. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. Continue transmission of the PDSCH until at least 2000 wideband CQI reports have been gathered for each, low power subframes and high power subframes. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request field set to 10 and I_MCS=29 and N_PRB allocated to be less or equal to 4.In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI.
6. Set up a relative frequency distribution for the first 2000 reported wideband CQI-values whose reference resource is in the downlink subframe with 6 dB transmission power boost, i.e., high power subframe. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as Median CQI_{high} value.
7. If Median CQI_{high} is equal to 1 or 15, or 1800 or less of the wideband CQI values for high power subframes are in the range (Median CQI_{high} - 1) ≤ Median CQI_{high} ≤ (Median CQI_{high} + 1), then fail the UE.
8. Set up a relative frequency distribution for the first 2000 reported wideband CQI-values whose reference resource is in the downlink subframe with 0 dB transmission power boost, i.e., low power subframe. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as Median CQI_{low} value.
9. If Median CQI_{low} is equal to 1 or 15, or 1800 or less of the wideband CQI values for low power subframes are in the range (Median CQI_{low} - 1) ≤ Median CQI_{low} ≤ (Median CQI_{low} + 1), then fail the UE.
10. If Median CQI_{high} - Median CQI_{low} < 2 then fail the UE.
11. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband median-CQI value Median CQI_{high} for high power subframes and according to the wideband median-CQI value Median CQI_{low} for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of

responses for each HARQ process, discard all the statDTX responses. The responses are then recorded in two sets. The first set is obtained by responses for high power subframes. The second set is obtained by responses for low power subframes. Continue to gather data until the number of filtered ACK+NACK responses reaches at least 1000 for each set.

For the filtered ACK and NACK responses:

If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then go to step 12.

If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK /ACK + NACK) > 0.1 for low power subframes then go to step 13.

If the ratio (NACK /ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then go to step 14.

If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then go to step 15.

12. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} + 1) for high power subframes and according to wideband CQI value (Median CQI_{low} + 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

13. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} + 1) for high power subframes and according to wideband CQI value (Median CQI_{low} - 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) > 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

14. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} - 1) for high power subframes and according to wideband CQI value (Median CQI_{low} + 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) > 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

15. The SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to wideband CQI value (Median CQI_{high} - 1) for high power subframes and according to wideband CQI value (Median CQI_{low} - 1) for low power subframes. The SS does not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 11 until 1000 filtered ACK+NACK responses are gathered in each set.

    If the ratio (NACK / ACK + NACK) ≤ 0.1 for high power subframes AND the ratio (NACK / ACK + NACK) ≤ 0.1 for low power subframes then pass the UE for this test and go to step 16, otherwise fail the UE.

16. If both Tests have not been done, then repeat the same procedure (steps 1 to 15) with test conditions according to Table 9.2.7.2.3-1 and Table 9.2.7.2.3-2 for the other Test as appropriate. Otherwise pass the UE.

9.2.7.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.2.7.2.4.3-1: *TDD-Config-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

Table 9.2.7.2.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Table 9.2.7.2.4.3-3: PhysicalConfigDedicatedSCell-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10	AntennaInfoDedicated-r10		
crossCarrierSchedulingConfig-r10	Not present		
csi-RS-Config- r10 ::= SEQUENCE {	CSI-RS-Config-r10		
pdsch-ConfigDedicated-r10	PDSCH-ConfigDedicated-DEFAULT		
}			
ul-Configuration-r10	Not present		
}			

Table 9.2.7.2.4.3-4: AntennaInfoDedicated-r10

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000001		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.2.7.2.4.3-5: CQI-ReportConfig-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 9.2.7.2.4.3-6: CQI-ReportAperiodic-r10-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm31		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	01000000	Configure report only for SCell	
trigger2-r10	00000000	No report	
}			
}			
}			

Table 9.2.7.2.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	2 antenna ports for transmission of CSI reference signals	
resourceConfig-r10	4		
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}}$ = $I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 9.2.7.2.4.3-8: PDSCH-ConfigDedicated-DEFAULT

Derivation Path: TS 36.508 [7] clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

9.2.7.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.2.7.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.3 CQI Reporting under fading conditions

9.3.1 Frequency-selective scheduling mode

The accuracy of sub-band channel quality indicator (CQI) reporting under frequency selective fading conditions is determined by a double-sided percentile of the reported differential CQI offset level 0 per sub-band, and the relative increase of the throughput obtained when transmitting on any one of the sub-bands with the highest reported differential CQI offset level the corresponding transport format compared to the case for which a fixed format is transmitted on any sub-band in set of TS 36.213 [10]. To account for sensitivity of the input SNR the sub-band CQI reporting under frequency selective fading conditions is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.3.1.1 CQI Reporting under fading conditions – PUSCH 3-0 (Cell-Specific Reference Symbols)

9.3.1.1.1 FDD CQI Reporting under fading conditions – PUSCH 3-0

9.3.1.1.1.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling.

9.3.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports.

9.3.1.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.1.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.1.1.1.3-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput obtained when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI.

Table 9.3.1.1.1.3-1: Sub-band test for single antenna transmission (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR (Note 3)		dB	9	10	14	15
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-89	-88	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Antenna configuration			1x2			
Reporting interval		ms	5			
CQI delay		ms	8			
Reporting mode			PUSCH 3-0			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.3 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Table 9.3.1.1.1.3-2: Minimum requirement (FDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.1	1.1
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.1.1.1.

9.3.1.1.1.4 Test description

9.3.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.1.1.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.1.1.1.4.3.

9.3.1.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.1.1.1.5-2 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 $\leq$ number of CQI reports with index 0 for each full-size subband $\leq$ 2000*β%/100". (2000= No of full-size subband reports, 100 because of %) If yes, continue with step5, otherwise goto step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each TTI randomly selected full-size subband regardless of UE wideband and full-size subband CQI report. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) $\geq \gamma$ and (NACK /(ACK + NACK))$\geq$ 0.05 , pass the UE for this test and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.1.1.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.1.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.1.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm30		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			
}			

9.3.1.1.1.5 Test requirement

Table 9.3.1.1.1.5-1: Test requirement (FDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.09	1.09
BLER	0.05	0.05

Table 9.3.1.1.1.5-2: Sub-band test for single antenna transmission (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR for UE with 2Rx RF band (Note 3)		dB	9	10	14	15
SNR for 4Rx UE without 2Rx RF band		dB	6	7	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-89	-88	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Antenna configuration			1x2			
Reporting interval		ms	5			
CQI delay		ms	8			
Reporting mode			PUSCH 3-0			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.3 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note4: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.1.1.2 TDD CQI Reporting under fading conditions – PUSCH 3-0

9.3.1.1.2.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling.

9.3.1.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.1.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.1.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.1.1.2.3-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each available downlink transmission instance].

Table 9.3.1.1.2.3-1: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
SNR		dB	9	10	14	15
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-89	-88	-84	-83
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s *a* = 1, $f_D = 5$ Hz			
Antenna configuration			1 x 2			
Reporting interval		ms	5			
Minimum CQI delay		ms	10 or 11			
Reporting mode			PUSCH 3-0			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.3 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Table 9.3.1.1.2.3-2: Minimum requirement (TDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.1	1.1
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.2.1.1.

9.3.1.1.2.4 Test description

9.3.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.1.1.2.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.1.1.2.4.3.

9.3.1.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.1.1.2.5-2 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and full-size subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI report for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. For each subband, if subband CQI of index 0 is reported, at least α% but less than β% of 2000 full-size subband CQI report, then continue to step 5, otherwise, go to step 7.
5. The SS shall send PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each available downlink transmission instance randomly selected full-size subband regardless of UE wideband and subband CQI report. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3 Declare the throughput as t_{median}.
6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the sub-bands in which UE report the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the

PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) $\geq \gamma$ and (NACK /(ACK + NACK))$\geq$ 0.05, pass the UE and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.1.1.2.3-1 for the other test as appropriate.

9.3.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.1.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.1.1.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm30		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			
}			

Table 9.3.1.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.3.1.1.2.5 Test requirement

Table 9.3.1.1.2.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.09	1.09
BLER	0.05	0.05

Table 9.3.1.1.2.5-2: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
SNR for UE with 2Rx RF band		dB	9	10	14	15
SNR for 4Rx UE without 2Rx RF band		dB	6	7	11	12
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-89	-88	-84	-83
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s *a* = 1, $f_D = 5$ Hz			
Antenna configuration			1 x 2			
Reporting interval		ms	5			
Minimum CQI delay		ms	10 or 11			
Reporting mode			PUSCH 3-0			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.3 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note4: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.1.2 CQI Reporting under fading conditions – PUSCH 3-1 (CSI Reference Symbols)

9.3.1.2.1_D FDD CQI Reporting under fading conditions – PUSCH 3-1 for eDL MIMO

9.3.1.2.1_D.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling.

9.3.1.2.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.1.2.1_D.3 Minimum conformance requirements

For the parameters specified in Table 9.3.1.2.1_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.2.1_D.3-2 and by the following:

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput obtained when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI.

Table 9.3.1.2.1_D.3-1: Sub-band test for FDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	0			
	σ	dB	0			
SNR (Note 3)		dB	4	5	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93	-87	86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Antenna configuration			2x2			
CRS reference signals			Antenna port 0			
CSI reference signals			Antenna ports 15, 16			
Beamforming model			Annex B.4.3			
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 1			
CSI-RS reference signal configuration			4			
CodeBookSubsetRestriction bitmap			000001			
Reporting interval (Note 4)		Ms	5			
CQI delay		Ms	8			
Reporting mode			PUSCH 3-1			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.8 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Table 9.3.1.2.1_D.3-2: Minimum requirement (FDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	40	40
γ	1.1	1.1
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.1.2.1.

9.3.1.2.1_D.4 Test description

9.3.1.2.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.1.2.1_D.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.1.2.1_D.4.3.

9.3.1.2.1_D.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.1.2.1_D.5-2 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 ≤ number of CQI reports with index 0 for each full-size subband ≤ 2000*β%/100". (2000= No of full-size subband reports, 100 because of %) If yes, continue with step5, otherwise goto step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2Cfor C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each TTI randomly selected full-size subband regardless of UE wideband and full-size subband CQI report. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) ≥ γ and (NACK /(ACK + NACK))≥ 0.05 , pass the UE for this test and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.1.2.1_D.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.1.2.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.1.2.1_D.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 9.3.1.2.1_D.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.3.1.2.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000001		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 9.3.1.2.1_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.3.1.2.1_D.4.3-5: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.3.1.2.1_D.5 Test requirement

Table 9.3.1.2.1.5-1: Test requirement (FDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	40	40
γ	1.09	1.09
UE Category	1-8	1-8
BLER	0.05	0.05

Table 9.3.1.2.1_D.5-2: Sub-band test for FDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	0			
	σ	dB	0			
SNR for UE with 2Rx RF band (Note 3)		dB	4	5	11	12
SNR for 4Rx UE without 2Rx RF band		dB	1	2	8	9
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93	-87	86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Antenna configuration			2x2			
CRS reference signals			Antenna port 0			
CSI reference signals			Antenna ports 15, 16			
Beamforming model			Annex B.4.3			
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 1			
CSI-RS reference signal configuration			4			
CodeBookSubsetRestriction bitmap			000001			
Reporting interval (Note 4)		Ms	5			
CQI delay		Ms	8			
Reporting mode			PUSCH 3-1			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.8 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Note5: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.1.2.2_D TDD CQI Reporting under fading conditions – PUSCH 3-1 for eDL MIMO

9.3.1.2.2_D.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling.

9.3.1.2.2_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.1.2.2_D.3 Minimum conformance requirements

For the parameters specified in Table 9.3.1.2.2_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.2.2_D.3-2 and by the following:

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput obtained when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI.

Table 9.3.1.2.2_D.3-1: Sub-band test for TDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			9			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	0			
	σ	dB	0			
SNR (Note 3)		dB	4	5	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93	-87	-86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Antenna configuration			2x2			
CRS reference signals			Antenna port 0			
CSI reference signals			Antenna ports 15,16			
Beamforming model			Annex B.4.3			
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 3			
CSI-RS reference signal configuration			4			
CodeBookSubsetRestriction bitmap			000001			
Reporting interval (Note 4)		ms	5			
CQI delay		ms	10			
Reporting mode			PUSCH 3-1			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: Reference measurement channel RC.8 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#3 and #8 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#2 and #7.

Table 9.3.1.2.2_D.3-2: Minimum requirement (TDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	40	40
γ	1.1	1.1
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.1.2.2.

9.3.1.2.2_D.4 Test description

9.3.1.2.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.1.2.2_D.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.1.2.2_D.4.3.

9.3.1.2.2_D.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.1.2.2_D.5-2 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and full-size subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI report for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. For each subband, if subband CQI of index 0 is reported, at least α% but less than β% of 2000 full-size subband CQI report, then continue to step 5, otherwise, go to step 7.

5. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each available downlink transmission instance randomly selected full-size subband regardless of UE wideband and subband CQI report. Note that each full-size subband is selected in

equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3 Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the sub-bands in which UE report the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) $\geq \gamma$ and (NACK /(ACK + NACK))$\geq$ 0.05, pass the UE and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.1.2.2_D.3-1 for the other test as appropriate.

9.3.1.2.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.1.2.2_D.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 9.3.1.2.2_D.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.3.1.2.2_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000001		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 9.3.1.2.2_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.3.1.2.2_D.4.3-5: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

Table 9.3.1.2.2_D.4.3-6: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.3.1.2.2_D.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.3.1.2.2_D.5 Test requirement

Table 9.3.1.2.2.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	40	40
γ	1.09	1.09
UE Category	1-8	1-8
BLER	0.05	0.05

Table 9.3.1.2.2_D.5-2: Sub-band test for TDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			9			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	0			
	σ	dB	0			
SNR for UE with 2Rx RF band (Note 3)		dB	4	5	11	12
SNR for 4Rx UE without 2Rx RF band		dB	1	2	8	9
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93	-87	-86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Antenna configuration			2x2			
CRS reference signals			Antenna port 0			
CSI reference signals			Antenna ports 15,16			
Beamforming model			Annex B.4.3			
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 3			
CSI-RS reference signal configuration			4			
CodeBookSubsetRestriction bitmap			000001			
Reporting interval (Note 4)		ms	5			
CQI delay		ms	10			
Reporting mode			PUSCH 3-1			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: Reference measurement channel RC.8 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#3 and #8 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#2 and #7.
Note 5: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.1.2.3 FDD CQI Reporting under fading conditions – PUSCH 3-1 for 256QAM in DL

9.3.1.2.3.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling.

9.3.1.2.3.2 Test applicability

This test applies to E-UTRA FDD UE release 12 and forward of UE Category 11-12 and DL Category ≥11 that supports 256QAM in DL. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.1.2.3.3 Minimum conformance requirements

For the parameters specified in Table 9.3.1.2.3.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.2.3.3-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test.

In this test, 4-bit CQI Table 2 in Table 7.2.3-2 in TS 36.213 [10], and Modulation and TBS index table 2 in Table 7.1.7.1-1A for PDSCH in TS 36.213 [10] are applied.

Table 9.3.1.2.3.3-1: Sub-band test for FDD

Parameter		Unit	Test 1	
Bandwidth		MHz	10 MHz	
Transmission mode			9	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	P_C	dB	0	
	σ	dB	0	
SNR (Note 3)		dB	16	17
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-82	-81
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration			2x2	
Beamforming Model			As specified in Section B.4.3	
CRS reference signals			Antenna ports 0	
CSI reference signals			Antenna ports 15, 16	
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 1	
CSI-RS reference signal configuration			4	
CodeBookSubsetRestriction bitmap			000001	
Reporting interval (Note 4)		ms	5	
CQI delay		ms	8	
Reporting mode			PUSCH 3-1	
Sub-band size		RB	6 (full size)	
Max number of HARQ transmissions			1	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.8A FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Table 9.3.1.2.3.3-2: Minimum requirement (FDD)

	Test 1
α [%]	2
β [%]	40
γ	1.1
UE Category	11-12
UE DL Category	≥11

The normative reference for this requirement is TS 36.101 [2] clause 9.3.1.2.3.

9.3.1.2.3.4 Test description

9.3.1.2.3.4.1 Initial conditions

Same Initial conditions as in clause 9.3.1.2.1_D.4.1 with the following exceptions:

- Instead of Table 9.3.1.2.1_D.3-1, use Table 9.3.1.2.3.3-1.
- Instead of Clause 9.3.1.2.1_D.4.3, use Clause 9.3.1.2.3.4.3.

9.3.1.2.3.4.2 Test procedure

Same test procedure as in clause 9.3.1.2.1_D.4.2 without step 8 and with the following exceptions:

- Instead of Table 9.3.1.2.1_D.3-1, use Table 9.3.1.2.3.5-2.

9.3.1.2.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.1.2.3.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
cqi-ReportConfigPCell-v1250 SEQUENCE {			
altCQI-Table-r12	allSubframes		
}			
}			

Table 9.3.1.2.3.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.3.1.2.3.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000001		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 9.3.1.2.3.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10 CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm31		
}			
}			
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.3.1.2.3.4.3-5: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE {			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE {			
release	NULL		
}			
}			

9.3.1.2.3.5 Test requirement

Table 9.3.1.2.3.5-1: Test requirement (FDD)

	Test 1
α [%]	2
β [%]	40
γ	1.09
UE Category	11-12
UE DL Category	≥11

Table 9.3.1.2.3.5-2: Sub-band test for FDD

Parameter		Unit	Test 1	
Bandwidth		MHz	10 MHz	
Transmission mode			9	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	P_C	dB	0	
	σ	dB	0	
SNR for UE with 2Rx RF band (Note 3)		dB	16	17
SNR for 4Rx UE without 2Rx RF band		dB	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-82	-81
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration			2x2	
Beamforming Model			As specified in Section B.4.3	
CRS reference signals			Antenna ports 0	
CSI reference signals			Antenna ports 15, 16	
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 1	
CSI-RS reference signal configuration			4	
CodeBookSubsetRestriction bitmap			000001	
Reporting interval (Note 4)		ms	5	
CQI delay		ms	8	
Reporting mode			PUSCH 3-1	
Sub-band size		RB	6 (full size)	
Max number of HARQ transmissions			1	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.8A FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Note 5: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α, β and γ must be fulfilled.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.1.2.4 TDD CQI Reporting under fading conditions – PUSCH 3-1 for 256QAM in DL

9.3.1.2.4.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling.

9.3.1.2.4.2 Test applicability

This test applies to E-UTRA TDD UE release 12 and forward of UE Category 11-12 and DL Category ≥11 that supports 256QAM in DL. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.1.2.4.3 Minimum conformance requirements

For the parameters specified in Table 9.3.1.2.4.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.2.4.3-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be ≥ γ;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test.

In this test, 4-bit CQI Table 2 in Table 7.2.3-2 in TS 36.213 [10], and Modulation and TBS index table 2 in Table 7.1.7.1-1A for PDSCH in TS 36.213 [10] are applied.

Table 9.3.1.2.4.3-1: Sub-band test for TDD

Parameter		Unit	Test 1
Bandwidth		MHz	20 MHz
Transmission mode			9
Uplink downlink configuration			2
Special subframe configuration			4
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	P_C	dB	0
	σ	dB	0

SNR (Note 3)	dB	16	17
$\hat{I}_{or}^{(j)}$	dB[mW/15kHz]	-82	-81
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration		2x2	
Beamforming Model		As specified in Section B.4.3	
CRS reference signals		Antenna port 0	
CSI reference signals		Antenna port 15,16	
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		5/ 3	
CSI-RS reference signal configuration		4	
CodeBookSubsetRestriction bitmap		000001	
Reporting interval (Note 4)	ms	5	
CQI delay	ms	10	
Reporting mode		PUSCH 3-1	
Sub-band size	RB	8 (full size)	
Max number of HARQ transmissions		1	
ACK/NACK feedback mode		Multiplexing	
Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: Reference measurement channel RC.8A TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2. Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level. Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#3 and #8 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#2 and #7.			

Table 9.3.1.2.4.3-2: Minimum requirement (TDD)

	Test 1
α [%]	2
β [%]	40
γ	1.1
UE Category	11-12
UE DL Category	≥11

The normative reference for this requirement is TS 36.101 [2] clause 9.3.1.2.4.

9.3.1.2.4.4 Test description

9.3.1.2.4.4.1 Initial conditions

Same Initial conditions as in clause 9.3.1.2.2_D.4.1 with the following exceptions:

- Instead of Table 9.3.1.2.2_D.3-1, use Table 9.3.1.2.4.3-1.
- Instead of Clause 9.3.1.2.2_D.4.3, use Clause 9.3.1.2.4.4.3.

9.3.1.2.4.4.2 Test procedure

Same test procedure as in clause 9.3.1.2.2_D.4.2 without step 8 and with the following exceptions:

- Instead of Table 9.3.1.2.2_D.3-1, use Table 9.3.1.2.4.5-2.

9.3.1.2.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.1.2.4.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
cqi-ReportConfigPCell-v1250 SEQUENCE {			
altCQI-Table-r12	allSubframes		
}			
}			

Table 9.3.1.2.4.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.3.1.2.4.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000001		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 9.3.1.2.4.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10 CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm31		
}			
}			
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.3.1.2.4.4.3-5: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

Table 9.3.1.2.4.4.3-6: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.3.1.2.4.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.3.1.2.4.5 Test requirement

Table 9.3.1.2.4.5-1: Test requirement (TDD)

	Test 1
α [%]	2
β [%]	40
γ	1.09
UE Category	11-12
UE DL Category	≥11

Table 9.3.1.2.4.5-2: Sub-band test for TDD

Parameter		Unit	Test 1	
Bandwidth		MHz	20 MHz	
Transmission mode			9	
Uplink downlink configuration			2	
Special subframe configuration			4	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	P_C	dB	0	
	σ	dB	0	
SNR for UE with 2Rx RF band (Note 3)		dB	16	17
SNR for 4Rx UE without 2Rx RF band		dB	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-82	-81
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration			2x2	
Beamforming Model			As specified in Section B.4.3	
CRS reference signals			Antenna port 0	
CSI reference signals			Antenna port 15,16	
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 3	
CSI-RS reference signal configuration			4	
CodeBookSubsetRestriction bitmap			000001	
Reporting interval (Note 4)		ms	5	
CQI delay		ms	10	
Reporting mode			PUSCH 3-1	
Sub-band size		RB	8 (full size)	
Max number of HARQ transmissions			1	
ACK/NACK feedback mode			Multiplexing	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.8A TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#3 and #8 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#2 and #7.

Note 5: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β and γ must be fulfilled.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.1.3 CQI Reporting under fading conditions – PUSCH 3-0 (Cell-Specific Reference Symbols)

9.3.1.3.1

9.3.1.3.1_E FDD CQI Reporting under fading conditions – PUSCH 3-0 for feICIC

9.3.1.3.1_E.1 FDD CQI Reporting under fading conditions – PUSCH 3-0 for feICIC (non-MBSFN ABS)

9.3.1.3.1_E.1.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling.

9.3.1.3.1_E.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling release 11 and forward. Applicability requires support of FGI bit 115.

9.3.1.3.1_E.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.1.3.1_E.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.3.1_E.1.3-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput in ABS subframes obtained when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to ε.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. T

Table 9.3.1.3.1_E.1.3-1: Sub-band test for single antenna transmission (FDD)

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2 and 3	Cell 1	Cell 2 and 3
Bandwidth		MHz	10		10	
PDSCH transmission mode			1	Note 10	1	Note 10
Downlink power allocation	ρ_A	dB	0		0	
	ρ_B	dB	0		0	
	σ	dB	0		0	
Propagation condition			Clause B.2.4 with Td = 0.45 us, a = 1, fd = 5 Hz	EVA5 Low antenna correlation	Clause B.2.4 with Td = 0.45 us, a = 1, fd = 5 Hz	EVA5 Low antenna correlation
Antenna configuration			1x2		1x2	
$\hat{E}_s / N_{oc2}$ (Note 1)		dB	4 5	Cell 2: 12 Cell 3: 10	14 15	Cell 2: 12 Cell 3: 10
$N_{oc}^{(j)}$ at antenna port	$N_{oc1}^{(j)}$	dBm/15kHz	-98 (Note 7)	N/A	-98 (Note 7)	N/A
	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (Note 8)	N/A	-98 (Note 8)	N/A
	$N_{oc3}^{(j)}$	dBm/15kHz	-93 (Note 9)	N/A	-93 (Note 9)	N/A
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN
Cell Id			0	Cell 2: 6 Cell 3: 1	0	Cell 2: 6 Cell 3: 1
Time Offset between Cells		μs	Cell 2: 3 usec Cell 3: -1usec		Cell 2: 3 usec Cell 3: -1usec	
Frequency Shift between Cells		Hz	Cell 2: 300Hz Cell 3: -100Hz		Cell 2: 300Hz Cell 3: -100Hz	
ABS pattern (Note 2)			N/A	01010101 01010101 01010101 01010101 01010101	N/A	01010101 01010101 01010101 01010101 01010101
RLM/RRM Measurement Subframe Pattern (Note 4)			00000100 00000100 00000100 00000100 00000100	N/A	00000100 00000100 00000100 00000100 00000100	N/A
CSI Subframe Sets (Note 3)	$C_{CSI,0}$		01010101 01010101 01010101 01010101 01010101	N/A	01010101 01010101 01010101 01010101 01010101	N/A
	$C_{CSI,1}$		10101010 10101010 10101010 10101010 10101010	N/A	10101010 10101010 10101010 10101010 10101010	N/A
Number of control OFDM symbols			3		3	
Max number of HARQ transmissions			1		1	
CQI delay		ms	8			
Reporting interval (Note 13)		ms	10			
Reporting mode			PUSCH 3-0			
Sub-band size		RB	6 (full size)			

Note 1: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2: ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 3: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 4: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36331 [5].
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 6: Cell 1 is the serving cell. Cell 2 and Cell 3 are the aggressor cells. The number of the CRS ports in Cell 1, Cell 2, and Cell 3 are the same.
Note 7: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 8: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 9: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.1.5.
Note 11: Reference measurement channel in Cell 1 RC.3 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.
Note 12: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 13: The CSI reporting is such that reference subframes belong to $C_{csi,0}$.

Table 9.3.1.3.1_E.1.3-2: Minimum requirement (FDD)

	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.1	1.1
ε	0.01	0.01
UE Category	≥1	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.3.1.1.3.

9.3.1.3.1_E.1.4 Test description

9.3.1.3.1_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.54 for antenna configuration 1x2.

2. The parameter settings for the cell are set up according to Table 9.3.1.3.1_E.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 9.3.1.3.1_E.1.4.3.

9.3.1.3.1_E.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.1.3.1_E.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS protected subframes according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband for subframe set $C_{CSI,0}$ have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 10 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 (transmitted in SF#3) with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 10 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values for subframe set $C_{CSI,0}$. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI_0.

4. Check if "2000*α%/100 ≤ number of CQI reports with index 0 for each full-size subband ≤ 2000*β%/100". (2000= No of full-size subband reports, 100 because of %) If yes, continue with step5, otherwise goto step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS protected subframes according to the wideband Median CQI_0 in each downlink transmission instance randomly selected full-size subband regardless of UE wideband and full-size subband CQI report. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 10 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 (transmitted in SF#3) with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput during ABS according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS protected subframes according to the highest UE reported full-size subband CQI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 10 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 (transmitted in SF#3) with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput during ABS and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) ≥ γ and (NACK /(ACK + NACK)) ≥ ε, pass the UE for this test and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.1.3.1_E.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.1.3.1_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 9.3.1.3.1_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'0000010000000100 0000010000000100 00000100'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	6		Cell 2
	1		Cell 3
antennaPortsCount-r11	an1		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 9.3.1.3.1_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 9.3.1.3.1_E.1-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm30		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'0101010101010101 0101010101010101 01010101'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'1010101010101010 1010101010101010 10101010'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

9.3.1.3.1_E.1.5 Test requirement

Table 9.3.1.3.1_E.1.5-1: Test requirement (FDD)

	Test 1	**Test 2**
α [%]	2	2
β [%]	55	55
γ	1.09	1.09
ε	0.01	0.01
UE Category	≥1	≥1

To pass the test, α and β and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.1.3.2

9.3.1.3.2_E TDD CQI Reporting under fading conditions – PUSCH 3-0 for feICIC

9.3.1.3.2_E.1 TDD CQI Reporting under fading conditions – PUSCH 3-0 for feICIC (non-MBSFN ABS)

9.3.1.3.2_E.1.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling.

9.3.1.3.2_E.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE and CRS interference handling and ss-CCH interference handling release 11 and forward. Applicability requires support of FGI bit 115.

9.3.1.3.2_E.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.1.3.2_E.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.3.2_E.1.3-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput in ABS subframes obtained when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to ε.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD.6.

Table 9.3.1.3.2_E.1.3-1: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2 and 3	Cell 1	Cell 2 and 3
Bandwidth		MHz	10		10	
PDSCH transmission mode			1	Note 10	1	Note 10
Uplink downlink configuration			1		1	
Special subframe configuration			4		4	
Downlink power allocation	ρ_A	dB	0		0	
	ρ_B	dB	0		0	
	σ	dB	0		0	
Propagation condition			Clause B.2.4 with Td = 0.45 us, a = 1, fd = 5 Hz	EVA5 Low antenna correlation	Clause B.2.4 with Td = 0.45 us, a = 1, fd = 5 Hz	EVA5 Low antenna correlation
Antenna configuration			1x2		1x2	
$\widehat{E}_s / N_{oc2}$ (Note 1)		dB	4 5	Cell 2: 12 Cell 3: 10	14 15	Cell 2: 12 Cell 3: 10
$N_{oc}^{(j)}$ at antenna port	$N_{oc1}^{(j)}$	dBm/15kHz	-98 (Note 7)	N/A	-98 (Note 7)	N/A
	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (Note 8)	N/A	-98 (Note 8)	N/A
	$N_{oc3}^{(j)}$	dBm/15kHz	-93 (Note 9)	N/A	-93 (Note 9)	N/A
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN
Cell Id			0	Cell 2: 6 Cell 3: 1	0	Cell 2: 6 Cell 3: 1
Time Offset between Cells		µs	Cell 2: 3 usec Cell 3: -1usec		Cell 2: 3 usec Cell 3: -1usec	
Frequency shift between Cells		Hz	Cell 2: 300Hz Cell 3: -100Hz		Cell 2: 300Hz Cell 3: -100Hz	
ABS pattern (Note 2)			N/A	0100010001 0100010001	N/A	0100010001 0100010001
RLM/RRM Measurement Subframe Pattern (Note 4)			0000000001 0000000001	N/A	0000000001 0000000001	N/A
CSI Subframe Sets (Note 3)	$C_{CSI,0}$		0100010001 0100010001	N/A	0100010001 0100010001	N.A
	$C_{CSI,1}$		1000101000 1000101000	N/A	1000101000 1000101000	N/A
Number of control OFDM symbols			3		3	
Max number of HARQ transmissions			1		1	
CQI delay		ms	10			
Reporting interval (Note 13)		ms	10			
Reporting mode			PUSCH 3-0			
Sub-band size		RB	6 (full size)			
ACK/NACK feedback mode			Multiplexing		Multiplexing	

Note 1: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2: ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 3: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 4: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 6: Cell 1 is the serving cell. Cell 2 and Cell 3 are the aggressor cells. The number of the CRS ports in Cell1, Cell 2, and Cell 3 is the same.
Note 7: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 8: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 9: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern as defined in TS 36.521-1 [10] Annex A.5.2.5
Note 11: Reference measurement channel in Cell 1 RC.3 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.
Note 12: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 13: The CSI reporting is such that reference subframes belong to $C_{csi,0}$.

Table 9.3.1.3.2_E.1.3-2: Minimum requirement (TDD)

	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.1	1.1
ε	0.01	0.01
UE Category	≥1	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.3.1.1.4.

9.3.1.3.2_E.1.4 Test description

9.3.1.3.2_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.54 for antenna configuration 1x2.
2. The parameter settings for the cell are set up according to Table 9.3.1.3.2_E.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 9.3.1.3.2_E.1.4.3.

9.3.1.3.2_E.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.1.3.2_E.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS protected subframes according to CQI value 8 and keep it regardless of the wideband and full-size subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI report for each full-size subband for subframe set $C_{CSI,0}$ have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 (transmitted in DL SF#1) with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 10 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values for subframe set $C_{CSI,0.}$ Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI_0.

4. For each subband, if subband CQI of index 0 is reported, at least α% but less than β% of 2000 full-size subband CQI report, then continue to step 5, otherwise, go to step 7.

5. The SS shall send PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS protected subframes according to the wideband Median CQI_0 in each downlink transmission instance randomly selected full-size subband regardless of UE wideband and subband CQI report. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 (transmitted in DL SF#1) with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput during ABS according to Annex G.5.3 Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in ABS protected subframes according to the highest UE reported full-size subband CQI value in one full-size subband selected among the sub-bands in which UE report the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 (transmitted in DL SF#1) with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput during ABS and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) $\geq \gamma$ and (NACK /(ACK + NACK))$\geq \varepsilon$, pass the UE and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.1.3.2_E.1.3-1 for the other test as appropriate.

9.3.1.3.2_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 9.3.1.3.2_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	6		Cell 2
	1		Cell 3
antennaPortsCount-r11	an1		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			

Table 9.3.1.3.2_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 9.3.1.3.2_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm30		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0100010001 0100010001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'1000101000 1000101000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 9.3.1.3.2_E.1.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.3.1.3.2_E.1.4.3-5: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing		
}			

9.3.1.3.2_E.1.5 Test requirement

Table 9.3.1.3.2_E.1.5-1: Test requirement (TDD)

	Test 1	**Test 2**
α [%]	2	2
β [%]	55	55
γ	1.09	1.09
ε	0.01	0.01
UE Category	≥1	≥1

To pass the test, α and β and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.2 Frequency non-selective scheduling mode

The reporting accuracy of the channel quality indicator (CQI) under frequency non-selective fading conditions is determined by the reporting variance, and the relative increase of the throughput obtained when the transport format transmitted is that indicated by the reported CQI compared to the case for which a fixed transport format configured according to the reported median CQI is transmitted. In addition, the reporting accuracy is determined by a minimum BLER using the transport formats indicated by the reported CQI. To account for sensitivity of the input SNR the CQI reporting under frequency non-selective fading conditions is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.3.2.1 CQI Reporting under fading conditions – PUCCH 1-0 (Cell-Specific Reference Symbols)

9.3.2.1.1 FDD CQI Reporting under fading conditions – PUCCH 1-0

9.3.2.1.1.1 Test purpose

To verify that the UE is tracking the channel variations and selecting the largest transport format possible according to the prevailing channel state for frequently non-selective scheduling

9.3.2.1.1.2 Test applicability

This test applies to E-UTRA FDD UE release 8 and forward of UE category ≥2.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.2.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.2.1.1.3-1 and Table 9.3.2.1.1.3-3, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.2.1.1.3-2 and Table 9.3.2.1.1.3-4 and by the following:

a) CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least α% of the time;

b) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be $\geq \gamma$;

c) when transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.02

The applicability of the requirement with 5MHz bandwidth as specified in Table 9.3.2.1.1.3-3 and Table 9.3.2.1.1.3-4 is defined in clause 9.1.1.1.

Table 9.3.2.1.1.3-1 Fading test for single antenna (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR (Note 3)		dB	6	7	12	13
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-92	-91	-86	-85
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA5			
Correlation and antenna configuration			High (1 x 2)			
Reporting mode			PUCCH 1-0			
Reporting periodicity		ms	N_{pd} = 2			
CQI delay		ms	8			
Physical channel for CQI reporting			PUSCH (Note 4)			
PUCCH Report Type			4			
cqi-pmi-ConfigurationIndex			1			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 FDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and RC.4 FDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Table 9.3.2.1.1.3-2 Minimum requirement (FDD)

Parameter	Test 1	Test 2
α [%]	20	20
γ	1.05	1.05
UE Category	1-8	1-8

Table 9.3.2.1.1.3-3: Fading test for single antenna (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	5 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR (Note 3)		dB	6	7	12	13
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-92	-91	-86	-85
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA5			
Correlation and antenna configuration			High (1 x 2)			
Reporting mode			PUCCH 1-0			
Reporting periodicity		ms	N_{pd} = 2			
CQI delay		ms	8			
Physical channel for CQI reporting			PUSCH (Note 4)			
PUCCH Report Type			4			
cqi-pmi-ConfigurationIndex			1			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.14 FDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and RC.15 FDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Table 9.3.2.1.1.3-4: Minimum requirement (FDD)

	Test 1	Test 2
α [%]	20	20
γ	1.05	1.05
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.2.1.1.

9.3.2.1.1.4 Test description

9.3.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.3.2.1.1.3-1 and 5MHz for tests defined in Table 9.3.2.1.1.3-3, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.2.1.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.2.1.1.4.3.

9.3.2.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.2.1.1.5-3 for 10MHz tests or Table 9.3.2.1.1.3-3 for 5MHz tests as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1,#3,#5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH Continue transmission of the PDSCH until 100000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 2 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. If less than (100-α)/100*100000 of the wideband CQI values are in the range (Median CQI - 1) $\leq$ Median CQI $\leq$ (Median CQI + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value regardless of UE wideband CQI report. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1,#3,#5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1,#3,#5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{wideband}$. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
   If the ratio ($t_{wideband}$ / t_{median}) $\geq \gamma$ and ratio (NACK /(ACK + NACK)) is greater or equal to 0.02, then pass the UE for this test and go to step 8. Otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.2.1.1.3-1 for 10MHz or table 9.3.2.1.1.3-3 for 5MHz for the other Test as appropriate. Otherwise pass the UE.

9.3.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.2.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.2.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	1	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.3.2.1.1.5 Test requirement

The applicability of the test requirement with 5MHz bandwidth as specified in Table 9.3.2.1.1.5-2 is defined in clause 9.1.1.1.

Table 9.3.2.1.1.5-1: Test requirement (10MHz FDD)

Parameter	Test 1	Test 2
α [%]	20	20
γ	1.04	1.04
BLER	0.02	0.02
UE category	≥2	≥2

Table 9.3.2.1.1.5-2: Test requirement (5MHz FDD)

	Test 1	Test 2
α [%]	20	20
γ	1.04	1.04
BLER	0.02	0.02
UE Category	≥2	≥2

Table 9.3.2.1.1.5-3 Fading test for single antenna (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR for UE with 2Rx RF band (Note 3)		dB	6	7	12	13
SNR for 4Rx UE without 2Rx RF band		dB	3	4	9	10
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-92	-91	-86	-85
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA5			
Correlation and antenna configuration			High (1 x 2)			
Reporting mode			PUCCH 1-0			
Reporting periodicity		ms	N_{pd} = 2			
CQI delay		ms	8			
Physical channel for CQI reporting			PUSCH (Note 4)			
PUCCH Report Type			4			
cqi-pmi-ConfigurationIndex			1			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 FDD according to Table A.4-1 for Category ≥2 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and RC.4 FDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Note 5: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.2.1.1_1 FDD CQI Reporting under fading conditions - PUCCH 1-0 (Release 9 and forward)

9.3.2.1.1_1.1 Test purpose

Same test purpose as in clause 9.3.2.1.1.1.

9.3.2.1.1_1.2 Test applicability

This test applies to E-UTRA FDD UE release 9 and forward of UE category 1.

9.3.2.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.3.2.1.1.3.

9.3.2.1.1_1.4 Test description

9.3.2.1.1_1.4.1 Initial conditions

Same initial conditions as in clause 9.3.2.1.1.4.1.

9.3.2.1.1_1.4.2 Test procedure

Same test procedure as in clause 9.3.2.1.1.4.2.

9.3.2.1.1_1.4.3 Message contents

Same message contents as in clause 9.3.2.1.1.4.3.

9.3.2.1.1_1.5 Test requirement

Same test requirements as in clause 9.3.2.1.1.5 with the following exceptions:

Instead of table 9.3.2.1.1.5.1-> use table 9.3.2.1.1_1.5-1 below for 10MHz bandwidth tests:

Table 9.3.2.1.1_1.5-1: Test requirement (FDD)

Parameter	Test 1	Test 2
α [%]	20	20
γ	1.04	1.04
BLER	0.02	0.02
UE category	1	1

Or instead of table 9.3.2.1.1.5.2-> use table 9.3.2.1.1_1.5-2 below for 5MHz bandwidth tests:

Table 9.3.2.1.1_1.5-2: Test requirement (5MHz FDD)

	Test 1	Test 2
α [%]	20	20
γ	1.04	1.04
BLER	0.02	0.02
UE Category	1	1

9.3.2.1.2 TDD CQI Reporting under fading conditions – PUCCH 1-0

9.3.2.1.2.1 Test purpose

To verify that the UE is tracking the channel variations and selecting the transport format according to the prevailing channel state for frequently non-selective scheduling

9.3.2.1.2.2 Test applicability

This test applies to E-UTRA TDD UE release 8 and forward of UE category $\geq$2.

9.3.2.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.2.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.2.1.2.3-2 and by the following

a) a CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least α% of the time;

b) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be $\geq \gamma$;

c) when transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.02

Table 9.3.2.1.2.3-1: Fading test for single antenna (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
SNR		dB	6	7	12	13
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-92	-91	-86	-85
Propagation channel			EPA5			
Correlation and antenna configuration			High (1 x 2)			
Reporting mode			PUCCH 1-0			
Reporting periodicity		ms	N_P = 5			
CQI delay		ms	10 or 11			
Physical channel for CQI reporting			PUSCH (Note 4)			
PUCCH Report Type			4			
cqi-pmi-ConfigurationIndex			3			
Max number of HARQ transmissions			1			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 TDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1 and RC.4 TDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Table 9.3.2.1.2.3-2: Minimum requirement (TDD)

Parameter	Test 1	Test 2
α [%]	20	20
γ	1.05	1.05
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.2.1.2.

9.3.2.1.2.4 Test description

9.3.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Table 9.3.2.1.2.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.2.1.2.4.3.

9.3.2.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.2.1.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH Continue transmission of the PDSCH until 100000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. If less than (100-α)/100*100000 of the wideband CQI values are in the range (Median CQI - 1) $\leq$ Median CQI $\leq$ (Median CQI + 1) then continue with step 5, otherwise go to step 7.
5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value regardless of UE wideband CQI report. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Declare the throughput as $t_{wideband}$. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
   If the ratio ($t_{wideband}$ / t_{median}) $\geq \gamma$ and ratio (NACK /(ACK + NACK)) is greater or equal to 0.02, then pass the UE and go to step 8. Otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.2.1.2.3-1 for the other test as appropriate.

9.3.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.2.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.2.1.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.2.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.3.2.1.2.5 Test requirement

Table 9.3.2.1.2.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2
α [%]	20	20
γ	1.04	1.04
BLER	0.02	0.02
UE category	2-8	2-8

To pass the test, α and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.2.1.2_1 TDD CQI Reporting under fading conditions - PUCCH 1-0 (Release 9 and forward)

9.3.2.1.2_2.1 Test purpose

Same test purpose as in clause 9.3.2.1.2.1.

9.3.2.1.2_1.2 Test applicability

This test applies to E-UTRA TDD UE release 9 and forward of UE category 1.

9.3.2.1.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.3.2.1.2.3.

9.3.2.1.2_1.4 Test description

9.3.2.1.2_1.4.1 Initial conditions

Same initial conditions as in clause 9.3.2.1.2.4.1.

9.3.2.1.2_1.4.2 Test procedure

Same test procedure as in clause 9.3.2.1.2.4.2.

9.3.2.1.2_1.4.3 Message contents

Same message contents as in clause 9.3.2.1.2.4.3.

9.3.2.1.2_1.5 Test requirement

Same test requirements as in clause 9.3.2.1.2.5 with the following exceptions:

Instead of table 9.3.2.1.2.5-1 use table 9.3.2.1.2_1.5-1 below:

Table 9.3.2.1.2_1.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2
α [%]	20	20
γ	1.04	1.04
BLER	0.02	0.02
UE category	1	1

9.3.2.2 CQI Reporting under fading conditions – PUCCH 1-1 (CSI Reference Symbols)

9.3.2.2.1_D FDD CQI Reporting under fading conditions – PUCCH 1-1 for eDL-MIMO

9.3.2.2.1_D.1 Test purpose

To verify that the UE is tracking the channel variations and selecting the largest transport format possible according to the prevailing channel state for frequently non-selective scheduling.

9.3.2.2.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward of Category 2-8. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.2.2.1_D.3 Minimum conformance requirements

For the parameters specified in Table 9.3.2.2.1_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.2.2.1_D.3-2 and by the following:

a) CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least α% of the time;

b) The ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be $\geq \gamma$;

c) When transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

Table 9.3.2.2.1_D.3-1: Fading test for FDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-3			
	σ	dB	-3			
SNR (Note 3)		dB	2	3	7	8
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-96	-95	-91	-90
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA5			
Correlation and antenna configuration			ULA High (4 x 2)			
Cell-specific reference signals			Antenna ports 0,1			
CSI reference signals			Antenna ports 15,…,18			
Beamforming model			As specified in Annex B.4.3			
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1			
CSI-RS reference signal configuration			2			
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 0001			
Reporting mode			PUCCH 1-1			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	8			
Physical channel for CQI/ PMI reporting			PUSCH (Note 4)			
PUCCH Report Type for CQI/PMI			2			
PUCCH channel for RI reporting			PUCCH Format 2			
PUCCH report type for RI			3			
cqi-pmi-ConfigurationIndex			2			
ri-ConfigIndex			1			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.7 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.

Table 9.3.2.2.1_D.3-2: Minimum requirement (FDD)

	Test 1	Test 2
α [%]	20	20
γ	1.05	1.05
UE Category	2-8	2-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.2.2.1.

9.3.2.2.1_D.4 Test description

9.3.2.2.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.2.2.1_D.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.2.2.1_D.4.3.

9.3.2.2.1_D.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.2.2.1_D.5-2 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. If less than (100-α)/100*2000 of the wideband CQI values are in the range (Median CQI - 1) ≤ Median CQI ≤ (Median CQI + 1) then continue with step 5, otherwise go to step 7.
5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband median-CQI value regardless of UE wideband CQI report. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.
6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{wideband}$.
   For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
   If the ratio ($t_{wideband}$ / t_{median}) ≥ γ and ratio (NACK /(ACK + NACK)) is greater or equal to 0.02, then pass the UE for this test and go to step 8. Otherwise go to step 7.
7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.2.2.1_D.3-1 for the other test as appropriate.

9.3.2.2.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.2.2.1_D.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not Present		
antennaInfo-r10 CHOICE{			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
csi-ReportConfig-r10	CSI-RS-Config-r10		
}			

Table 9.3.2.2.1_D.4.3-2: *Void*

Table 9.3.2.2.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0000 0001		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.3.2.2.1_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.3.2.2.1_D.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.2.2.1_D.4.3-6: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.3.2.2.1_D.5 Test requirement

Table 9.3.2.2.1_D.3-2: Test requirement (FDD)

	Test 1	Test 2
α [%]	20	20
γ	1.04	1.04
UE Category	2-8	2-8
BLER	0.02	0.02

Table 9.3.2.2.1_D.5-2: Fading test for FDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-3			
	σ	dB	-3			
SNR for UE with 2Rx RF band (Note 3)		dB	2	3	7	8
SNR for 4Rx UE without 2Rx RF band		dB	-1	0	4	5
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-96	-95	-91	-90
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA5			
Correlation and antenna configuration			ULA High (4 x 2)			
Cell-specific reference signals			Antenna ports 0,1			
CSI reference signals			Antenna ports 15,…,18			
Beamforming model			As specified in Annex B.4.3			
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$			5/1			
CSI-RS reference signal configuration			2			
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 0001			
Reporting mode			PUCCH 1-1			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	8			
Physical channel for CQI/ PMI reporting			PUSCH (Note 4)			
PUCCH Report Type for CQI/PMI			2			
PUCCH channel for RI reporting			PUCCH Format 2			
PUCCH report type for RI			3			
cqi-pmi-ConfigurationIndex			2			
ri-ConfigIndex			1			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.7 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.

Note 5: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.2.2.2_D TDD CQI Reporting under fading conditions – PUCCH 1-1 for eDL-MIMO

9.3.2.2.2_D.1 Test purpose

To verify that the UE is tracking the channel variations and selecting the largest transport format possible according to the prevailing channel state for frequently non-selective scheduling.

9.3.2.2.2_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward of Category ≥2. Applicability requires support for FGI bits 104 and 110.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.2.2.2_D.3 Minimum conformance requirements

For the parameters specified in Table 9.3.2.2.2_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.2.2.2_D.3-2 and by the following:

a) CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least α% of the time;

b) The ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be $\geq \gamma$;

c) When transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

Table 9.3.2.2.2_D.3-1: Fading test for TDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			9			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-6			
	σ	dB	-3			
SNR (Note 3)		dB	1	2	7	8
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-97	-96	-91	-90
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA5			
Correlation and antenna configuration			XP High (8 x 2)			
CRS reference signals			Antenna ports 0, 1			
CSI reference signals			Antenna ports 15,…,22			
Beamforming model			As specified in Annex B.4.3			
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$			5/ 3			
CSI-RS reference signal configuration			2			
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 0020 0000 0000 0001			
Reporting mode			PUCCH 1-1 (Sub-mode: 2)			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	10			
Physical channel for CQI/ PMI reporting			PUSCH (Note 4)			
PUCCH Report Type for CQI/ PMI			2c			
Physical channel for RI reporting			PUCCH Format 2			
PUCCH report type for RI			3			
cqi-pmi-ConfigurationIndex			3			
ri-ConfigIndex			805 (Note 5)			
Max number of HARQ transmissions			1			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.7 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#2 and #7.

Note 5: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.

Table 9.3.2.2.2_D.3-2: Minimum requirement (TDD)

	Test 1	Test 2
α [%]	20	20
γ	1.05	1.05
UE Category	≥2	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.2.2.2.

9.3.2.2.2_D.4 Test description

9.3.2.2.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure 47 for UE with 2Rx RF band and Annex A, Figure A.47a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.2.2.2_D.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.2.2.2_D.4.3.

9.3.2.2.2_D.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.2.2.2_D.5-2 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMCaccording to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH Continue transmission of the PDSCH until 2000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. If less than (100-α)/100*2000 of the wideband CQI values are in the range (Median CQI - 1) ≤ Median CQI ≤ (Median CQI + 1) then continue with step 5, otherwise go to step 7.
5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMCaccording to the wideband median-CQI value regardless of UE wideband CQI report. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Declare the throughput as t_{median}.
6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMCaccording to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Declare the throughput as $t_{wideband}$. For any PDSCH transmitted by the SS,

record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
If the ratio ($t_{wideband}$ / t_{median}) $\geq \gamma$ and ratio (NACK /(ACK + NACK)) is greater or equal to 0.02, then pass the UE and go to step 8. Otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.2.2.2_D.3-1 for the other test as appropriate.

9.3.2.2.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.2.2.2_D.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
antennaInfo	Not Present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
csi-ReportConfig-r10	CSI-RS-Config-r10		
}			

Table 9.3.2.2.2_D.4.3-2: *Void*

Table 9.3.2.2.2_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0000 0020 0000 0000 0001		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.3.2.2.2_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
Pmi-RI-Report-r9	setup		
}			

Table 9.3.2.2.2_D.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	submode2		
}			
ri-ConfigIndex	805	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.2.2.2_D.4.3-6: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

Table 9.3.2.2.2_D.4.3-7: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.3.2.2.2_D.4.3-8: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an8	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-6	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.3.2.2.2_D.5 Test requirement

Table 9.3.2.2.2_D.5-1: Test requirement (TDD)

	Test 1	**Test 2**
α [%]	20	20
γ	1.04	1.04
UE Category	≥2	≥2
BLER	0.02	0.02

Table 9.3.2.2.2_D.5-2: Fading test for TDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			9			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-6			
	σ	dB	-3			
SNR for UE with 2Rx RF band (Note 3)		dB	1	2	7	8
SNR for 4Rx UE without 2Rx RF band		dB	-2	-1	4	5
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-97	-96	-91	-90
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA5			
Correlation and antenna configuration			XP High (8 x 2)			
CRS reference signals			Antenna ports 0, 1			
CSI reference signals			Antenna ports 15,…,22			
Beamforming model			As specified in Annex B.4.3			
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 3			
CSI-RS reference signal configuration			2			
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 0020 0000 0000 0000 0001			
Reporting mode			PUCCH 1-1 (Sub-mode: 2)			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	10			
Physical channel for CQI/ PMI reporting			PUSCH (Note 4)			
PUCCH Report Type for CQI/ PMI			2c			
Physical channel for RI reporting			PUCCH Format 2			
PUCCH report type for RI			3			
cqi-pmi-ConfigurationIndex			3			
ri-ConfigIndex			805 (Note 5)			
Max number of HARQ transmissions			1			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.7 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#2 and #7.

Note 5: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.

Note 6: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.3 Frequency-selective interference

The accuracy of sub-band channel quality indicator (CQI) reporting under frequency selective interference conditions is determined by a double-sided percentile of the reported differential CQI offset level +2 for a preferred sub-band, and the relative increase of the throughput obtained when transmitting on any one of the sub-bands with the highest reported differential CQI offset level the corresponding transport format compared to the case for which a fixed format is transmitted on any sub-band in set of TS 36.213 [10]. The purpose is to verify that preferred sub-bands are used for frequently-selective scheduling under frequency-selective interference conditions.

9.3.3.1 CQI Reporting under fading conditions and frequency-selective interference – PUSCH 3-0 (Cell-Specific Reference Symbols)

9.3.3.1.1 FDD CQI Reporting under fading conditions and frequency-selective interference – PUSCH 3-0

9.3.3.1.1.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling with frequency-selective interference situation.

9.3.3.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.3.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.3.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.3.1.1.3-2 and by the following:

a) a sub-band differential CQI offset level of +2 shall be reported at least α% for at least one of the sub-bands of full size at the channel edges;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set S shall be $\geq \gamma$;

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test.

Table 9.3.3.1.1.3-1 Sub-band test for single antenna transmission (FDD)

Parameter		Unit	Test 1	Test 2
Bandwidth		MHz	10 MHz	10 MHz
Transmission mode			1 (port 0)	1 (port 0)
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0	0
	σ	dB	0	0
$I_{ot}^{(j)}$ for RB 0…5 Note 3		dB[mW/15kHz]	-102	-93
$I_{ot}^{(j)}$ for RB 6…41 Note 3		dB[mW/15kHz]	-93	-93
$I_{ot}^{(j)}$ for RB 42…49 Note 3		dB[mW/15kHz]	-93	-102
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-94
Max number of HARQ transmissions			1	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Reporting interval		ms	5	
Antenna configuration			1 x 2	
CQI delay		ms	8	
Reporting mode			PUSCH 3-0	
Sub-band size		RB	6 (full size)	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.3 FDD according to Table A.4-1.with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2

Note 3: Iot shall be modelled as connecting Gaussian distributed uncorrelated interference source for each UE receive antenna port. The received power spectral density of the interfering signal as measured at the UE antenna connector is to be scaled accordingly for different RB groups.

Table 9.3.3.1.1.3-2: Minimum requirement (FDD)

Parameter	Test 1	Test 2
α [%]	60	60
γ	1.6	1.6
UE Category	≥1	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.3.3.1.1.

9.3.3.1.1.4 Test description

9.3.3.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, interfering source and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.21 for UE with 2Rx RF band and Annex A, Figure A.21a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.3.1.1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.3.1.1.4.3.

9.3.3.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.3.1.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. If for at least one of the full-size subbands at the channel edges, a subband differential CQI offset level of +2 is reported in α% or more of 2000 reports, then continue with step 5, otherwise fail the UE.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC on an each TTI randomly selected full-size subband using the transport format according to the wideband median-CQI value regardless of UE wideband or subband CQI report. Note that each full-size subband shall be selected in the equal probability The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the sub-bands in which UE reports the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval.
   If $t_{subband} / t_{median} \geq \gamma$, then pass the UE for this test and go to step 7. Otherwise fail the UE.

7. If both tests have not been done, then repeat the same procedure (steps 1 to 6) with test conditions according to the table 9.3.3.1.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.3.1.1.4.3 Message contents

Table 9.3.3.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.3.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm30		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	Not present		
}			
}			

9.3.3.1.1.5 Test requirement

Table 9.3.3.1.1.5-1: Test requirement (FDD)

Parameter	Test 1	Test 2
α [%]	40	40
γ	1.50	1.50

9.3.3.1.2 TDD CQI Reporting under fading conditions and frequency-selective interference – PUSCH 3-0

9.3.3.1.2.1 Test purpose

To verify that preferred sub-bands can be used for frequently-selective scheduling with frequency-selective interference situation.

9.3.3.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.3.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.3.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.3.1.2.3-2 and by the following:

a) a sub-band differential CQI offset level of +2 shall be reported at least α% for at least one of the sub-bands of full size at the channel edges;

b) the ratio of the throughput obtained when transmitting on any one of the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test.

Table 9.3.3.1.2.3-1: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1	Test 2
Bandwidth		MHz	10 MHz	10 MHz
Transmission mode			1 (port 0)	1 (port 0)
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0	0
	σ	dB	0	0
Uplink downlink configuration			2	
Special subframe configuration			4	
$I_{ot}^{(j)}$ for RB 0…[5] Note 3		dB[mW/15kHz]	-102	-93
$I_{ot}^{(j)}$ for RB 6…[41] Note 3		dB[mW/15kHz]	-93	-93
$I_{ot}^{(j)}$ for RB [42]…49 Note 3		dB[mW/15kHz]	-93	-102
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-94
Max number of HARQ transmissions			1	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration			1 x 2	
Reporting interval		ms	5	
CQI delay		ms	10 or 11	
Reporting mode			PUSCH 3-0	
Sub-band size		RB	6 (full size)	
ACK/NACK feedback mode			Multiplexing	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.3 TDD according to table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: Iot shall be modelled as connecting Gaussian distributed uncorrelated interference source for each UE receive antenna port. The received power spectral density of the interfering signal as measured at the UE antenna connector is to be scaled accordingly for different RB groups.

Table 9.3.3.1.2.3-2: Minimum requirement (TDD)

Parameter	Test 1	Test 2
α [%]	60	60
γ	1.6	1.6
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.3.1.2.

9.3.3.1.2.4 Test description

9.3.3.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and interfering source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.21 for UE with 2Rx RF band and Annex A, Figure A.21a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.3.1.2.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.3.1.2.4.3.

9.3.3.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.3.1.2.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. If for at least one of the full-size subbands at the channel edges, a subband differential CQI offset level of +2 is reported in α% or more of 2000 reports, then continue with step 5, otherwise fail the UE.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in an each available downlink transmission instance randomly selected full-size subband using the transport format according to the wideband median-CQI value regardless of UE wideband or subband CQI report. Note that each full-size subband shall be selected in the equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the sub-bands in which UE reports the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval.

   If $t_{subband}$ / $t_{median} \geq \gamma$, then pass the UE for this test and go to step 7. Otherwise fail the UE.

7. If both tests have not been done, then repeat the same procedure (steps 1 to 6) with test conditions according to the table 9.3.3.1.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.3.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.3.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.3.1.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm30		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	Not present		
}			
}			

Table 9.3.3.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.3.3.1.2.5 Test requirement

Table 9.3.3.1.2.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2
α [%]	40	40
γ	1.50	1.50

9.3.4 UE-selected subband CQI

The accuracy of UE-selected subband channel quality indicator (CQI) reporting under frequency-selective fading conditions is determined by the relative increase of the throughput obtained when transmitting on the UE-selected subbands with the corresponding transport format compared to the case for which a fixed format is transmitted on any subband in set *S* of TS 36.213 [10]. The purpose is to verify that correct subbands are accurately reported for frequency-selective scheduling. To account for sensitivity of the input SNR the subband CQI reporting under frequency-selective fading conditions is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.3.4.1 CQI Reporting under fading conditions – PUSCH 2-0 (Cell-Specific Reference Symbols)

9.3.4.1.1 FDD CQI Reporting under fading conditions – PUSCH 2-0

9.3.4.1.1.1 Test purpose

To verify that UE-selected sub-bands can be used for frequently-selective scheduling.

9.3.4.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward. Applicability requires support for FGI bit 1.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.4.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.4.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.4.1.1.3-2 and by the following:

a) the ratio of the throughput obtained when transmitting on a randomly selected subband among the best M subbands reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected subband in set *S* shall be $\geq \gamma$;

The requirements only apply for subbands of full size and the random scheduling across the subbands is done by selecting a new subband in each TTI for FDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [10] that corresponds to the subband size.

Table 9.3.4.1.1.3-1: Subband test for single antenna transmission (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR (Note 3)		dB	9	10	14	15
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-89	-88	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Reporting interval		ms	5			
CQI delay		ms	8			
Reporting mode			PUSCH 2-0			
Max number of HARQ transmissions			1			
Subband size (*k*)		RBs	3 (full size)			
Number of preferred subbands (*M*)			5			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.5 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Table 9.3.4.1.1.3-2: Minimum requirement (FDD)

	Test 1	Test 2
γ	1.2	1.2
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.4.1.1.

9.3.4.1.1.4 Test description

9.3.4.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.4.1.1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.4.1.1.4.3.

9.3.4.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.4.1.1.5-2 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC on a randomly selected full-size subband using the transport format according to the wideband median-CQI value regardless of UE wideband or subband CQI report. Note that each full-size subband shall be selected in the equal probability The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in one full-size subband selected among the M subbands reported by the UE and with the corresponding TBS. Differential CQI offset level is selected from {1, 2, 3, 4}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 5 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval.
   If $t_{subband} / t_{median} \geq \gamma$, then pass the UE for this test and go to step 7. Otherwise go to step 6.

6. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 5) for the other SNR point as appropriate. Otherwise fail the UE.

7. If both tests have not been done, then repeat the same procedure (steps 1 to 5) with test conditions according to the table 9.3.4.1.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.4.1.1.4.3 Message contents

Table 9.3.4.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.4.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm20		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	Not present		
}			
}			

9.3.4.1.1.5 Test requirement

Table 9.3.4.1.1.5-1: Test requirement (FDD)

	Test 1	**Test 2**
γ	1.19	1.19
UE Category	1-8	1-8

Table 9.3.4.1.1.5-2: Subband test for single antenna transmission (FDD)

Parameter		**Unit**	**Test 1**		**Test 2**	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR for UE with 2Rx RF band (Note 3)		dB	9	10	14	15
SNR for 4Rx UE without 2Rx RF band		dB	6	7	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-89	-88	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Reporting interval		ms	5			
CQI delay		ms	8			
Reporting mode			PUSCH 2-0			
Max number of HARQ transmissions			1			
Subband size (*k*)		RBs	3 (full size)			
Number of preferred subbands (*M*)			5			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.5 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

9.3.4.1.2 TDD CQI Reporting under fading conditions – PUSCH 2-0

9.3.4.1.2.1 Test purpose

To verify that UE-selected sub-bands can be used for frequently-selective scheduling.

9.3.4.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward. Applicability requires support for FGI bit 1.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.4.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.4.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.4.1.2.3-2 and by the following:

a) the ratio of the throughput obtained when transmitting on a randomly selected subband among the best M subbands reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected subband in set *S* shall be $\geq \gamma$;

The requirements only apply for subbands of full size and the random scheduling across the subbands is done by selecting a new subband in each available downlink transmission instance for TDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [10] that corresponds to the subband size.

Table 9.3.4.1.2.3-1: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
SNR (Note 3)		dB	9	10	14	15
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-89	-88	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Reporting interval		ms	5			
CQI delay		ms	10 or 11			
Reporting mode			PUSCH 2-0			
Max number of HARQ transmissions			1			
Subband size (*k*)		RBs	3 (full size)			
Number of preferred subbands (*M*)			5			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.5 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Table 9.3.4.1.2.3-2: Minimum requirement (TDD)

	Test 1	Test 2
γ	1.2	1.2
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.4.1.2.

9.3.4.1.2.4 Test description

9.3.4.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.4.1.2.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.4.1.2.4.3.

9.3.4.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.4.1.2.5-2 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC on a randomly selected full-size subband using the transport format according to the wideband median-CQI value regardless of UE wideband or subband CQI report. Note that each full-size subband shall be selected in the equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in one full-size subband selected among the M subbands reported by the UE and with the corresponding TBS. Differential CQI offset level is selected from {1, 2, 3, 4}. Note that the SS shall send PDSCH in the same full-size until next UE report is available. In case when same full-size subbands are reported subsequently, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval.
   If $t_{subband} / t_{median} \geq \gamma$, then pass the UE for this test and go to step 7. Otherwise go to step 6.

6. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 5) for the other SNR point as appropriate. Otherwise fail the UE.

7. If both tests have not been done, then repeat the same procedure (steps 1 to 6) with test conditions according to the table 9.3.4.1.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.4.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.4.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.4.1.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm20		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	Not present		
}			
}			

Table 9.3.4.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.3.4.1.2.5 Test requirement

Table 9.3.4.1.2.5-1: Test requirement (TDD)

	Test 1	**Test 2**
γ	1.19	1.19
UE Category	1-8	1-8

Table 9.3.4.1.2.5-2: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
SNR for UE with 2Rx RF band (Note 3)		dB	9	10	14	15
SNR for 4Rx UE without 2Rx RF band		dB	6	7	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-89	-88	-84	-83
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Reporting interval		ms	5			
CQI delay		ms	10 or 11			
Reporting mode			PUSCH 2-0			
Max number of HARQ transmissions			1			
Subband size (*k*)		RBs	3 (full size)			
Number of preferred subbands (*M*)			5			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.5 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

9.3.4.2 CQI Reporting under fading conditions – PUCCH 2-0 (Cell-Specific Reference Symbols)

9.3.4.2.1 FDD CQI Reporting under fading conditions – PUCCH 2-0

9.3.4.2.1.1 Test purpose

To verify that UE-selected sub-bands can be used for frequently-selective scheduling.

9.3.4.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward. Applicability requires support for FGI bit 2.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.4.2.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.4.2.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.4.2.1.3-2 and by the following

a) the ratio of the throughput obtained when transmitting on subbands reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected subband in set *S* shall be $\geq \gamma$;

The requirements only apply for subbands of full size and the random scheduling across the subbands is done by selecting a new subband in each TTI for FDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [10] that corresponds to the subband size.

Table 9.3.4.2.1.3-1: Subband test for single antenna transmission (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR (Note 3)		dB	8	9	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-90	-89	-85	-84
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, *a* = 1, $f_D = 5$ Hz			
Reporting periodicity		ms	N_P = 2			
CQI delay		ms	8			
Physical channel for CQI reporting			PUSCH (Note 4)			
PUCCH Report Type for wideband CQI			4			
PUCCH Report Type for subband CQI			1			
Max number of HARQ transmissions			1			
Subband size (*k*)		RBs	6 (full size)			
Number of bandwidth parts (*J*)			3			
K			1			
cqi-pmi-ConfigIndex			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.3 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Note 5: CQI reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and data scheduling according to the most recent subband CQI report for bandwidth part with j=1.

Note 6: In the case where wideband CQI is reported, data is to be scheduled according to the most recently used subband CQI report.

Table 9.3.4.2.1.3-2: Minimum requirement (FDD)

	Test 1	Test 2
γ	1.15	1.15
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.4.2.1.

9.3.4.2.1.4 Test description

9.3.4.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.4.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.4.2.1.4.3.

9.3.4.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.4.2.1.5-2 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1, #3, #5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. In this process the SS collects wideband CQI reports and also cases where UE transmits nothing in its wideband CQI timing are counted as wideband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC on a randomly selected full-size subband using the transport format according to the wideband median-CQI value regardless of UE wideband or subband CQI report. Note that each full-size subband shall be selected in the equal probability The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1, #3, #5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.
5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in the full-size subband reported by the UE and with the corresponding TBS. When the UE reports a non-full-size SB, the SS schedules the recent reported SB for bandwidth part with j=1 and with the corresponding TBS. Note that the SS shall send PDSCH in the same full-size subband until next subband UE report is available. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1, #3, #5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. Count the number of NACKs, ACKs

and statDTXs on the UL during the test interval.

If $t_{subband}$ / t_{median} $\geq \gamma$, then pass the UE for this test and go to step 7. Otherwise go to step 6.

6. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 5) for the other SNR point as appropriate. Otherwise fail the UE.

7. If both tests have not been done, then repeat the same procedure (steps 1 to 6) with test conditions according to the table 9.3.4.2.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.4.1.1.4.3 Message contents

Table 9.3.4.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.4.2.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	1	(see Table 7.2.2-1A in TS 36.213	
cqi-FormatIndicatorPeriodic CHOICE {			
subbandCQI	1		
}			
ri-ConfigIndex	483	(see Table 7.2.2-1B in TS 36.213	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.3.4.2.1.5 Test requirement

Table 9.3.4.2.1.5-1: Test requirement (FDD)

	Test 1	**Test 2**
γ	1.14	1.14
UE Category	1-8	1-8

Table 9.3.4.2.1.5-2: Subband test for single antenna transmission (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR for UE with 2Rx RF band (Note 3)		dB	8	9	13	14
SNR for 4Rx UE without 2Rx RF band		dB	5	6	10	11
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-90	-89	-85	-84
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, *a* = 1, $f_D = 5$ Hz			
Reporting periodicity		ms	N_P = 2			
CQI delay		ms	8			
Physical channel for CQI reporting			PUSCH (Note 4)			
PUCCH Report Type for wideband CQI			4			
PUCCH Report Type for subband CQI			1			
Max number of HARQ transmissions			1			
Subband size (*k*)		RBs	6 (full size)			
Number of bandwidth parts (*J*)			3			
K			1			
cqi-pmi-ConfigIndex			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.3 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Note 5: CQI reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and data scheduling according to the most recent subband CQI report for bandwidth part with j=1.

Note 6: In the case where wideband CQI is reported, data is to be scheduled according to the most recently used subband CQI report.

Note 7: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

9.3.4.2.2 TDD CQI Reporting under fading conditions – PUCCH 2-0

9.3.4.2.2.1 Test purpose

To verify that UE-selected sub-bands can be used for frequently-selective scheduling.

9.3.4.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward. Applicability requires support for FGI bit 2.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.4.2.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.4.2.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.4.2.2.3-2 and by the following:

a) the ratio of the throughput obtained when transmitting on subbands reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected subband in set *S* shall be $\geq \gamma$;

The requirements only apply for subbands of full size and the random scheduling across the subbands is done by selecting a new subband in each available downlink transmission instance for TDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [10] that corresponds to the subband size.

Table 9.3.4.2.2.3-1: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
SNR (Note 3)		dB	8	9	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-90	-89	-85	-84
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Reporting periodicity		ms	N_P = 5			
CQI delay		ms	10 or 11			
Physical channel for CQI reporting			PUSCH (Note 4)			
PUCCH Report Type for wideband CQI			4			
PUCCH Report Type for subband CQI			1			
Max number of HARQ transmissions			1			
Subband size (*k*)		RBs	6 (full size)			
Number of bandwidth parts (*J*)			3			
K			1			
cqi-pmi-ConfigIndex			3			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.3 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 5: CQI reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and data scheduling according to the most recent subband CQI report for bandwidth part with j=1.

Note 6: In the case where wideband CQI is reported, data is to be scheduled according to the most recently used subband CQI report.

Table 9.3.4.2.2.3-2: Minimum requirement (TDD)

	Test 1	Test 2
γ	1.15	1.15
UE Category	1-8	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.4.2.2.

9.3.4.2.2.4 Test description

9.3.4.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.4.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.4.2.2.4.3.

9.3.4.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.4.2.2.5-2 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. In this process the SS collects wideband CQI reports and also cases where UE transmits nothing in its wideband CQI timing are counted as wideband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC on a randomly selected full-size subband using the transport format according to the wideband median-CQI value regardless of UE wideband or subband CQI report. Note that each full-size subband shall be selected in the equal probability. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.
5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC in the full-size subband reported by the UE and with the corresponding TBS. When the UE reports a non-full-size SB, the SS schedules the recent reported SB for bandwidth part with j=1 and with the corresponding TBS. Note that the SS shall send PDSCH in the same full-size subband until next subband UE report is available. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. Count the number of NACKs, ACKs and

statDTXs on the UL during the test interval.

If $t_{subband}$ / t_{median} $\geq \gamma$, then pass the UE for this test and go to step 7. Otherwise go to step 6.

6. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 5) for the other SNR point as appropriate. Otherwise fail the UE.

7. If both tests have not been done, then repeat the same procedure (steps 1 to 6) with test conditions according to the table 9.3.4.2.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.4.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.4.2.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.4.2.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
subbandCQI	1		
}			
ri-ConfigIndex	484	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.4.2.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.3.4.2.2.5 Test requirement

Table 9.3.4.2.2.5-1: Test requirement (TDD)

	Test 1	**Test 2**
γ	1.14	1.14
UE Category	1-8	1-8

Table 9.3.4.2.2.5-2: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
SNR for UE with 2Rx RF band (Note 3)		dB	8	9	13	14
SNR for 4Rx UE without 2Rx RF band		dB	5	6	10	11
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-90	-89	-85	-84
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Reporting periodicity		ms	N_P = 5			
CQI delay		ms	10 or 11			
Physical channel for CQI reporting			PUSCH (Note 4)			
PUCCH Report Type for wideband CQI			4			
PUCCH Report Type for subband CQI			1			
Max number of HARQ transmissions			1			
Subband size (*k*)		RBs	6 (full size)			
Number of bandwidth parts (*J*)			3			
K			1			
cqi-pmi-ConfigIndex			3			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.3 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 5: CQI reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and data scheduling according to the most recent subband CQI report for bandwidth part with j=1.

Note 6: In the case where wideband CQI is reported, data is to be scheduled according to the most recently used subband CQI report.

Note 7: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

9.3.5 Additional requirements for enhanced receiver Type A

9.3.5.1 PUCCH 1-0 (Cell-Specific Reference Symbol)

9.3.5.1.1 FDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A

9.3.5.1.1.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.3.5.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that support enhanced receiver Type A.

9.3.5.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.5.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.5.1.1.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;

b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

Table 9.3.5.1.1.3-1: Fading test for single antenna (FDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		1 (port 0)	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-2	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (1 x 2)	(1 x 2)
DIP (Note 4)	dB	N/A	-0.41
Reference measurement channel		Note 2	R.2 FDD
Reporting mode		PUCCH 1-0	N/A
Reporting periodicity	ms	N_{pd} = 2	N/A
CQI delay	ms	8	N/A
Physical channel for CQI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type		4	N/A
cqi-pmi-ConfigurationIndex		1	N/A
Max number of HARQ transmissions		1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 FDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and RC.4 FDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Table 9.3.5.1.1.3-2: Minimum requirement (FDD)

γ	1.8
UE Category	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.5.1.1.

9.3.5.1.1.4 Test description

9.3.5.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.50.
2. The parameter settings for the cell 1 are set up according to Table 9.3.5.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.5.1.1.4.3.

9.3.5.1.1.4.2 Test procedure

1. Set the cell 1 and 2 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.5.1.1.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1,#3,#5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_interference}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
3. Deactivate i.e., stop transmitting anything from the cell 2 and set the cell 1 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.5.1.1.3-1 as appropriate.
4. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1,#3,#5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_gaussian_noise}}$.
5. If the ratio ($t_{\text{wideband_interference}} / t_{\text{wideband_gaussian_noise}}$) $\geq \gamma$ and ratio (NACK /(ACK + NACK)) calculated in step 2 is greater or equal to 0.02, then pass the UE for this test. Otherwise fail the UE.

9.3.5.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.5.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.5.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	1	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.3.5.1.1.5 Test requirement

Table 9.3.5.1.1.5-1: Test Parameters for Fading test with single antenna (FDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		1 (port 0)	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-1.97	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (1 x 2)	(1 x 2)
DIP (Note 4)	dB	N/A	-0.38
Reference measurement channel		Note 2	R.2 FDD
Reporting mode		PUCCH 1-0	N/A
Reporting periodicity	ms	N_{pd} = 2	N/A
CQI delay	ms	8	N/A
Physical channel for CQI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type		4	N/A
cqi-pmi-ConfigurationIndex		1	N/A
Max number of HARQ transmissions		1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 FDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and RC.4 FDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Table 9.3.5.1.1.5-2: Test requirement (FDD)

γ	1.79
UE Category	1-8

9.3.5.1.2 TDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A

9.3.5.1.2.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.3.5.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward that support enhanced receiver Type A.

9.3.5.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.5.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.5.1.2.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;

b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

Table 9.3.5.1.2.3-1: Fading test for single antenna (TDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		1 (port 0)	
Uplink downlink configuration		2	
Special subframe configuration		4	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-2	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (1 x 2)	(1 x 2)
DIP (Note 4)	dB	N/A	-0.41
Reference measurement channel		Note 2	R.2A TDD
Reporting mode		PUCCH 1-0	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	10 or 11	N/A
Physical channel for CQI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type		4	N/A
cqi-pmi-ConfigurationIndex		3	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback mode		Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 TDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1 and RC.4 TDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Table 9.3.5.1.2.3-2: Minimum requirement (TDD)

γ	1.8
UE Category	1-8

The normative reference for this requirement is TS 36.101 [2] clause 9.3.5.1.2.

9.3.5.1.2.4 Test description

9.3.5.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.50.
2. The parameter settings for the cell 1 are set up according to Table 9.3.5.1.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.5.1.2.4.3.

9.3.5.1.2.4.2 Test procedure

1. Set the cell 1 and 2 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.5.1.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_interference}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
3. Deactivate i.e., stop transmitting anything from the cell 2 and set the cell 1 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.5.1.2.3-1 as appropriate.
4. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_gaussian_noise}}$.
5. If the ratio ($t_{\text{wideband_interference}} / t_{\text{wideband_gaussian_noise}}$) $\geq \gamma$ and ratio (NACK /(ACK + NACK)) calculated in step 2 is greater or equal to 0.02, then pass the UE for this test. Otherwise fail the UE.

9.3.5.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.5.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.3.5.1.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.5.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.3.5.1.2.5 Test requirement

Table 9.3.5.1.2.5-1: Test Parameters for Fading test with single antenna (TDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		1 (port 0)	
Uplink downlink configuration		2	
Special subframe configuration		4	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-1.97	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (1 x 2)	(1 x 2)
DIP (Note 4)	dB	N/A	-0.38
Reference measurement channel		Note 2	R.2A TDD
Reporting mode		PUCCH 1-0	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	10 or 11	N/A
Physical channel for CQI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type		4	N/A
cqi-pmi-ConfigurationIndex		3	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback mode		Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 TDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1 and RC.4 TDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Table 9.3.5.1.2.5-2: Test requirement (TDD)

γ	1.79
UE Category	1-8

9.3.5.2 PUCCH 1-1 (CSI Reference Symbol)

9.3.5.2.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A

9.3.5.2.1.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.3.5.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward of Category ≥2 that support enhanced receiver Type A.

Applicability requires support for FGI bit 103.

9.3.5.2.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.5.2.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.5.2.1.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;

b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

Table 9.3.5.2.1.3-1: Fading test for single antenna (FDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		9	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-2	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 2)	(1 x 2)
Beamforming Model		As specified in Section B.4.3 (Note 10, 11)	N/A
DIP (Note 4)	dB	N/A	-0.41
Cell-specific reference signals		Antenna ports 0,1	Antenna port 0
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/1	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	N/A	1 / 0010000000000000
CodeBookSubsetRestriction bitmap		001111	N/A
Reference measurement channel		Note 2	R.2 FDD
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	8	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
PUCCH channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-ConfigurationIndex		2	N/A
ri-ConfigIndex		1	N/A
Max number of HARQ transmissions		1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.

Note 4: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7:	Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.
Note 8:	SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.
Note 9:	N/A.
Note 10:	The precoder in clause B.4.3 follows UE recommended PMI.
Note 11:	If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 9.3.5.2.1.3-2: Minimum requirement (FDD)

γ	1.8
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.5.2.1.

9.3.5.2.1.4 Test description

9.3.5.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.51.
2. The parameter settings for the cell 1 are set up according to Table 9.3.5.2.1.5-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.5.2.1.4.3.

9.3.5.2.1.4.2 Test procedure

1. Set the cell 1 and 2 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.5.2.1.5-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_interference}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
3. Deactivate i.e., stop transmitting anything from the cell 2 and set the cell 1 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.5.2.1.5-1 as appropriate.

4. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_gaussian_noise}}$.

5. If the ratio ($t_{\text{wideband_interference}} / t_{\text{wideband_gaussian_noise}}$) $\geq \gamma$ in Table 9.3.5.2.1.5-2 and ratio (NACK /(ACK + NACK)) calculated in step 2 is greater or equal to 0.02, then pass the UE for this test. Otherwise fail the UE.

9.3.5.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.5.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.3.5.2.1.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	001111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.3.5.2.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.3.5.2.1.4.3-4: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	2		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.5.2.1.4.3-5: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 9.3.5.2.1.4.3-6: *Void*

9.3.5.2.1.5 Test requirement

Table 9.3.5.2.1.5-1: Test Parameters for fading test for single antenna (FDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		9	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-1.97	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 2)	(1 x 2)
Beamforming Model		As specified in Section B.4.3 (Note: 10, 11)	N/A
DIP (Note 4)	dB	N/A	-0.38
Cell-specific reference signals		Antenna ports 0,1	Antenna port 0
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/1	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	N/A	1 / 0010000000000000
CodeBookSubsetRestriction bitmap		001111	N/A
Reference measurement channel		Note 2	R.2 FDD
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	8	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
PUCCH channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-ConfigurationIndex		2	N/A
ri-ConfigIndex		1	N/A
Max number of HARQ transmissions		1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 FDD according to Table A.4-1with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.

Note 4: The respective received power spectral density of each interfering

	cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.
Note 5:	Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Interfering cell is fully loaded.
Note 6:	Both cells are time-synchronous.
Note 7:	Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.
Note 8:	SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.
Note 9:	N/A.
Note 10:	The precoder in clause B.4.3 follows UE recommended PMI.
Note 11:	If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 9.3.5.2.1.5-2: Test requirement (FDD)

γ	1.79
UE Category	≥2

9.3.5.2.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A

9.3.5.2.2.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.3.5.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward of Category ≥2 that support enhanced receiver Type A.

Applicability requires support for FGI bit 103.

9.3.5.2.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.5.2.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in 9.3.5.2.2.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;

b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

Table 9.3.5.2.2.3-1: Fading test for single antenna (TDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		9	
Uplink downlink configuration		2	
Special subframe configuration		4	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-2	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 2)	(1 x 2)
Beamforming Model		As specified in Section B.4.3 (Note 11, 12)	N/A
DIP (Note 4)	dB	N/A	-0.41
Cell-specific reference signals		Antenna ports 0,1	Antenna port 0
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/3	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	N/A	3 / 0010000000000000
CodeBookSubsetRestriction bitmap		001111	N/A
Reference measurement channel		Note 2	R.2A TDD
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	10	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
Physical channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-ConfigurationIndex		3	N/A
ri-ConfigIndex		805 (Note 9)	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback mode		Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in

uplink subframe SF#2 and #7.

Note 4: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}$´ of Cell 1 as defined in clause 8.1.1.

Note 9: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.

Note 10: N/A.

Note 11: The precoder in clause B.4.3 follows UE recommended PMI.

Note 12: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 9.3.5.2.2.3-2: Minimum requirement (TDD)

γ	1.8
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.5.2.2.

9.3.5.2.2.4 Test description

9.3.5.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.51.
2. The parameter settings for the cell 1 are set up according to Table 9.3.5.2.2.5-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.5.2.2.4.3.

9.3.5.2.2.4.2 Test procedure

1. Set the cell 1 and 2 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.5.2.2.5-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_interference}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.

3. Deactivate i.e., stop transmitting anything from the cell 2 and set the cell 1 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.5.2.2.5-1 as appropriate.

4. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_gaussian_noise}}$.

5. If the ratio ($t_{\text{wideband_interference}}$ / $t_{\text{wideband_gaussian_noise}}$) $\geq \gamma$ in Table 9.3.5.2.2.5-2 and ratio (NACK /(ACK + NACK)) calculated in step 2 is greater or equal to 0.02, then pass the UE for this test. Otherwise fail the UE.

9.3.5.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.5.2.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.3.5.2.2.4.3-2 *Void*

Table 9.3.5.2.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	001111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.3.5.2.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.3.5.2.2.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	805		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.5.2.2.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 9.3.5.2.2.4.3-7: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.3.5.2.2.5 Test requirement

Table 9.3.5.2.2.5-1: Test parameters for fading test for single antenna (TDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		9	
Uplink downlink configuration		2	
Special subframe configuration		4	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-1.97	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 2)	(1 x 2)
Beamforming Model		As specified in Section B.4.3 (Note 11, 12)	N/A
DIP (Note 4)	dB	N/A	-0.38
Cell-specific reference signals		Antenna ports 0,1	Antenna port 0
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/3	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	N/A	3 / 0010000000000000
CodeBookSubsetRestriction bitmap		001111	N/A
Reference measurement channel		Note 2	R.2A TDD
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	10	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
Physical channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-ConfigurationIndex		3	N/A
ri-ConfigIndex		805 (Note 9)	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback mode		Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH

DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#2 and #7.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Note 9: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.

Note 10: N/A.

Note 11: The precoder in clause B.4.3 follows UE recommended PMI.

Note 12: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 9.3.5.2.2.5-2: Test requirement (TDD)

γ	1.79
UE Category	≥2

9.3.6 CQI Reporting under fading conditions (With multiple CSI processes)

9.3.6.1_F FDD CQI Reporting under fading conditions with CSI processes for CoMP

9.3.6.1_F.1 FDD CQI Reporting under fading conditions with Single CSI process for CoMP

9.3.6.1_F.1.1 Test purpose

The purpose of the test is to verify the reporting accuracy of the CQI and the UE processing capability for single CSI process.

9.3.6.1_F.1.2 Test applicability

This test applies to all types of E-UTRA FDD UEs release 11 and forward, supporting Maximum CSI processes of One on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.6.1_F.1.3 Minimum conformance requirements

Each CSI process is associated with a CSI-RS resource and a CSI-IM resource as shown in Table 9.3.6.1_F.1.3-1. For UE supports one CSI process, CSI process 2 is configured and the corresponding requirements shall be fulfilled. For UE supports three CSI processes, CSI processes 0, 1 and 2 are configured and the corresponding requirements shall be fulfilled. For UE supports four CSI processes, CSI processes 0, 1, 2 and 3 are configured and the corresponding requirements shall be fulfilled. And the Table 9.3.6.1_F.1.3-1 is valid for FDD and TDD.

Table 9.3.6.1_F.1.3-1: Configuration of CSI processes

	CSI process 0	CSI process 1	CSI process 2	CSI process 3
CSI-RS resource	CSI-RS signal 0	CSI-RS signal 1	CSI-RS signal 0	CSI-RS signal 1
CSI-IM resource	CSI-IM resource 0	CSI-IM resource 0	CSI-IM resource 1	CSI-IM resource 2

For the parameters specified in Table 9.3.6.1_F.1.3-2, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.6.1_F.1.3-3 and by the following:

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band for CSI process 1, 2, or 3;

b) a CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least δ% of the time for CSI process 0;

c) the difference of the median CQIs of the reported wideband CQI for configured CSI processes shall be greater or equal to the values as in Table 9.3.6.1_F.1.3-4;

d) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

e) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test.

Table 9.3.6.1_F.1.3-2: Fading test for FDD

Parameter		Unit	Test 1				Test 2			
			TP1		TP2		TP1		TP2	
Bandwidth		MHz	10 MHz				10 MHz			
Transmission mode			10		10		10		10	
Downlink power allocation	ρ_A	dB	0				0			
	ρ_B	dB	0				0			
	P_C	dB	-3		0		-3		0	
	σ	dB	-3				-3			
SNR (Note 7)		dB	10	11	7	8	14	15	9	10
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-87	-91	-90	-84	-85	-89	-88
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98				-98			
Propagation channel			EPA 5 Low		Clause B.2.4.1 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz		EPA 5 Low		Clause B.2.4.1 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration			4x2		2x2		4x2		2x2	
Beamforming Model			As specified in Section B.4.3				As specified in Section B.4.3			
Timing offset between TPs		us	0				0			
Frequency offset between TPs		Hz	0				0			
Cell-specific reference signals			Antenna ports 0,1				Antenna ports 0,1			
CSI-RS signal 0			Antenna ports 15,…,18		N/A		Antenna ports 15,…,18		N/A	
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1		N/A		5/1		N/A	
CSI-RS 0 configuration			0		N/A		0		N/A	
CSI-RS signal 1			N/A		Antenna ports 15,16		N/A		Antenna ports 15,16	
CSI-RS 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A		5/1		N/A		5/1	
CSI-RS 1 configuration			N/A		5		N/A		5	
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			N/A		1 / 1110000000000000		N/A		1 / 1110000000000000	
Zero-power CSI-RS 1 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			1 / 0010011000000000		N/A		1 / 0010011000000000		N/A	
CSI-IM 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1		5/1		5/1		5/1	
CSI-IM 0 configuration			2		2		2		2	
CSI-IM 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1		N/A		5/1		N/A	
CSI-IM 1 configuration			6		N/A		6		N/A	
CSI-IM 2 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A		5/1		N/A		5/1	
CSI-IM 2 configuration			N/A		1		N/A		1	
CSI process 0	CSI-RS		CSI-RS 0				CSI-RS 0			
	CSI-IM		CSI-IM 0				CSI-IM 0			
	Reporting mode		PUCCH 1-1				PUCCH 1-1			
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001				0x0000 0000 0000 0001			
	Reporting periodicity	ms	N_{pd} = 5				N_{pd} = 5			
	CQI delay	ms	11				11			
	Physical channel for CQI/ PMI reporting		PUSCH (Note 6)				PUSCH (Note 6)			
	PUCCH Report Type for CQI/PMI		2				2			
	PUCCH channel		PUCCH Format 2				PUCCH Format 2			

	for RI reporting					
	PUCCH report type for RI		3		3	
	cqi-pmi-ConfigurationIndex		4		4	
	ri-ConfigIndex		2		2	
CSI process 1	CSI-RS		CSI-RS 1		CSI-RS 1	
	CSI-IM		CSI-IM 0		CSI-IM 0	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		000001		000001	
	Reporting interval (Note 10)	ms	5		5	
	CQI delay	ms	11		11	
	Sub-band size	RB	6 (full size)		6 (full size)	
CSI process 2 (For UE configured single process)	CSI-RS		CSI-RS 0		CSI-RS 0	
	CSI-IM		CSI-IM 1		CSI-IM 1	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001		0x0000 0000 0000 0001	
	Reporting interval (Note 8)	ms	5		5	
	CQI delay	ms	8		8	
	Sub-band size	RB	6 (full size) (Note 9)		6 (full size) (Note 9)	
CSI process 2 (For UE configured multiple processes)	CSI-RS		CSI-RS 0		CSI-RS 0	
	CSI-IM		CSI-IM 1		CSI-IM 1	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001		0x0000 0000 0000 0001	
	Reporting interval (Note 10)	ms	5		5	
	CQI delay	ms	11		11	
	Sub-band size	RB	6 (full size) (Note 9)		6 (full size) (Note 9)	
CSI process 3	CSI-RS		CSI-RS 1		CSI-RS 1	
	CSI-IM		CSI-IM 2		CSI-IM 2	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		000001		000001	
	Reporting interval (Note 10)	ms	5		5	
	CQI delay	ms	11		11	
	Sub-band size	RB	6 (full size)		6 (full size)	
CSI process for PDSCH scheduling			CSI process 2		CSI process 2	
Cell ID			0	6	0	6
Quasi-co-located CSI-RS			CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CRS			Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell ID as Cell 2
PMI for subframe 2, 3, 4, 7, 8 and 9			0x0000 0000 0000 0001	100000	0x0000 0000 0000 0001	100000
PMI for subframe 1 and 6			0x0000 0000 0001 0000	100000	0x0000 0000 0001 0000	100000
Max number of HARQ transmissions			1	N/A	1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: 3 symbols allocated to PDCCH.
Note 3: Reference measurement channel RC.12 FDD according to Table A.4-1. PDSCH transmission is scheduled on subframe 2, 3, 4, 7, 8 and 9 from TP1.
Note 4: TM10 OCNG as specified in A.5.1.8 is transmitted on subframe 1 and 6 from TP1.
Note 5: TM10 OCNG as specified in A.5.1.8 is transmitted on subframe 1, 2, 3, 4, 6, 7, 8 and 9 from TP2.
Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#2 and #7.
Note 7: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.
Note 9: For these sub-bands which are not selected for PDSCH transmission, TM10 OCNG should be transmitted.

Note 10: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#2 and #7 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#1 and #6.

Table 9.3.6.1_F.1.3-3: Minimum requirement (FDD)

	CSI process 0	CSI process 1	CSI process 2	CSI process 3
α [%]	N/A	2	2	2
β [%]	N/A	40	40	40
δ [%]	10	N/A	N/A	N/A
γ	N/A	N/A	1.02	N/A
UE Category	≥1			

Table 9.3.6.1_F.1.3-4: Minimum median CQI difference between configured CSI processes (FDD)

	CSI process 1	CSI process 2	CSI process 3
CSI process 0	N/A	1	3
UE Category	≥1		

The normative reference for this requirement is TS 36.101 [2] clause 9.3.6.1.

9.3.6.1_F.1.4 Test description

9.3.6.1_F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.52 for UE with 2Rx RF band and Annex A, Figure A.52a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.6.1_F.1.3-2.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.6.1_F.1.4.3.

9.3.6.1_F.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.6.1_F.1.5-2 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered for CSI process 2. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback for CSI process 2 via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less

or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 ≤ number of CQI reports with index 0 for each full-size subband ≤ 2000*β%/100" for CSI process 2. (2000= No of full-size subband reports, 100 because of %) If yes, continue with step5, otherwise goto step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each TTI randomly selected full-size subband regardless of UE wideband and full-size subband CQI report based on CSI process 2. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI based on CSI process 2. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) ≥ γ and (NACK /(ACK + NACK))≥ 0.02 , pass the UE for this test and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.6.1_F.1.3-2 for the other Test as appropriate. Otherwise pass the UE.

9.3.6.1_F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 9.3.6.1_F.1.4.3-1: CQI-ReportConfig-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2ABA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
simultaneousAckNackAndCQI-Format3-r11	Not present	PUCCH Format 2	
cqi-ReportPeriodicProcExtToReleaseList-r11	Not present		
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	2		
cqi-FormatIndicatorPeriodic-r11 CHOICE {			
widebandCQI-r11 SEQUENCE {			
csi-ReportMode-r11	submode1		
}			
subbandCQI-r11	Not present	PUCCH 1-1	
}			
ri-ConfigIndex-r11	1		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	1 entry		
csi-IM-ConfigId-r11[1]	2	CSI-IM 1	
resourceConfig-r11[1]	6		
subframeConfig-r11[1]	1		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	1 entry		
csi-ProcessId-r11[1]	3	CSI process 2	
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	2		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	-3		
codebookSubsetRestriction-r11[1]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	3		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[1]	Not present		
cqi-ReportAperiodicProc-r11[1] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
}			
}			
}			

Table 9.3.6.1_F.1.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated ::= SEQUENCE {			
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF SEQUENCE {	1 entry		
csi-RS-ConfigNZPId-r11[1]	1	CSI-RS signal 0	
antennaPortsCount-r11[1]	an4		
resourceConfig-r11[1]	0		
subframeConfig-r11[1]	1		
qcl-CRS-Info-r11 SEQUENCE[1] {			
crs-PortsCount-r11[1]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[1]	Not present		
}			
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF SEQUENCE {			
csi-RS-ConfigZPId-r11[1]	1	Zero-power CSI-RS 0	
resourceConfigList-r11[1]	1110000000000000	For TP2	
subframeConfig-r11[1]	1		
csi-RS-ConfigZPId-r11[2]	2	Zero-power CSI-RS 1	
resourceConfigList-r11[2]	0010011000000000	For TP1	
subframeConfig-r11[2]	1		
}			
}			

9.3.6.1_F.1.5 Test requirement

Table 9.3.6.1_F.1.5-1: Test requirement (FDD)

	CSI process 2
α [%]	2
β [%]	40
δ [%]	N/A
γ	1.01
UE Category	≥1

Table 9.3.6.1_F.1.5-2: Fading test for FDD

Parameter		Unit	Test 1				Test 2			
			TP1		TP2		TP1		TP2	
Bandwidth		MHz	10 MHz				10 MHz			
Transmission mode			10		10		10		10	
Downlink power allocation	ρ_A	dB	0				0			
	ρ_B	dB	0				0			
	P_C	dB	-3		0		-3		0	
	σ	dB	-3				-3			
SNR for UE with 2Rx RF band (Note 7)		dB	10	11	7	8	14	15	9	10
SNR for 4Rx UE without 2Rx RF band		dB	7	8	4	5	11	12	6	7
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-87	-91	-90	-84	-85	-89	-88
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98				-98			
Propagation channel			EPA 5 Low		Clause B.2.4.1 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz		EPA 5 Low		Clause B.2.4.1 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration			4x2		2x2		4x2		2x2	
Beamforming Model			As specified in Section B.4.3				As specified in Section B.4.3			
Timing offset between TPs		us	0				0			
Frequency offset between TPs		Hz	0				0			
Cell-specific reference signals			Antenna ports 0,1				Antenna ports 0,1			
CSI-RS signal 0			Antenna ports 15,…,18		N/A		Antenna ports 15,…,18		N/A	
CSI-RS 0 periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/1		N/A		5/1		N/A	
CSI-RS 0 configuration			0		N/A		0		N/A	
CSI-RS signal 1			N/A		Antenna ports 15,16		N/A		Antenna ports 15,16	
CSI-RS 1 periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			N/A		5/1		N/A		5/1	
CSI-RS 1 configuration			N/A		5		N/A		5	
Zero-power CSI-RS 0 configuration $I_{\text{CSI-RS}}$ / *ZeroPowerCSI-RS* bitmap			N/A		1 / 1110000000000000		N/A		1 / 1110000000000000	
Zero-power CSI-RS 1 configuration $I_{\text{CSI-RS}}$ / *ZeroPowerCSI-RS* bitmap			1 / 0010011000000000		N/A		1 / 0010011000000000		N/A	
CSI-IM 0 periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/1		5/1		5/1		5/1	
CSI-IM 0 configuration			2		2		2		2	
CSI-IM 1 periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/1		N/A		5/1		N/A	
CSI-IM 1 configuration			6		N/A		6		N/A	
CSI-IM 2 periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			N/A		5/1		N/A		5/1	
CSI-IM 2 configuration			N/A		1		N/A		1	
CSI process 0	CSI-RS		CSI-RS 0				CSI-RS 0			
	CSI-IM		CSI-IM 0				CSI-IM 0			
	Reporting mode		PUCCH 1-1				PUCCH 1-1			
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001				0x0000 0000 0000 0001			
	Reporting periodicity	ms	N_{pd} = 5				N_{pd} = 5			
	CQI delay	ms	11				11			
	Physical channel for CQI/ PMI reporting		PUSCH (Note 6)				PUSCH (Note 6)			
	PUCCH Report Type for CQI/PMI		2				2			

	PUCCH channel for RI reporting		PUCCH Format 2		PUCCH Format 2	
	PUCCH report type for RI		3		3	
	cqi-pmi-ConfigurationIndex		4		4	
	ri-ConfigIndex		2		2	
CSI process 1	CSI-RS		CSI-RS 1		CSI-RS 1	
	CSI-IM		CSI-IM 0		CSI-IM 0	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		000001		000001	
	Reporting interval (Note 10)	ms	5		5	
	CQI delay	ms	11		11	
	Sub-band size	RB	6 (full size)		6 (full size)	
CSI process 2 (For UE configured single process)	CSI-RS		CSI-RS 0		CSI-RS 0	
	CSI-IM		CSI-IM 1		CSI-IM 1	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001		0x0000 0000 0000 0001	
	Reporting interval (Note 8)	ms	5		5	
	CQI delay	ms	8		8	
	Sub-band size	RB	6 (full size) (Note 9)		6 (full size) (Note 9)	
CSI process 2 (For UE configured multiple processes)	CSI-RS		CSI-RS 0		CSI-RS 0	
	CSI-IM		CSI-IM 1		CSI-IM 1	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001		0x0000 0000 0000 0001	
	Reporting interval (Note 10)	ms	5		5	
	CQI delay	ms	11		11	
	Sub-band size	RB	6 (full size) (Note 9)		6 (full size) (Note 9)	
CSI process 3	CSI-RS		CSI-RS 1		CSI-RS 1	
	CSI-IM		CSI-IM 2		CSI-IM 2	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		000001		000001	
	Reporting interval (Note 10)	ms	5		5	
	CQI delay	ms	11		11	
	Sub-band size	RB	6 (full size)		6 (full size)	
CSI process for PDSCH scheduling			CSI process 2		CSI process 2	
Cell ID			0	6	0	6
Quasi-co-located CSI-RS			CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CRS			Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell ID as Cell 2
PMI for subframe 2, 3, 4, 7, 8 and 9			0x0000 0000 0000 0001	100000	0x0000 0000 0000 0001	100000
PMI for subframe 1 and 6			0x0000 0000 0001 0000	100000	0x0000 0000 0001 0000	100000
Max number of HARQ transmissions			1	N/A	1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: 3 symbols allocated to PDCCH.
Note 3: Reference measurement channel RC.12 FDD according to Table A.4-1. PDSCH transmission is scheduled on subframe 2, 3, 4, 7, 8 and 9 from TP1.
Note 4: TM10 OCNG as specified in A.5.1.8 is transmitted on subframe 1 and 6 from TP1.
Note 5: TM10 OCNG as specified in A.5.1.8 is transmitted on subframe 1, 2, 3, 4, 6, 7, 8 and 9 from TP2.
Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#2 and #7.
Note 7: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Note 9:	For these sub-bands which are not selected for PDSCH transmission, TM10 OCNG should be transmitted.
Note 10:	PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#2 and #7 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#1 and #6.
Note 11:	The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β and δ and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one or the other SNR point within one test must be fulfilled.

9.3.6.1_F.2 FDD CQI Reporting under fading conditions with Three CSI processes for CoMP

9.3.6.1_F.2.1 Test purpose

The purpose of the test is to verify the reporting accuracy of the CQI and the UE processing capability for Three CSI processes.

9.3.6.1_F.2.2 Test applicability

This test applies to all types of E-UTRA FDD UEs release 11 and forward, supporting Maximum CSI processes of Three on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.6.1_F.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.3.6.1_F.1.3.

9.3.6.1_F.2.4 Test description

9.3.6.1_F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.52 for UE with 2Rx RF band and Annex A, Figure A.52a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.6.1_F.1.3-2.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.6.1_F.2.4.3.

9.3.6.1_F.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.6.1_F.1.5-2 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered for each of CSI process 0, 1 and 2. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe subframe #1 and subframe #6 to carry the PUSCH CQI feedback for CSI process 1 and 2 via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. But for CSI process 0, SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUCCH CQI feedback. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 ≤ number of CQI reports with index 0 for each full-size subband ≤ 2000*β%/100" for CSI process 1 and 2. And check if the number of CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least 2000*δ%/100 for CSI process 0. And check if the difference of the median CQIs of the reported wideband CQI for configured CSI processes 0, 1 and 2 shall be greater or equal to the values as in Table 9.3.6.1_F.2.5-2.(2000= No of full-size subband reports, 100 because of %).. If yes, continue with step 5, otherwise goto step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each TTI randomly selected full-size subband regardless of UE wideband and full-size subband CQI report based on CSI process 2. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #1 and subframe #6 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. But for CSI process 0, SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUCCH CQI feedback. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI based on CSI process 2. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #1 and subframe #6 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. But for CSI process 0, SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUCCH CQI feedback. Measure the average throughput and (NACK / (ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) ≥ γ and (NACK / (ACK + NACK))≥ 0.02 , pass the UE for this test and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to table 9.3.6.1_F.1.3-2 for the other Test as appropriate. Otherwise pass the UE.

9.3.6.1_F.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 9.3.6.1_F.2.4.3-1: CQI-ReportConfig-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2ABA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
simultaneousAckNackAndCQI-Format3-r11	Not present	PUCCH Format 2	
cqi-ReportPeriodicProcExtToReleaseList-r11	Not present		
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	2		
cqi-FormatIndicatorPeriodic-r11 CHOICE {			
widebandCQI-r11 SEQUENCE {			
csi-ReportMode-r11	submode1		
}			
subbandCQI-r11	Not present	PUCCH 1-1	
}			
ri-ConfigIndex-r11	1		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	3 entries		
csi-IM-ConfigId-r11[1]	1	CSI-IM 0	
resourceConfig-r11[1]	2		
subframeConfig-r11[1]	1		
csi-IM-ConfigId-r11[2]	2	CSI-IM 1	
resourceConfig-r11[2]	6		
subframeConfig-r11[2]	1		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	3 entries		
csi-ProcessId-r11[1]	1	CSI process 0	
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	1		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	-3		
codebookSubsetRestriction-r11[1]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	1		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[1]	1		
cqi-ReportAperiodicProc-r11[1]	Not present		
csi-ProcessId-r11[2]	2	CSI process 1	
csi-RS-ConfigNZPId-r11[2]	2		
csi-IM-ConfigId-r11[2]	1		
p-C-AndCBSRList-r11[2] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[2]	0		
codebookSubsetRestriction-r11[2]	000001		
}			
cqi-ReportBothProc-r11[2] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	2		
pmi-RI-Report-r11	setup		
}			

cqi-ReportPeriodicProcId-r11[2]	Not present		
cqi-ReportAperiodicProc-r11[2] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
csi-ProcessId-r11[3]	3	CSI process 2	
csi-RS-ConfigNZPId-r11[3]	1		
csi-IM-ConfigId-r11[3]	2		
p-C-AndCBSRList-r11[3] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[3]	-3		
codebookSubsetRestriction-r11[3]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[3] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	3		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[3]	Not present		
cqi-ReportAperiodicProc-r11[3] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
}			
}			
}			

Table 9.3.6.1_F.2.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated ::= SEQUENCE {			
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF SEQUENCE {	2 entries		
csi-RS-ConfigNZPId-r11[1]	1	CSI-RS signal 0	
antennaPortsCount-r11[1]	an4		
resourceConfig-r11[1]	0		
subframeConfig-r11[1]	1		
qcl-CRS-Info-r11 SEQUENCE[1] {			
crs-PortsCount-r11[1]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[1]	Not present		
}			
csi-RS-ConfigNZPId-r11[2]	2	CSI-RS signal 1	
antennaPortsCount-r11[2]	an2		
resourceConfig-r11[2]	5		
subframeConfig-r11[2]	1		
qcl-CRS-Info-r11 SEQUENCE[2] {			
crs-PortsCount-r11[2]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[2]	Not present		
}			
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF SEQUENCE {			
csi-RS-ConfigZPId-r11[1]	1	Zero-power CSI-RS 0	
resourceConfigList-r11[1]	1110000000000000	For TP2	
subframeConfig-r11[1]	1		
csi-RS-ConfigZPId-r11[2]	2	Zero-power CSI-RS 1	
resourceConfigList-r11[2]	0010011000000000	For TP1	
subframeConfig-r11[2]	1		
}			
}			

9.3.6.1_F.2.5 Test requirement

Table 9.3.6.1_F.2.5-1: Test requirement (FDD)

	CSI process 0	**CSI process 1**	**CSI process 2**
α [%]	N/A	2	2
β [%]	N/A	40	40
δ [%]	10	N/A	N/A
γ	N/A	N/A	1.01
UE Category	≥1		

Table 9.3.6.1_F.2.5-2: Minimum median CQI difference between configured CSI processes (FDD)

	CSI process 1	**CSI process 2**
CSI process 0	N/A	1
UE Category	≥1	

To pass the test, α and β and δ and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one or the other SNR point within one test must be fulfilled.

9.3.6.1_F.3 FDD CQI Reporting under fading conditions with Four CSI processes for CoMP

9.3.6.1_F.3.1 Test purpose

The purpose of the test is to verify the reporting accuracy of the CQI and the UE processing capability for Four CSI processes.

9.3.6.1_F.3.2 Test applicability

This test applies to all types of E-UTRA FDD UEs release 11 and forward, supporting Maximum CSI processes of Four on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.6.1_F.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.3.6.1_F.1.3.

9.3.6.1_F.3.4 Test description

9.3.6.1_F.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.52 for UE with 2Rx RF band and Annex A, Figure A.52a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.6.1_F.1.3-2.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.6.1_F.3.4.3.

9.3.6.1_F.3.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.6.1_F.1.5-2 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered for each of CSI process 0, 1, 2, and 3. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #1 and subframe #6 to carry the PUSCH CQI feedback for CSI process 1, 2, and 3 via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. But for CSI process 0, SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUCCH CQI feedback. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 ≤ number of CQI reports with index 0 for each full-size subband ≤ 2000*β%/100" for CSI process 1, 2 and 3. And check if the number of CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least 2000*δ%/100 for CSI process 0. And check if the difference of the median CQIs of the reported wideband CQI for configured CSI processes 0, 1, 2 and 3 shall be greater or equal to the values as in Table 9.3.6.1_F.3.5-2.
(2000= No of full-size subband reports, 100 because of %). If yes, continue with step 5, otherwise goto step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each TTI randomly selected full-size subband regardless of UE wideband and full-size subband CQI report based on CSI process 2. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #1 and subframe #6 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. But for CSI process 0, SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUCCH CQI feedback.Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI based on CSI process 2. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #1 and subframe #6 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. But for CSI process 0, SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUCCH CQI feedback.Measure the average throughput and (NACK / (ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) ≥ γ and (NACK / (ACK + NACK))≥ 0.02 , pass the UE for this test and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to table 9.3.6.1_F.1.3-2 for the other Test as appropriate. Otherwise pass the UE.

9.3.6.1_F.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 9.3.6.1_F.3.4.3-1: CQI-ReportConfig-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2ABA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
simultaneousAckNackAndCQI-Format3-r11	Not present	PUCCH Format 2	
cqi-ReportPeriodicProcExtToReleaseList-r11	Not present		
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	2		
cqi-FormatIndicatorPeriodic-r11 CHOICE {			
widebandCQI-r11 SEQUENCE {			
csi-ReportMode-r11	submode1		
}			
subbandCQI-r11	Not present	PUCCH 1-1	
}			
ri-ConfigIndex-r11	1		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	3 entries		
csi-IM-ConfigId-r11[1]	1	CSI-IM 0	
resourceConfig-r11[1]	2		
subframeConfig-r11[1]	1		
csi-IM-ConfigId-r11[2]	2	CSI-IM 1	
resourceConfig-r11[2]	6		
subframeConfig-r11[2]	1		
csi-IM-ConfigId-r11[3]	3	CSI-IM 2	
resourceConfig-r11[3]	1		
subframeConfig-r11[3]	1		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	4 entries		
csi-ProcessId-r11[1]	1	CSI process 0	
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	1		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	-3		
codebookSubsetRestriction-r11[1]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	1		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[1]	1		
cqi-ReportAperiodicProc-r11[1]	Not present		
csi-ProcessId-r11[2]	2	CSI process 1	
csi-RS-ConfigNZPId-r11[2]	2		
csi-IM-ConfigId-r11[2]	1		
p-C-AndCBSRList-r11[2] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[2]	0		
codebookSubsetRestriction-r11[2]	000001		
}			
cqi-ReportBothProc-r11[2] SEQUENCE {			

ri-Ref-CSI-ProcessId-r11	2		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[2]	Not present		
cqi-ReportAperiodicProc-r11[2] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
csi-ProcessId-r11[3]	3	CSI process 2	
csi-RS-ConfigNZPId-r11[3]	1		
csi-IM-ConfigId-r11[3]	2		
p-C-AndCBSRList-r11[3] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[3]	-3		
codebookSubsetRestriction-r11[3]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[3] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	3		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[3]	Not present		
cqi-ReportAperiodicProc-r11[3] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
csi-ProcessId-r11[4]	4	CSI process 3	
csi-RS-ConfigNZPId-r11[4]	2		
csi-IM-ConfigId-r11[4]	3		
p-C-AndCBSRList-r11[4] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[4]	0		
codebookSubsetRestriction-r11[4]	000001		
}			
cqi-ReportBothProc-r11[4] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	4		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[4]	Not present		
cqi-ReportAperiodicProc-r11[4] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
}			
}			
}			

Table 9.3.6.1_F.3.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated ::= SEQUENCE {			
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF SEQUENCE {	2 entries		
csi-RS-ConfigNZPId-r11[1]	1	CSI-RS signal 0	
antennaPortsCount-r11[1]	an4		
resourceConfig-r11[1]	0		
subframeConfig-r11[1]	1		
qcl-CRS-Info-r11 SEQUENCE[1] {			
crs-PortsCount-r11[1]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[1]	Not present		
}			
csi-RS-ConfigNZPId-r11[2]	2	CSI-RS signal 1	
antennaPortsCount-r11[2]	an2		
resourceConfig-r11[2]	5		
subframeConfig-r11[2]	1		
qcl-CRS-Info-r11 SEQUENCE[2] {			
crs-PortsCount-r11[2]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[2]	Not present		
}			
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF SEQUENCE {			
csi-RS-ConfigZPId-r11[1]	1	Zero-power CSI-RS 0	
resourceConfigList-r11[1]	1110000000000000	For TP2	
subframeConfig-r11[1]	1		
csi-RS-ConfigZPId-r11[2]	2	Zero-power CSI-RS 1	
resourceConfigList-r11[2]	0010011000000000	For TP1	
subframeConfig-r11[2]	1		
}			
}			

9.3.6.1_F.3.5 Test requirement

Table 9.3.6.1_F.3.5-1: Test requirement (FDD)

	CSI process 0	**CSI process 1**	**CSI process 2**	**CSI process 3**
α [%]	N/A	2	2	2
β [%]	N/A	40	40	40
δ [%]	10	N/A	N/A	N/A
γ	N/A	N/A	1.01	N/A
UE Category	≥1			

Table 9.3.6.1_F.3.5-2: Minimum median CQI difference between configured CSI processes (FDD)

	CSI process 1	**CSI process 2**	**CSI process 3**
CSI process 0	N/A	1	3
UE Category	≥1		

To pass the test, α and β and δ and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one or the other SNR point within one test must be fulfilled.

9.3.6.2_F TDD CQI Reporting under fading conditions with CSI processes for CoMP

9.3.6.2_F.1 TDD CQI Reporting under fading conditions with Single CSI process for CoMP

9.3.6.2_F.1.1 Test purpose

The purpose of the test is to verify the reporting accuracy of the CQI and the UE processing capability for single CSI process.

9.3.6.2_F.1.2 Test applicability

This test applies to all types of E-UTRA TDD UEs release 11 and forward, supporting Maximum CSI processes of One on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.6.2_F.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.6.2_F.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.6.2_F.1.3-2 and by the following:

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band for CSI process 1, 2, or 3;

b) a CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least δ% of the time for CSI process 0;

c) the difference of the median CQIs of the reported wideband CQI for configured CSI processes shall be greater or equal to the values as in Table 9.3.6.2_F.1.3-3;

d) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set S shall be $\geq \gamma$;

e) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test.

Table 9.3.6.2_F.1.3-1: Fading test for TDD

Parameter		Unit	Test 1				Test 2			
			TP1		TP2		TP1		TP2	
Bandwidth		MHz	10 MHz				10 MHz			
Transmission mode			10		10		10		10	
Uplink downlink configuration			2		2		2		2	
Special subframe configuration			4		4		4		4	
Downlink power allocation	ρ_A	dB	0				0			
	ρ_B	dB	0				0			
	P_C	dB	-3		0		-3		0	
	σ	dB	-3				-3			
SNR (Note 7)		dB	10	11	7	8	14	15	9	10
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-87	-91	-90	-84	-85	-89	-88
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98				-98			
Propagation channel			EPA 5 Low		Clause B.2.4.1 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz		EPA 5 Low		Clause B.2.4.1 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration			4x2		2x2		4x2		2x2	
Beamforming Model			As specified in Section B.4.3				As specified in Section B.4.3			
Timing offset between TPs		us	0				0			
Frequency offset between TPs		Hz	0				0			
Cell-specific reference signals			Antenna ports 0,1				Antenna ports 0,1			
CSI-RS signal 0			Antenna ports 15,…, 18		N/A		Antenna ports 15,…, 18		N/A	
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3		N/A		5/3		N/A	
CSI-RS 0 configuration			0		N/A		0		N/A	
CSI-RS signal 1			N/A		Antenna ports 15, 16		N/A		Antenna ports 15, 16	
CSI-RS 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A		5/3		N/A		5/3	
CSI-RS 1 configuration			N/A		5		N/A		5	
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			N/A		3 / 1110000000000000		N/A		3 / 1110000000000000	
Zero-power CSI-RS 1 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			3 / 0010011000000000		N/A		3 / 0010011000000000		N/A	
CSI-IM 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3		5/3		5/3		5/3	
CSI-IM 0 configuration			2		2		2		2	
CSI-IM 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3		N/A		5/3		N/A	
CSI-IM 1 configuration			6		N/A		6		N/A	
CSI-IM 2 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A		5/3		N/A		5/3	
CSI-IM 2 configuration			N/A		1		N/A		1	
CSI process 0	CSI-RS		CSI-RS 0				CSI-RS 0			
	CSI-IM		CSI-IM 0				CSI-IM 0			
	Reporting mode		PUCCH 1-1				PUCCH 1-1			
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001				0x0000 0000 0000 0001			
	Reporting periodicity	ms	N_{pd} = 5				N_{pd} = 5			
	CQI delay	ms	12				12			
	Physical channel for CQI/ PMI reporting		PUSCH (Note 6)				PUSCH (Note 6)			
	PUCCH Report		2				2			

	Type for CQI/PMI					
	PUCCH channel for RI reporting		PUCCH Format 2		PUCCH Format 2	
	PUCCH report type for RI		3		3	
	cqi-pmi-ConfigurationIndex		3		3	
	ri-ConfigIndex		805 (Note 10)		805 (Note 10)	
CSI process 1	CSI-RS		CSI-RS 1		CSI-RS 1	
	CSI-IM		CSI-IM 0		CSI-IM 0	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		000001		000001	
	Reporting interval (Note 9)	ms	5		5	
	CQI delay	ms	12		12	
	Sub-band size	RB	6 (full size)		6 (full size)	
CSI process 2	CSI-RS		CSI-RS 0		CSI-RS 0	
	CSI-IM		CSI-IM 1		CSI-IM 1	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001		0x0000 0000 0000 0001	
	Reporting interval (Note 9)	ms	5		5	
	CQI delay	ms	12		12	
	Sub-band size	RB	6 (full size) (Note 8)		6 (full size) (Note 8)	
CSI process 3	CSI-RS		CSI-RS 1		CSI-RS 1	
	CSI-IM		CSI-IM 2		CSI-IM 2	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		000001		000001	
	Reporting interval (Note 9)	ms	5		5	
	CQI delay	ms	12		12	
	Sub-band size	RB	6 (full size)		6 (full size)	
CSI process for PDSCH scheduling			CSI process 2		CSI process 2	
Cell ID			0	6	0	6
Quasi-co-located CSI-RS			CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CRS			Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell ID as Cell 2
PMI for subframe 4 and 9			0x0000 0000 0000 0001	100000	0x0000 0000 0000 0001	100000
PMI for subframe 3 and 8			0x0000 0000 0001 0000	100000	0x0000 0000 0001 0000	100000
Max number of HARQ transmissions			1	N/A	1	N/A
ACK/NACK feedback mode			Multiplexing	N/A	Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: 3 symbols allocated to PDCCH
Note 3: Reference measurement channel RC.12 TDD according to Table A.4-1. PDSCH transmission is scheduled on subframe 4 and 9 from TP1.
Note 4: TM10 OCNG is transmitted as specified in A.5.2.8 on subframe 3 and 8 from TP1.
Note 5: TM10 OCNG is transmitted as specified in A.5.2.8 on subframe 3, 4, 8 and 9 from TP2
Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7 and #2.
Note 7: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#3 and #8 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#7 and #2.
Note 9: For these sub-bands which are not selected for PDSCH transmission, TM10 OCNG should be transmitted.
Note 10: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.

Table 9.3.6.2_F.1.3-2: Minimum requirement (TDD)

	CSI process 0	CSI process 1	CSI process 2	CSI process 3
α [%]	N/A	2	2	2
β [%]	N/A	40	40	40
δ [%]	10	N/A	N/A	N/A
γ	N/A	N/A	1.02	N/A
UE Category	≥1			

Table 9.3.6.2_F.1.3-3: Minimum median CQI difference between configured CSI processes (TDD)

	CSI process 1	CSI process 2	CSI process 3
CSI process 0	N/A	1	3
UE Category	≥1		

The normative reference for this requirement is TS 36.101 [2] clause 9.3.6.2.

9.3.6.2_F.1.4 Test description

9.3.6.2_F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.52 for UE with 2Rx RF band and Annex A, Figure A.52a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.6.2_F.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.6.2_F.1.4.3.

9.3.6.2_F.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.6.2_F.1.5-2 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to CQI value 10 and keep it regardless of the wideband and full-size subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI report for each full-size subband have been gathered for CSI process 2. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback for CSI process 2 via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 ≤ number of CQI reports with index 0 for each full-size subband ≤ 2000*β%/100" for CSI process 2. (2000= No of full-size subband reports, 100 because of %). If yes, continue with step 5, otherwise goto step 7.

5. The SS shall send PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each available downlink transmission instance randomly selected full-size subband regardless of UE wideband and subband CQI report based on CSI process 2. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3 Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the sub-bands in which UE report the highest full-size subband CQI based on CSI process 2. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK / (ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) ≥ γ and (NACK / (ACK + NACK))≥ 0.02, pass the UE and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to table 9.3.6.2_F.1.3-1 for the other test as appropriate.

9.3.6.2_F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 9.3.6.2_F.1.4.3-1: CQI-ReportConfig-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2ABA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
simultaneousAckNackAndCQI-Format3-r11	Not present	PUCCH Format 2	
cqi-ReportPeriodicProcExtToReleaseList-r11	Not present		
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	3		
cqi-FormatIndicatorPeriodic-r11 CHOICE {			
widebandCQI-r11 SEQUENCE {			
csi-ReportMode-r11	submode1		
}			
subbandCQI-r11	Not present	PUCCH 1-1	
}			
ri-ConfigIndex-r11	805		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	1 entry		
csi-IM-ConfigId-r11[1]	2	CSI-IM 1	
resourceConfig-r11[1]	6		
subframeConfig-r11[1]	3		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	1 entry		
csi-ProcessId-r11[1]	3	CSI process 2	
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	2		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	-3		
codebookSubsetRestriction-r11[1]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	3		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[1]	Not present		
cqi-ReportAperiodicProc-r11[1] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
}			
}			
}			

Table 9.3.6.2_F.1.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated ::= SEQUENCE {			
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF SEQUENCE {	1 entry		
csi-RS-ConfigNZPId-r11[1]	1	CSI-RS signal 0	
antennaPortsCount-r11[1]	an4		
resourceConfig-r11[1]	0		
subframeConfig-r11[1]	3		
qcl-CRS-Info-r11 SEQUENCE[1] {			
crs-PortsCount-r11[1]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[1]	Not present		
}			
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF SEQUENCE {			
csi-RS-ConfigZPId-r11[1]	1	Zero-power CSI-RS 0	
resourceConfigList-r11[1]	1110000000000000	For TP2	
subframeConfig-r11[1]	3		
csi-RS-ConfigZPId-r11[2]	2	Zero-power CSI-RS 1	
resourceConfigList-r11[2]	0010011000000000	For TP1	
subframeConfig-r11[2]	3		
}			
}			

9.3.6.2_F.1.5 Test requirement

Table 9.3.6.2_F.1.5-1: Test requirement (TDD)

	CSI process 2
α [%]	2
β [%]	40
δ [%]	N/A
γ	1.01
UE Category	≥1

Table 9.3.6.2_F.1.5-2: Fading test for TDD

Parameter		Unit	Test 1				Test 2			
			TP1		TP2		TP1		TP2	
Bandwidth		MHz	10 MHz				10 MHz			
Transmission mode			10		10		10		10	
Uplink downlink configuration			2		2		2		2	
Special subframe configuration			4		4		4		4	
Downlink power allocation	ρ_A	dB	0				0			
	ρ_B	dB	0				0			
	P_C	dB	-3		0		-3		0	
	σ	dB	-3				-3			
SNR for UE with 2Rx RF band (Note 7)		dB	10	11	7	8	14	15	9	10
SNR for 4Rx UE without 2Rx RF band		dB	7	8	4	5	11	12	6	7
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-87	-91	-90	-84	-85	-89	-88
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98				-98			
Propagation channel			EPA 5 Low		Clause B.2.4.1 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz		EPA 5 Low		Clause B.2.4.1 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz	
Antenna configuration			4x2		2x2		4x2		2x2	
Beamforming Model			As specified in Section B.4.3				As specified in Section B.4.3			
Timing offset between TPs		us	0				0			
Frequency offset between TPs		Hz	0				0			
Cell-specific reference signals			Antenna ports 0,1				Antenna ports 0,1			
CSI-RS signal 0			Antenna ports 15,…, 18		N/A		Antenna ports 15,…, 18		N/A	
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3		N/A		5/3		N/A	
CSI-RS 0 configuration			0		N/A		0		N/A	
CSI-RS signal 1			N/A		Antenna ports 15, 16		N/A		Antenna ports 15, 16	
CSI-RS 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A		5/3		N/A		5/3	
CSI-RS 1 configuration			N/A		5		N/A		5	
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			N/A		3 / 1110000000000000		N/A		3 / 1110000000000000	
Zero-power CSI-RS 1 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			3 / 0010011000000000		N/A		3 / 0010011000000000		N/A	
CSI-IM 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3		5/3		5/3		5/3	
CSI-IM 0 configuration			2		2		2		2	
CSI-IM 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3		N/A		5/3		N/A	
CSI-IM 1 configuration			6		N/A		6		N/A	
CSI-IM 2 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A		5/3		N/A		5/3	
CSI-IM 2 configuration			N/A		1		N/A		1	
CSI process 0	CSI-RS		CSI-RS 0				CSI-RS 0			
	CSI-IM		CSI-IM 0				CSI-IM 0			
	Reporting mode		PUCCH 1-1				PUCCH 1-1			
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001				0x0000 0000 0000 0001			
	Reporting periodicity	ms	N_{pd} = 5				N_{pd} = 5			
	CQI delay	ms	12				12			
	Physical channel for CQI/ PMI reporting		PUSCH (Note 6)				PUSCH (Note 6)			

	PUCCH Report Type for CQI/PMI		2		2	
	PUCCH channel for RI reporting		PUCCH Format 2		PUCCH Format 2	
	PUCCH report type for RI		3		3	
	cqi-pmi-ConfigurationIndex		3		3	
	ri-ConfigIndex		805 (Note 10)		805 (Note 10)	
CSI process 1	CSI-RS		CSI-RS 1		CSI-RS 1	
	CSI-IM		CSI-IM 0		CSI-IM 0	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		000001		000001	
	Reporting interval (Note 9)	ms	5		5	
	CQI delay	ms	12		12	
	Sub-band size	RB	6 (full size)		6 (full size)	
CSI process 2	CSI-RS		CSI-RS 0		CSI-RS 0	
	CSI-IM		CSI-IM 1		CSI-IM 1	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		0x0000 0000 0000 0001		0x0000 0000 0000 0001	
	Reporting interval (Note 9)	ms	5		5	
	CQI delay	ms	12		12	
	Sub-band size	RB	6 (full size) (Note 8)		6 (full size) (Note 8)	
CSI process 3	CSI-RS		CSI-RS 1		CSI-RS 1	
	CSI-IM		CSI-IM 2		CSI-IM 2	
	Reporting mode		PUSCH 3-1		PUSCH 3-1	
	CodeBookSubsetRestriction bitmap		000001		000001	
	Reporting interval (Note 9)	ms	5		5	
	CQI delay	ms	12		12	
	Sub-band size	RB	6 (full size)		6 (full size)	
CSI process for PDSCH scheduling			CSI process 2		CSI process 2	
Cell ID			0	6	0	6
Quasi-co-located CSI-RS			CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CRS			Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell ID as Cell 2
PMI for subframe 4 and 9			0x0000 0000 0000 0001	100000	0x0000 0000 0000 0001	100000
PMI for subframe 3 and 8			0x0000 0000 0001 0000	100000	0x0000 0000 0001 0000	100000
Max number of HARQ transmissions			1	N/A	1	N/A
ACK/NACK feedback mode			Multiplexing	N/A	Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: 3 symbols allocated to PDCCH
Note 3: Reference measurement channel RC.12 TDD according to Table A.4-1. PDSCH transmission is scheduled on subframe 4 and 9 from TP1.
Note 4: TM10 OCNG is transmitted as specified in A.5.2.8 on subframe 3 and 8 from TP1.
Note 5: TM10 OCNG is transmitted as specified in A.5.2.8 on subframe 3, 4, 8 and 9 from TP2
Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7 and #2.
Note 7: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#3 and #8 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#7 and #2.
Note 9: For these sub-bands which are not selected for PDSCH transmission, TM10 OCNG should be transmitted.
Note 10: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.

Note 11: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β and δ and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.6.2_F.2 TDD CQI Reporting under fading conditions with Three CSI processes for CoMP

9.3.6.2_F.2.1 Test purpose

The purpose of the test is to verify the reporting accuracy of the CQI and the UE processing capability for Three CSI processes.

9.3.6.2_F.2.2 Test applicability

This test applies to all types of E-UTRA TDD UEs release 11 and forward, supporting Maximum CSI processes of Three on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.6.2_F.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.3.6.2_F.1.3.

9.3.6.2_F.2.4 Test description

9.3.6.2_F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.52 for UE with 2Rx RF band and Annex A, Figure A.9a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.6.2_F.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.6.2_F.2.4.3.

9.3.6.2_F.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.6.2_F.1.5-2 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to CQI value 10 ,and keep it regardless of the wideband and full-size subband CQI value sent by the UE. Continue

transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI report for each full-size subband have been gathered for each of CSI process 0, 1 and 2. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback for CSI process 1and 2 via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. But for CSI process 0, SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUCCH CQI feedback. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 ≤ number of CQI reports with index 0 for each full-size subband ≤ 2000*β%/100" for CSI process 1and 2. And check if the number of CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least 2000*δ%/100 for CSI process 0. And check if the difference of the median CQIs of the reported wideband CQI for configured CSI processes 0, 1 and 2 shall be greater or equal to the values as in Table 9.3.6.2_F.2.5-2.
(2000= No of full-size subband reports, 100 because of %) If yes, continue with step5, otherwise goto step 7.

5. The SS shall send PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each available downlink transmission instance randomly selected full-size subband regardless of UE wideband and subband CQI report based on CSI process 2. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3 Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the sub-bands in which UE report the highest full-size subband CQI based on CSI process 2. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) ≥ γ and (NACK /(ACK + NACK))≥ FFS, pass the UE and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.3.6.2_F.1.3-1 for the other test as appropriate.

9.3.6.2_F.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 9.3.6.2_F.2.4.3-1: CQI-ReportConfig-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2ABA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
simultaneousAckNackAndCQI-Format3-r11	Not present	PUCCH Format 2	
cqi-ReportPeriodicProcExtToReleaseList-r11	Not present		
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	3		
cqi-FormatIndicatorPeriodic-r11 CHOICE {			
widebandCQI-r11 SEQUENCE {			
csi-ReportMode-r11	submode1		
}			
subbandCQI-r11	Not present	PUCCH 1-1	
}			
ri-ConfigIndex-r11	805		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	3 entries		
csi-IM-ConfigId-r11[1]	1	CSI-IM 0	
resourceConfig-r11[1]	2		
subframeConfig-r11[1]	3		
csi-IM-ConfigId-r11[2]	2	CSI-IM 1	
resourceConfig-r11[2]	6		
subframeConfig-r11[2]	3		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	4 entries		
csi-ProcessId-r11[1]	1	CSI process 0	
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	1		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	-3		
codebookSubsetRestriction-r11[1]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	1		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[1]	1		
cqi-ReportAperiodicProc-r11[1]	Not present		
csi-ProcessId-r11[2]	2	CSI process 1	
csi-RS-ConfigNZPId-r11[2]	2		
csi-IM-ConfigId-r11[2]	1		
p-C-AndCBSRList-r11[2] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[2]	0		
codebookSubsetRestriction-r11[2]	000001		
}			
cqi-ReportBothProc-r11[2] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	2		
pmi-RI-Report-r11	setup		
}			

cqi-ReportPeriodicProcId-r11[2]	Not present		
cqi-ReportAperiodicProc-r11[2] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
csi-ProcessId-r11[3]	3	CSI process 2	
csi-RS-ConfigNZPId-r11[3]	1		
csi-IM-ConfigId-r11[3]	2		
p-C-AndCBSRList-r11[3] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[3]	-3		
codebookSubsetRestriction-r11[3]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[3] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	3		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[3]	Not present		
cqi-ReportAperiodicProc-r11[3] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
}			
}			
}			

Table 9.3.6.2_F.2.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated ::= SEQUENCE {			
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF SEQUENCE {	2 entries		
csi-RS-ConfigNZPId-r11[1]	1	CSI-RS signal 0	
antennaPortsCount-r11[1]	an4		
resourceConfig-r11[1]	0		
subframeConfig-r11[1]	3		
qcl-CRS-Info-r11 SEQUENCE[1] {			
crs-PortsCount-r11[1]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[1]	Not present		
}			
csi-RS-ConfigNZPId-r11[2]	2	CSI-RS signal 1	
antennaPortsCount-r11[2]	an2		
resourceConfig-r11[2]	5		
subframeConfig-r11[2]	3		
qcl-CRS-Info-r11 SEQUENCE[2] {			
crs-PortsCount-r11[2]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[2]	Not present		
}			
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF SEQUENCE {			
csi-RS-ConfigZPId-r11[1]	1	Zero-power CSI-RS 0	
resourceConfigList-r11[1]	1110000000000000	For TP2	
subframeConfig-r11[1]	3		
csi-RS-ConfigZPId-r11[2]	2	Zero-power CSI-RS 1	
resourceConfigList-r11[2]	0010011000000000	For TP1	
subframeConfig-r11[2]	3		
}			
}			

9.3.6.2_F.2.5 Test requirement

Table 9.3.6.2_F.2.5-1: Test requirement (TDD)

	CSI process 0	**CSI process 1**	**CSI process 2**
α [%]	N/A	2	2
β [%]	N/A	40	40
δ [%]	10	N/A	N/A
γ	N/A	N/A	1.01
UE Category	≥1		

Table 9.3.6.2_F.2.5-2: Minimum median CQI difference between configured CSI processes (TDD)

	CSI process 1	**CSI process 2**
CSI process 0	N/A	1
UE Category	≥1	

To pass the test, α and β and δ and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.6.2_F.3 TDD CQI Reporting under fading conditions with Four CSI processes for CoMP

9.3.6.2_F.3.1 Test purpose

The purpose of the test is to verify the reporting accuracy of the CQI and the UE processing capability for Four CSI processes.

9.3.6.2_F.3.2 Test applicability

This test applies to all types of E-UTRA TDD UEs release 11 and forward, supporting Maximum CSI processes of Four on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.6.2_F.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.3.6.2_F.1.3.

9.3.6.2_F.3.4 Test description

9.3.6.2_F.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.52 for UE with 2Rx RF band and Annex A, Figure A.52a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.6.2_F.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.6.2_F.3.4.3.

9.3.6.2_F.3.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.6.2_F.1.5-2 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to CQI value 10 and keep it regardless of the wideband and full-size subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI report for each full-size subband have been gathered for each of CSI process 0, 1, 2, and 3. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback for CSI process 1, 2, and 3 via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. But for CSI process 0, SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUCCH CQI feedback. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 ≤ number of CQI reports with index 0 for each full-size subband ≤ 2000*β%/100" for CSI process 1, 2 and 3. And check if the number of CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least 2000*δ%/100 for CSI process 0. And check if the difference of the median CQIs of the reported wideband CQI for configured CSI processes 0, 1, 2 and 3 shall be greater or equal to the values as in Table 9.3.6.2_F.3.5-2.
(2000= No of full-size subband reports, 100 because of %). If yes, continue with step 5, otherwise goto step 7.

5. The SS shall send PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each available downlink transmission instance randomly selected full-size subband regardless of UE wideband and subband CQI report based on CSI process 2. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3 Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the sub-bands in which UE report the highest full-size subband CQI based on CSI process 2. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #2 and subframe #7 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK / (ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) ≥ γ and (NACK / (ACK + NACK))≥ 0.02, pass the UE and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to table 9.3.6.2_F.1.3-1 for the other test as appropriate.

9.3.6.2_F.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:

Table 9.3.6.2_F.3.4.3-1: CQI-ReportConfig-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2ABA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
simultaneousAckNackAndCQI-Format3-r11	Not present	PUCCH Format 2	
cqi-ReportPeriodicProcExtToReleaseList-r11	Not present		
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	3		
cqi-FormatIndicatorPeriodic-r11 CHOICE {			
widebandCQI-r11 SEQUENCE {			
csi-ReportMode-r11	submode1		
}			
subbandCQI-r11	Not present	PUCCH 1-1	
}			
ri-ConfigIndex-r11	805		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	3 entries		
csi-IM-ConfigId-r11[1]	1	CSI-IM 0	
resourceConfig-r11[1]	2		
subframeConfig-r11[1]	3		
csi-IM-ConfigId-r11[2]	2	CSI-IM 1	
resourceConfig-r11[2]	6		
subframeConfig-r11[2]	3		
csi-IM-ConfigId-r11[3]	3	CSI-IM 2	
resourceConfig-r11[3]	1		
subframeConfig-r11[3]	3		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	4 entries		
csi-ProcessId-r11[1]	1	CSI process 0	
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	1		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	-3		
codebookSubsetRestriction-r11[1]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	1		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[1]	1		
cqi-ReportAperiodicProc-r11[1]	Not present		
csi-ProcessId-r11[2]	2	CSI process 1	
csi-RS-ConfigNZPId-r11[2]	2		
csi-IM-ConfigId-r11[2]	1		
p-C-AndCBSRList-r11[2] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[2]	0		
codebookSubsetRestriction-r11[2]	000001		
}			
cqi-ReportBothProc-r11[2] SEQUENCE {			

ri-Ref-CSI-ProcessId-r11	2		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[2]	Not present		
cqi-ReportAperiodicProc-r11[2] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
csi-ProcessId-r11[3]	3	CSI process 2	
csi-RS-ConfigNZPId-r11[3]	1		
csi-IM-ConfigId-r11[3]	2		
p-C-AndCBSRList-r11[3] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[3]	-3		
codebookSubsetRestriction-r11[3]	0x0000 0000 0000 0001		
}			
cqi-ReportBothProc-r11[3] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	3		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[3]	Not present		
cqi-ReportAperiodicProc-r11[3] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
csi-ProcessId-r11[4]	4	CSI process 3	
csi-RS-ConfigNZPId-r11[4]	2		
csi-IM-ConfigId-r11[4]	3		
p-C-AndCBSRList-r11[4] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[4]	0		
codebookSubsetRestriction-r11[4]	000001		
}			
cqi-ReportBothProc-r11[4] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	4		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[4]	Not present		
cqi-ReportAperiodicProc-r11[4] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
}			
}			
}			

Table 9.3.6.2_F.3.4.3-2: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated ::= SEQUENCE {			
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF SEQUENCE {	2 entries		
csi-RS-ConfigNZPId-r11[1]	1	CSI-RS signal 0	
antennaPortsCount-r11[1]	an4		
resourceConfig-r11[1]	0		
subframeConfig-r11[1]	3		
qcl-CRS-Info-r11 SEQUENCE[1] {			
crs-PortsCount-r11[1]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[1]	Not present		
}			
csi-RS-ConfigNZPId-r11[2]	2	CSI-RS signal 1	
antennaPortsCount-r11[2]	an2		
resourceConfig-r11[2]	5		
subframeConfig-r11[2]	3		
qcl-CRS-Info-r11 SEQUENCE[2] {			
crs-PortsCount-r11[2]	n2		
mbsfn-SubframeConfigList-r11 CHOICE[2]	Not present		
}			
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF SEQUENCE {			
csi-RS-ConfigZPId-r11[1]	1	Zero-power CSI-RS 0	
resourceConfigList-r11[1]	1110000000000000	For TP2	
subframeConfig-r11[1]	3		
csi-RS-ConfigZPId-r11[2]	2	Zero-power CSI-RS 1	
resourceConfigList-r11[2]	0010011000000000	For TP1	
subframeConfig-r11[2]	3		
}			
}			

9.3.6.2_F.3.5 Test requirement

Table 9.3.6.2_F.3.5-1: Test requirement (TDD)

	CSI process 0	**CSI process 1**	**CSI process 2**	**CSI process 3**
α [%]	N/A	2	2	2
β [%]	N/A	40	40	40
δ [%]	10	N/A	N/A	N/A
γ	N/A	N/A	1.01	N/A
UE Category	≥1			

Table 9.3.6.2_F.3.5-2: Minimum median CQI difference between configured CSI processes (TDD)

	CSI process 1	**CSI process 2**	**CSI process 3**
CSI process 0	N/A	1	3
UE Category	≥1		

To pass the test, α and β and δ and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.7 PUSCH 3-2 for eDL MIMO Enhancement

9.3.7.1 FDD CQI Reporting under fading conditions - PUSCH 3-2 for eDL MIMO Enhancement

9.3.7.1.1 Test purpose

The purpose of the test is to verify the reporting accuracy of the sub band CQI and sub band PMI operation.

9.3.7.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE releases 12 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.7.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.7.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.7.1.3-2 and by the following.

a) the ratio of the throughput obtained when transmitting based on UE PUSCH 3-2 reported wideband CQI and subband PMI and that obtained when transmitting based on PUSCH 3-1 reported wideband CQI and wideband PMI shall be $\geq \alpha$;

b) The ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS based on UE PUSCH 3-2 reported subband CQI and subband PMI and that obtained when transmitting on a randomly selected sub-band in set S based on PUSCH 1-2 reported wideband CQI and subband PMI shall be $\geq \beta$;

The transport block sizes TBS for wideband CQI and subband CQI are selected according to RC.16 FDD for test 1 and according to RC.17 FDD for test 2.

Table 9.3.7.1.3-1: Sub-band test for FDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10MHz			
PDSCH resource allocation		RB	50PRB		a subband, 6PRB	
Transmission mode			TM6		TM9	
Downlink power allocation	ρ_A	dB	-6		0	
	ρ_B	dB	-6		0	
	P_C	dB	-		-3	
	σ	dB	3		-3	
SNR (Note 3)		dB	0	1	5	6
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-97	-93	-92
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
Propagation channel			EVA5		EVA5	
Antenna configuration			4x2 ULA low		4x2 XP high (Note 4)	
Beamforming Model			-		B.4.3	
CRS reference signals			Antenna ports 0, 1, 2, 3		Antenna ports 0, 1	
Time offset between TX antenna (Note 5)		ns	65		-	
CSI reference signals			-		Antenna ports 15, 16, 17, 18	
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			-		5/ 1	
CSI-RS reference signal configuration			-		4	
alternativeCodebookEnabledFor4TX			No		Yes	
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 FFFF		0x0000 0000 0000 FFFF 0000 FFFF	
Reporting interval (Note 6)		ms	5		5	
CQI delay		ms	8		8	
Reporting mode			PUSCH 3-2, PUSCH 3-1		PUSCH 3-2, PUSCH 1-2	
Sub-band size		RB	6 (full size)		6 (full size)	
Max number of HARQ transmissions			1		1	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: Reference measurement channel according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4: Randomization of the principle beam direction shall be used as specified in B.2.3A.4.
Note 5: The values of time offset are [0ns 65ns 0ns 65ns] for antenna port [0, 1, 2, 3] respectively.
Note 6: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Table 9.3.7.1.3-2: Minimum requirement (FDD)

	Test 1	Test 2
α	1.05	-
β	-	1.15
UE Category	≥2	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.7.1.

9.3.7.1.4 Test description

9.3.7.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.3.7.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.7.1.4.3.

9.3.7.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.7.1.5-2 as appropriate.

For Test1

2. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to the wideband and subband CQI value sent by the UE and according to the wideband and subband PMI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports, wideband PMI reports, full-size subband CQI reports, and full-size subband PMI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to the wideband CQI value and wideband PMI value. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH 3-1 CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{wideband}$.

4. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in every subframe (Table A.4.1-1).

5. The SS shall transmit an RRC Connection Reconfiguration message to set reporting mode according to Table 9.3.7.1.3-1.

6. The UE shall transmit RRC Connection Reconfiguration Complete message.

7. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to the wideband CQI value and subband PMI value. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH 3-2 CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$.

8. If the ratio ($t_{subband}$ / $t_{wideband}$) ≥ α which is specified in Table 9.3.7.1.5-1, pass the UE for this test and go to step 16. Otherwise, go to step 15.

For Test2

9. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband and subband CQI value sent by the UE and according to the wideband and subband PMI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports, wideband PMI reports, full-size subband CQI reports, and full-size subband PMI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

10. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value and subband PMI value in each available downlink transmission instance randomly selected full-size subband. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH 1-2 CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{wideband}$.

11. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in every subframe (Table A.4.1-1).

12. The SS shall transmit an RRC Connection Reconfiguration message to set reporting mode according to Table 9.3.7.1.3-1.

13. The UE shall transmit RRC Connection Reconfiguration Complete message.

14. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value and ull-size subband PMI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI and full-size subband PMI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #0 and subframe #5 to carry the PUSCH 3-2 CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / $t_{wideband}$) ≥ β which is specified in Table 9.3.7.1.5-1, pass the UE for this test and go to step 16. Otherwise, go to step15.

15. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 14) for the other SNR point as appropriate. Otherwise fail the UE.

16. If both tests have not been done, then repeat the same procedure (steps 1 to 15) with test conditions according to the Table 9.3.7.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.7.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.7.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*	Test 1	
antennaInfo CHOICE {		Test 1	
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n4TxAntenna-tm6	1111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
antennaInfo	Not present	Test 2	
antennaInfo-r10 CHOICE {		Test 2	
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT	Test 2	
csi-RS-Config-r10	CSI-RS-Config-r10	Test 2	
antennaInfo-v1250	AntennaInfoDedicated-v1250	Test 2	
}			

Table 9.3.7.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6	Test 1	
	dB0	Test 2	
}			

Table 9.3.7.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm32-v1250, rm31	Test 1	
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 9.3.7.1.4.3-4: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020	Test 2	
codebookSubsetRestriction-r10	0x0000 0000 0000 FFFF 0000 FFFF	Test 2	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.3.7.1.4.3-5: *AntennaInfoDedicated-v1250*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-v1250 ::= SEQUENCE {			
alternativeCodebookEnabledFor4TX-r12	TRUE	Test 2	
}			

Table 9.3.7.1.4.3-6: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm32-v1250, rm12	Test 2	
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
}			

Table 9.3.7.1.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
}			

9.3.7.1.5 Test requirement

Table 9.3.7.1.5-1: Test requirement (FDD)

	Test 1	**Test 2**
α	1.04	-
β	-	1.14
UE Category	≥2	≥2

Table 9.3.7.1.5-2: Sub-band test for FDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10MHz			
PDSCH resource allocation		RB	50PRB		a subband, 6PRB	
Transmission mode			TM6		TM9	
Downlink power allocation	ρ_A	dB	-6		0	
	ρ_B	dB	-6		0	
	P_C	dB	-		-3	
	σ	dB	3		-3	
SNR for UE with 2Rx RF band (Note 3)		dB	0	1	5	6
SNR for 4Rx UE without 2Rx RF band		dB	-3	-2	2	3
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-97	-93	-92
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
Propagation channel			EVA5		EVA5	
Antenna configuration			4x2 ULA low		4x2 XP high (Note 4)	
Beamforming Model			-		B.4.3	
CRS reference signals			Antenna ports 0, 1, 2, 3		Antenna ports 0, 1	
Time offset between TX antenna (Note 5)		ns	65		-	
CSI reference signals			-		Antenna ports 15, 16, 17, 18	
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			-		5/ 1	
CSI-RS reference signal configuration			-		4	
alternativeCodebookEnabledFor4TX			No		Yes	
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 FFFF		0x0000 0000 0000 FFFF 0000 FFFF	
Reporting interval (Note 6)		ms	5		5	
CQI delay		ms	8		8	
Reporting mode			PUSCH 3-2, PUSCH 3-1		PUSCH 3-2, PUSCH 1-2	
Sub-band size		RB	6 (full size)		6 (full size)	
Max number of HARQ transmissions			1		1	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: Reference measurement channel according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4: Randomization of the principle beam direction shall be used as specified in B.2.3A.4.
Note 5: The values of time offset are [0ns 65ns 0ns 65ns] for antenna port [0, 1, 2, 3] respectively.
Note 6: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.
Note 7: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.7.2 TDD CQI Reporting under fading conditions - PUSCH 3-2 for eDL MIMO Enhancement

9.3.7.2.1 Test purpose

The purpose of the test is to verify the reporting accuracy of the sub band CQI and sub band PMI operation.

9.3.7.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE releases 12 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.3.7.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.7.2.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.7.2.3-2 and by the following.

a) the ratio of the throughput obtained when transmitting based on UE PUSCH 3-2 reported wideband CQI and subband PMI and that obtained when transmitting based on PUSCH 3-1 reported wideband CQI and wideband PMI shall be $\geq \alpha$;

b) The ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS based on UE PUSCH3-2 reported subband CQI and subband PMI and that obtained when transmitting on a randomly selected sub-band in set S based on PUSCH 1-2 reported wideband CQI and subband PMI shall be $\geq \beta$;

The transport block sizes TBS for wideband CQI and subband CQI are selected according to RC.14 TDD for test 1 and RC.15 TDD for test 2.

Table 9.3.7.2.3-1: Sub-band test for TDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10MHz			
PDSCH resource allocation		RB	50PRB		a subband, 6PRB	
Transmission mode			TM6		TM9	
Uplink downlink configuration			1		1	
Special subframe configuration			4		4	
Downlink power allocation	ρ_A	dB	-6		0	
	ρ_B	dB	-6		0	
	P_C	dB	-		-3	
	σ	dB	3		-3	
SNR (Note 3)		dB	0	1	5	6
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-97	-93	-92
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
Propagation channel			EVA5		EVA5	
Antenna configuration			4x2 ULA low		4x2 XP high (Note 4)	
Beamforming Model			-		B.4.3	
CRS reference signals			Antenna ports 0, 1, 2, 3		Antenna ports 0, 1	
Time offset between TX antenna (Note 5)		ns	65		-	
CSI reference signals			-		Antenna ports 15, 16, 17, 18	
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			-		5/ 4	
CSI-RS reference signal configuration			-		4	
alternativeCodebookEnabledFor4TX			No		Yes	
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 FFFF		0x0000 0000 0000 FFFF 0000 FFFF	
Reporting interval (Note 6)		ms	5		5	
CQI delay		ms	8		8	
Reporting mode			PUSCH 3-2, PUSCH 3-1		PUSCH 3-2, PUSCH 1-2	
Sub-band size		RB	6 (full size)		6 (full size)	
Max number of HARQ transmissions			1		1	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: Reference measurement channel according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4: Randomization of the principle beam direction shall be used as specified in B.2.3A.4.
Note 5: The values of time offset are [0ns 65ns 0ns 65ns] for antenna port [0, 1, 2, 3] respectively.
Note 6: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#4 and #9 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#3 and #8.

Table 9.3.7.2.3-2: Minimum requirement (TDD)

	Test 1	Test 2
α	1.05	-
β	-	1.15
UE Category	≥2	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.7.2.

9.3.7.2.4 Test description

9.3.7.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.3.7.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.7.2.4.3.

9.3.7.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.7.2.5-2 as appropriate.

For Test1

2. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to the wideband and subband CQI value sent by the UE and according to the wideband and subband PMI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports, wideband PMI reports, full-size subband CQI reports, and full-size subband PMI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #3 and subframe #8 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.
3. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to the wideband CQI value and wideband PMI value. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #3 and subframe #8 to carry the PUSCH 3-1 CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{wideband}$.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in subframe#3 and #8 (Table A.4.1-2).
5. The SS shall transmit an RRC Connection Reconfiguration message to set reporting mode according to Table 9.3.7.2.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC according to the wideband CQI value and subband PMI value. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #3 and subframe #8 to carry the PUSCH 3-2 CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$.

8. If the ratio ($t_{subband}$ / $t_{wideband}$) ≥ α which is specified in Table 9.3.7.2.5-1, pass the UE for this test and go to step 16. Otherwise, go to step 15.

For Test2

9. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband and subband CQI value sent by the UE and according to the wideband and subband PMI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports, wideband PMI reports, full-size subband CQI reports, and full-size subband PMI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #3 and subframe #8 to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

10. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value and subband PMI value in each available downlink transmission instance randomly selected full-size subband. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #3 and subframe #8 to carry the PUSCH 1-2 CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{wideband}$.

11. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in subframe#3 and #8 (Table A.4.1-2).

12. The SS shall transmit an RRC Connection Reconfiguration message to set reporting mode according to Table 9.3.7.2.3-1.

13. The UE shall transmit RRC Connection Reconfiguration Complete message.

14. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value and ull-size subband PMI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI and full-size subband PMI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in subframe #3 and subframe #8 to carry the PUSCH 3-2 CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / $t_{wideband}$) ≥ β which is specified in Table 9.3.7.2.5-1, pass the UE for this test and go to step 16. Otherwise, go to step 15.

15. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 14) for the other SNR point as appropriate. Otherwise fail the UE.

16. If both tests have not been done, then repeat the same procedure (steps 1 to 15) with test conditions according to the Table 9.3.7.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.3.7.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.7.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*	Test 1	
antennaInfo CHOICE {		Test 1	
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n4TxAntenna-tm6	1111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
antennaInfo	Not present	Test 2	
antennaInfo-r10 CHOICE {		Test 2	
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT	Test 2	
csi-RS-Config-r10	CSI-RS-Config-r10	Test 2	
antennaInfo-v1250	AntennaInfoDedicated-v1250	Test 2	
}			

Table 9.3.7.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6	Test 1	
	dB0	Test 2	
}			

Table 9.3.7.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm32-v1250, rm31	Test 1	
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 9.3.7.2.4.3-4: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020	Test 2	
codebookSubsetRestriction-r10	0x0000 0000 0000 FFFF 0000 FFFF	Test 2	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.3.7.2.4.3-5: *AntennaInfoDedicated-v1250*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-v1250 ::= SEQUENCE {			
alternativeCodebookEnabledFor4TX-r12	TRUE	Test 2	
}			

Table 9.3.7.2.4.3-6: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm32-v1250, rm12	Test 2	
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
}			

Table 9.3.7.2.4.3-7: *CSI-RS-Config, Test 2*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
}			

Table 9.3.7.2.4.3-7: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

9.3.7.2.5 Test requirement

Table 9.3.7.2.3-1: Test requirement (TDD)

	Test 1	Test 2
α	1.04	-
β	-	1.14
UE Category	≥2	≥2

Table 9.3.7.2.5-2: Sub-band test for TDD

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10MHz			
PDSCH resource allocation		RB	50PRB		a subband, 6PRB	
Transmission mode			TM6		TM9	
Uplink downlink configuration			1		1	
Special subframe configuration			4		4	
Downlink power allocation	ρ_A	dB	-6		0	
	ρ_B	dB	-6		0	
	P_C	dB	-		-3	
	σ	dB	3		-3	
SNR for UE with 2Rx RF band (Note 3)		dB	0	1	5	6
SNR for 4Rx UE without 2Rx RF band		dB	-3	-2	2	3
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-97	-93	-92
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
Propagation channel			EVA5		EVA5	
Antenna configuration			4x2 ULA low		4x2 XP high (Note 4)	
Beamforming Model			-		B.4.3	
CRS reference signals			Antenna ports 0, 1, 2, 3		Antenna ports 0, 1	
Time offset between TX antenna (Note 5)		ns	65		-	
CSI reference signals			-		Antenna ports 15, 16, 17, 18	
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			-		5/ 4	
CSI-RS reference signal configuration			-		4	
alternativeCodebookEnabledFor4TX			No		Yes	
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 FFFF		0x0000 0000 0000 FFFF 0000 FFFF	
Reporting interval (Note 6)		ms	5		5	
CQI delay		ms	8		8	
Reporting mode			PUSCH 3-2, PUSCH 3-1		PUSCH 3-2, PUSCH 1-2	
Sub-band size		RB	6 (full size)		6 (full size)	
Max number of HARQ transmissions			1		1	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: Reference measurement channel according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.
Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4: Randomization of the principle beam direction shall be used as specified in B.2.3A.4.
Note 5: The values of time offset are [0ns 65ns 0ns 65ns] for antenna port [0, 1, 2, 3] respectively.
Note 6: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#4 and #9 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#3 and #8.
Note 7: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

To pass the test, α and β must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.3.8 Additional requirements for enhanced receiver Type B

9.3.8.1 PUCCH 1-1 (Cell-Specific Reference Symbols)

9.3.8.1.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 (Cell-Specific Reference Symbols) TM4 - Enhanced Receiver Type B

9.3.8.1.1.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality based on the receiver of the enhanced Type B meets a minimum performance. Performance requirements are specified in terms of the relative throughput obtained when the transport format is that indicated by the reported CQI with NeighCellsInfo-r12 configured compared to the case without NeighCellsInfo-r12 configured. Cell 1 is the serving cell, and Cell 2 and Cell 3 are the interference cells.

9.3.8.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 12 and forward UE of Category ≥ 2 that support enhanced performance requirement Type B.

9.3.8.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.8.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.8.1.1.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources with NeighCellsInfo-r12 configured and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources without NeighCellsInfo-r12 configured shall be $\geq \gamma$;

Table 9.3.8.1.1.3-1: Fading test for (FDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			4		
Downlink power allocation	ρ_A	dB	-3		
	ρ_B	dB	-3		
	σ	dB	0		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.34	N/A	N/A
$\hat{E}_s/N_{oc}$		dB	N/A	3.28	0.74
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.66	-94.72	-97.26
N_{oc}		dB [mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
Interference model			N/A	As specified in clause B.6.3	As specified in clause B.6.3
Reporting periodicity		ms	N_{pd} = 5	N/A	N/A
Physical channel for CQI/PMI reporting			PUCCH Format 2	N/A	N/A
PUCCH Report Type for CQI/PMI			2	N/A	N/A
PUCCH Report Type for RI			3	N/A	N/A
cqi-pmi-ConfigurationIndex			6	N/A	N/A
ri-ConfigurationIndex			1	N/A	N/A
CodeBookSubsetRestriction bitmap			000001	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.2 FDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 3: All cells are time-synchronous.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 9.3.8.1.1.3-2: Minimum requirement (FDD)

	Test
γ	0.925
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.8.1.1.

9.3.8.1.1.4 Test description

9.3.8.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Table 9.3.8.1.1.-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.8.1.1.4.3.

9.3.8.1.1.4.2 Test procedure

1. Set the cell 1, 2 and 3 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.8.1.1.5-1 as appropriate.
2. [SS shall not setup NAICS-AssistanceInfo for the next test step.]
3. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The UE will send ACK/NACK and periodic CQI, PMI and RI report using PUCCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{NAICS_OFF}}$.
4. SS shall setup NAICS-AssistanceInfo as per TS 36.508 [7] clause 5.2A.6.1.
5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The UE will send ACK/NACK and periodic CQI, PMI and RI report using PUCCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{NAICS_ON}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
6. If the ratio ($t_{\text{NAICS_ON}} / t_{\text{NAICS_OFF}}$) $\geq \gamma$ then pass the UE for this test. Otherwise fail the UE.
7. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

9.3.8.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.8.1.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	000001		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.3.8.1.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.3.8.1.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.3.8.1.1.5 Test requirement

Table 9.3.8.1.1.5-1: Test Parameters for Fading test for (FDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			4		
Downlink power allocation	ρ_A	dB	-3		
	ρ_B	dB	-3		
	σ	dB	0		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.97	N/A	N/A
$\hat{E}_s/N_{oc}$		dB	N/A	4.08	1.54
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.03	-93.92	-96.46
N_{oc}		dB [mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
Interference model			N/A	As specified in clause B.6.3	As specified in clause B.6.3
Reporting periodicity		ms	N_{pd} = 5	N/A	N/A
Physical channel for CQI/PMI reporting			PUCCH Format 2	N/A	N/A
PUCCH Report Type for CQI/PMI			2	N/A	N/A
PUCCH Report Type for RI			3	N/A	N/A
cqi-pmi-ConfigurationIndex			6	N/A	N/A
ri-ConfigurationIndex			1	N/A	N/A
CodeBookSubsetRestriction bitmap			000001	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
NeighCellsInfo-r12 (Note 4)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.2 FDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 3: All cells are time-synchronous.
Note 4: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 9.3.8.1.1.5-2: Test requirement (FDD)

	Test
γ	0.915
UE Category	≥2

9.3.8.1.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 (Cell-Specific Reference Symbols) TM4 - Enhanced Receiver Type B

9.3.8.1.2.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality based on the receiver of the enhanced Type B meets a minimum performance. Performance requirements are specified in terms of the relative throughput obtained

when the transport format is that indicated by the reported CQI with NeighCellsInfo-r12 configured compared to the case without NeighCellsInfo-r12 configured. Cell 1 is the serving cell, and Cell 2 and Cell 3 are the interference cells.

9.3.8.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 12 and forward UE of Category ≥ 2 that support enhanced performance requirement Type B.

9.3.8.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.8.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.8.1.2.3-2 and by the following:

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources with NeighCellsInfo-r12 configured and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources without NeighCellsInfo-r12 configured shall be ≥ γ;

Table 9.3.8.1.2.3-1: Fading test for (TDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			4		
Uplink downlink configuration			2		
Special subframe configuration			4		
Downlink power allocation	ρ_A	dB	-3		
	ρ_B	dB	-3		
	σ	dB	0		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.34	N/A	N/A
$\hat{E}_s/N_{oc}$		dB	N/A	3.28	0.74
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.66	-94.72	-97.26
N_{oc}		dB [mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
Interference model			N/A	As specified in clause B.6.3	As specified in clause B.6.3
Reporting periodicity		ms	N_{pd} = 5	N/A	N/A
Physical channel for CQI/PMI reporting			PUSCH (Note 3)	N/A	N/A
PUCCH Report Type			2	N/A	N/A
cqi-pmi-ConfigurationIndex			3	N/A	N/A
ri-ConfigIndex			805 (Note 5)	N/A	N/A
CodeBookSubsetRestriction bitmap			000001	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
NeighCellsInfo-r12 (Note 6)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.2 TDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.
Note 4: All cells are time-synchronous.
Note 5: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.
Note 6: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 9.3.8.1.2.3-2: Minimum requirement (TDD)

	Test
γ	0.925
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.8.1.2.

9.3.8.1.2.4 Test description

9.3.8.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Table 9.3.8.1.2.-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.8.1.2.4.3.

9.3.8.1.2.4.2 Test procedure

1. Set the cell 1, 2 and 3 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.8.1.2.5-1 as appropriate.
2. [SS shall not setup NAICS-AssistanceInfo for the next test step.]
3. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\mathrm{NAICS_OFF}}$.
4. SS shall setup NAICS-AssistanceInfo as per TS 36.508 [7] clause 5.2A.6.1.
5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\mathrm{NAICS_ON}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
6. If the ratio ($t_{\mathrm{NAICS_ON}} / t_{\mathrm{NAICS_OFF}}$) $\geq \gamma$ then pass the UE for this test. Otherwise fail the UE.
7. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

9.3.8.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.8.1.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	000001		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.3.8.1.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.3.8.1.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	805	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.3.8.1.2.5 Test requirement

Table 9.3.8.1.2.5-1: Test Parameters for Fading test for (TDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			4		
Uplink downlink configuration			2		
Special subframe configuration			4		
Downlink power allocation	ρ_A	dB	-3		
	ρ_B	dB	-3		
	σ	dB	0		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.97	N/A	N/A
$\hat{E}_s/N_{oc}$		dB	N/A	4.08	1.54
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.03	-93.92	-96.46
N_{oc}		dB [mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
Interference model			N/A	As specified in clause B.6.3	As specified in clause B.6.3
Reporting periodicity		ms	N_{pd} = 5	N/A	N/A
Physical channel for CQI/PMI reporting			PUSCH (Note 3)	N/A	N/A
PUCCH Report Type			2	N/A	N/A
cqi-pmi-ConfigurationIndex			3	N/A	N/A
ri-ConfigIndex			805 (Note 5)	N/A	N/A
CodeBookSubsetRestriction bitmap			000001	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
NeighCellsInfo-r12 (Note 6)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.2 TDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.
Note 4: All cells are time-synchronous.
Note 5: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.
Note 6: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331[5].

Table 9.3.8.1.2.5-2: Test requirement (TDD)

	Test
γ	0.915
UE Category	≥2

9.3.8.2 PUCCH 1-1 (CSI Reference Symbols)

9.3.8.2.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM9 - Enhanced Receiver Type B

9.3.8.2.1.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality based on the receiver of the enhanced Type B meets a minimum performance. Performance requirements are specified in terms of the relative throughput obtained when the transport format is that indicated by the reported CQI with NeighCellsInfo-r12 configured compared to the case without NeighCellsInfo-r12 configured. Cell 1 is the serving cell, and Cell 2 and Cell 3 are the interference cells.

9.3.8.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 12 and forward UE of Category ≥ 2 that support enhanced performance requirement Type B. Applicability requires support for FGI bit 103.

9.3.8.2.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.8.2.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.8.2.1.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources with NeighCellsInfo-r12 configured and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources without NeighCellsInfo-r12 configured shall be ≥ γ;

Table 9.3.8.2.1.3-1: Fading test for FDD

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			9		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.34	N/A	N/A
$\hat{E}_s/N_{oc}$			N/A	3.28	0.74
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.66	-94.72	-97.26
N_{oc}		dB [mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
Beamforming Model			As specified in Section B.4.3		
CSI reference signals			Antenna ports 15,16	N/A	N/A
CSI-RS periodicity and subframe offset			5/1	N/A	N/A
CSI-RS reference signal configuration			2	N/A	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	1 / 0001000000000000	1 / 0001000000000000
CodeBookSubsetRestriction bitmap			000001	N/A	N/A
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Reporting periodicity		ms	N_{pd} = 5	N/A	N/A
Physical channel for CQI/PMI reporting			PUSCH (Note 3)	N/A	N/A
PUCCH Report Type for CQI/PMI			2	N/A	N/A
PUCCH channel for RI reporting			PUCCH Format 2	N/A	N/A
PUCCH Report Type for RI			3	N/A	N/A
cqi-pmi-ConfigurationIndex			2	N/A	N/A
ri-ConfigIndex			1	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
NeighCellsInfo-r12 (Note 5)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.11 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.
Note 4: All cells are time-synchronous.
Note 5: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 9.3.8.2.1.3-2: Minimum requirement (FDD)

	Test 1
γ	0.925
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.8.2.1.

9.3.8.2.1.4 Test description

9.3.8.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Table 9.3.8.2.1.-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.8.1.1.4.3.

9.3.8.2.1.4.2 Test procedure

1. Set the cell 1, 2 and 3 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.8.2.1.5-1 as appropriate.
2. SS shall not setup NAICS-AssistanceInfo for the next test step.
3. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI, PMI and RI report using PUCCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{NAICS_OFF}}$.
4. SS shall setup NAICS-AssistanceInfo as per TS 36.508 [7] clause 5.2A.6.1.
5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI, PMI and RI report using PUCCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{NAICS_ON}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
6. If the ratio ($t_{\text{NAICS_ON}} / t_{\text{NAICS_OFF}}$) $\geq \gamma$ then pass the UE for this test. Otherwise fail the UE.

7. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

9.3.8.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.8.2.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
}			
codebookSubsetRestriction-r10	00000000000000000000000000000000000000000000000000000000111111111111111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.3.8.2.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.3.8.2.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.8.2.1.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.3.8.2.1.5 Test requirement

Table 9.3.8.2.1.5-1: Test Parameters for Fading test for (FDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			9		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.97	N/A	N/A
$\hat{E}_s/N_{oc}$			N/A	4.08	1.54
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.03	-93.92	-96.46
N_{oc}		dB [mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
Beamforming Model			As specified in Section B.4.3		
CSI reference signals			Antenna ports 15,16	N/A	N/A
CSI-RS periodicity and subframe offset			5/1	N/A	N/A
CSI-RS reference signal configuration			2	N/A	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	1 / 0001000000000000	1 / 0001000000000000
CodeBookSubsetRestriction bitmap			000001	N/A	N/A
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Reporting periodicity		ms	N_{pd} = 5	N/A	N/A
Physical channel for CQI/PMI reporting			PUSCH (Note 3)	N/A	N/A
PUCCH Report Type for CQI/PMI			2	N/A	N/A
PUCCH channel for RI reporting			PUCCH Format 2	N/A	N/A
PUCCH Report Type for RI			3	N/A	N/A
cqi-pmi-ConfigurationIndex			2	N/A	N/A
ri-ConfigIndex			1	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
NeighCellsInfo -r12 (Note 5)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmission ModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.11 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.
Note 4: All cells are time-synchronous.
Note 5: NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 9.3.8.2.1.5-2: Test requirement (FDD)

	Test
γ	0.915
UE Category	≥2

9.3.8.2.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM9 - Enhanced Receiver Type B

9.3.8.2.2.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality based on the receiver of the enhanced Type B meets a minimum performance. Performance requirements are specified in terms of the relative throughput obtained when the transport format is that indicated by the reported CQI with NeighCellsInfo-r12 configured compared to the case without NeighCellsInfo-r12 configured. Cell 1 is the serving cell, and Cell 2 and Cell 3 are the interference cells.

9.3.8.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 12 and forward UE of Category $\geq$ 2 that support enhanced performance requirement Type B. Applicability requires support for FGI bit 103.

9.3.8.2.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.8.2.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.8.2.2.3-2 and by the following:

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources with NeighCellsInfo-r12 configured and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources without NeighCellsInfo-r12 configured shall be $\geq \gamma$;

Table 9.3.8.2.2.3-1: Fading test for (TDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			9		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Uplink downlink configuration			2		
Special subframe configuration			4		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.34	N/A	N/A
$\hat{E}_s / N_{oc}$			N/A	3.28	0.74
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.66	-94.72	-97.26
N_{oc}		dB [mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
Beamforming Model			As specified in Section B.4.3		
CSI reference signals			Antenna ports 15,16	N/A	N/A
CSI-RS periodicity and subframe offset			5/3	N/A	N/A
CSI-RS reference signal configuration			2	N/A	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	3 / 0001000000000000	3 / 0001000000000000
CodeBookSubsetRestriction bitmap			000001	N/A	N/A
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Reporting periodicity		ms	N_{pd} = 5	N/A	N/A
Physical channel for CQI/PMI reporting			PUSCH (Note 3)	N/A	N/A
PUCCH Report Type for CQI/PMI			2	N/A	N/A
Physical channel for RI reporting			PUCCH Format 2	N/A	N/A
PUCCH Report Type for RI			3	N/A	N/A
cqi-pmi-ConfigurationIndex			3	N/A	N/A
ri-ConfigIndex			805 (Note 5)	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
NeighCellsInfo -r12 (Note 6)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmission ModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.11 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#2 and #7.

Note 4: All cells are time-synchronous.

Note 5:	RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.
Note 6:	NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 9.3.8.2.2.3-2: Minimum requirement (TDD)

	Test 1
γ	0.925
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.8.2.2.

9.3.8.2.2.4 Test description

9.3.8.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Table 9.3.8.2.2.-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.8.2.2.4.3.

9.3.8.2.2.4.2 Test procedure

1. Set the cell 1, 2 and 3 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.8.2.2.5-1 as appropriate.
2. SS shall not setup NAICS-AssistanceInfo for the next test step.
3. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\mathrm{NAICS_OFF}}$.
4. SS shall setup NAICS-AssistanceInfo as per TS 36.508 [7] clause 5.2A.6.1.
5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using

PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{NAICS_ON}. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.

6. If the ratio (t_{NAICS_ON} / t_{NAICS_OFF}) $\geq \gamma$ then pass the UE for this test. Otherwise fail the UE.

7. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

9.3.8.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.8.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
}			
codebookSubsetRestriction-r10	00000000000000000000 00000000000000000000 00000000111111111111 1111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.3.8.2.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.3.8.2.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	805	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.8.2.1.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.3.8.2.2.5 Test requirement

Table 9.3.8.2.2.5-1: Test Parameters for Fading test for (TDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			9		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Uplink downlink configuration			2		
Special subframe configuration			4		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.97	N/A	N/A
$\hat{E}_s / N_{oc}$			N/A	4.08	1.54
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.03	-93.92	-96.46
N_{oc}		dB [mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
Beamforming Model			As specified in Section B.4.3		
CSI reference signals			Antenna ports 15,16	N/A	N/A
CSI-RS periodicity and subframe offset			5/3	N/A	N/A
CSI-RS reference signal configuration			2	N/A	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	3 / 0001000000000000	3 / 0001000000000000
CodeBookSubsetRestriction bitmap			000001	N/A	N/A
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
Reporting periodicity		ms	N_{pd} = 5	N/A	N/A
Physical channel for CQI/PMI reporting			PUSCH (Note 3)	N/A	N/A
PUCCH Report Type for CQI/PMI			2	N/A	N/A
Physical channel for RI reporting			PUCCH Format 2	N/A	N/A
PUCCH Report Type for RI			3	N/A	N/A
cqi-pmi-ConfigurationIndex			3	N/A	N/A
ri-ConfigIndex			805 (Note 5)	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
NeighCellsInfo -r12 (Note 6)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmission ModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.11 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to

	allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#2 and #7.
Note 4:	All cells are time-synchronous.
Note 5:	RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.
Note 6:	NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 9.3.8.2.2.5-2: Minimum requirement (TDD)

	Test 1
γ	0.915
UE Category	≥2

9.3.8.3 CSI process

9.3.8.3.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM10 with TM9 interference - Enhanced Receiver Type B

9.3.8.3.1.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality based on the receiver of the enhanced Type B meets a minimum performance. Performance requirements are specified in terms of the relative throughput obtained when the transport format is that indicated by the reported CQI with NeighCellsInfo-r12 configured compared to the case without NeighCellsInfo-r12 configured. Cell 1 is the serving cell, and Cell 2 and Cell 3 are the interference cells.

9.3.8.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 12 and forward UE of Category ≥ 2 that support enhanced performance requirement Type B.

9.3.8.3.1.3 Minimum conformance requirements

For the parameters specified in Table 9.3.8.3.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.8.3.1.3-2 and by the following:

a) the ratio of the throughput obtained for the Type B receiver with NAICS assistance information when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources with specified $\hat{E}_s/N_{oc}$ and that obtained for the Type B receiver without NAICS assistance information when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources with the same specified $\hat{E}_s/N_{oc}$ shall be $\geq \gamma$;

Table 9.3.8.3.1.3-1: Fading test for single antenna (FDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			10	9	9
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.34	N/A	N/A
$\hat{E}_s / N_{oc}$		dB	N/A	3.28	0.74
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.66	-94.72	-97.26
N_{oc}		dB[mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna port 0, 1	Antenna port 0, 1
Beamforming Model			As specified in Section B.4.3		
CSI reference signals			Antenna ports 15,16	N/A	N/A
CSI-RS periodicity and subframe offset			5/1	N/A	N/A
CSI-RS reference signal configuration			2	N/A	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	1 / 0001000000000000	1 / 0001000000000000
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
CSI process	CSI-RS		CSI-RS	N/A	N/A
	CSI-IM		CSI-IM	N/A	N/A
	Reporting mode		PUCCH 1-1	N/A	N/A
	CodeBookSubsetRestriction bitmap		000001	N/A	N/A
	Reporting periodicity	ms	N_{pd} = 5	N/A	N/A
	CQI delay	ms	8	N/A	N/A
	Physical channel for CQI/ PMI reporting		PUSCH (Note 3)	N/A	N/A
	PUCCH Report Type for CQI/PMI		2	N/A	N/A
	PUCCH channel for RI reporting		PUCCH Format 2	N/A	N/A
	PUCCH report type for RI		3	N/A	N/A
	cqi-pmi-ConfigurationIndex		2	N/A	N/A
	ri-ConfigIndex		1	N/A	N/A
CSI-IM periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A	N/A
CSI-IM configuration			6	N/A	N/A
CSI process for PDSCH scheduling			CSI process	N/A	N/A
Quasi-co-located CSI-RS			CSI-RS	N/A	N/A
Quasi-co-located CRS			Same Cell ID as Cell 1	N/A	N/A
Reference measurement channel			Note 2	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
NeighCellsInfo-r12 (Note 5)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 FDD according to Table A.4-1 with one sided dynamic OCNG

	Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 3:	To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.
Note 4:	All cells are time-synchronous.
Note 5:	NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 9.3.8.3.1.3-2: Minimum requirement (FDD)

	Test 1
γ	0.925
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.8.3.1.

9.3.8.3.1.4 Test description

9.3.8.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Table 9.3.8.3.1.-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.8.1.1.4.3.

9.3.8.3.1.4.2 Test procedure

1. Set the cell 1, 2 and 3 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.8.3.1.5-1 as appropriate.
2. SS shall not setup NAICS-AssistanceInfo for the next test step.
3. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI, PMI and RI report using PUCCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{NAICS_OFF}}$.
4. SS shall setup NAICS-AssistanceInfo as per TS 36.508 [7] clause 5.2A.6.1.
5. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI, PMI and RI

report using PUCCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{NAICS_ON}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.

6. If the ratio ($t_{\text{NAICS_ON}} / t_{\text{NAICS_OFF}}$) $\geq \gamma$ then pass the UE for this test. Otherwise fail the UE.

7. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

9.3.8.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.8.3.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.3.8.3.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.3.8.3.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.8.3.1.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 9.3.8.3.1.4.3-5: CQI-ReportConfig-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2ABA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
simultaneousAckNackAndCQI-Format3-r11	Not present	PUCCH Format 2	
cqi-ReportPeriodicProcExtToReleaseList-r11	Not present		
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	2		
ri-ConfigIndex-r11	1		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	1 entry		
csi-IM-ConfigId-r11[1]	2	CSI-IM 1	
resourceConfig-r11[1]	6		
subframeConfig-r11[1]	1		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	1 entry		
csi-ProcessId-r11[1]	3	CSI process 2	
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	2		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	0		
codebookSubsetRestriction-r11[1]	0x00001		
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	3		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[1]	Not present		
cqi-ReportAperiodicProc-r11[1] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
}			
}			
}			

9.3.8.3.1.5 Test requirement

Table 9.3.8.3.1.5-1: Test Parameters for Fading test for single antenna (FDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			10	9	9
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8. 97	N/A	N/A
$\hat{E}_s / N_{oc}$		dB	N/A	4.08	1.54
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89. 03	-93. 92	-96. 46
N_{oc}		dB[mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna port 0, 1	Antenna port 0, 1
Beamforming Model			As specified in Section B.4.3		
CSI reference signals			Antenna ports 15,16	N/A	N/A
CSI-RS periodicity and subframe offset			5/1	N/A	N/A
CSI-RS reference signal configuration			2	N/A	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	1 / 0001000000000000	1 / 0001000000000000
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
CSI process	CSI-RS		CSI-RS	N/A	N/A
	CSI-IM		CSI-IM	N/A	N/A
	Reporting mode		PUCCH 1-1	N/A	N/A
	CodeBookSubsetRestriction bitmap		000001	N/A	N/A
	Reporting periodicity	ms	N_{pd} = 5	N/A	N/A
	CQI delay	ms	8	N/A	N/A
	Physical channel for CQI/ PMI reporting		PUSCH (Note 3)	N/A	N/A
	PUCCH Report Type for CQI/PMI		2	N/A	N/A
	PUCCH channel for RI reporting		PUCCH Format 2	N/A	N/A
	PUCCH report type for RI		3	N/A	N/A
	cqi-pmi-ConfigurationIndex		2	N/A	N/A
	ri-ConfigIndex		1	N/A	N/A
CSI-IM periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A	N/A
CSI-IM configuration			6	N/A	N/A
CSI process for PDSCH scheduling			CSI process	N/A	N/A
Quasi-co-located CSI-RS			CSI-RS	N/A	N/A
Quasi-co-located CRS			Same Cell ID as Cell 1	N/A	N/A
Reference measurement channel			Note 2	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
NeighCellsInfo-r12 (Note 5)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}
Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at					

	a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2:	Reference measurement channel RC.11 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 3:	To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.
Note 4:	All cells are time-synchronous.
Note 5:	NeighCellsInfo-r12 is described in subclause 6.3.2 of TS36.331 [5].

Table 9.3.8.3.1.5-2: Test requirement (FDD)

	Test
γ	0.915
UE Category	≥2

9.3.8.3.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM10 with TM9 interference - Enhanced Receiver Type B

9.3.8.3.2.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality based on the receiver of the enhanced Type B meets a minimum performance. Performance requirements are specified in terms of the relative throughput obtained when the transport format is that indicated by the reported CQI with NeighCellsInfo-r12 configured compared to the case without NeighCellsInfo-r12 configured. Cell 1 is the serving cell, and Cell 2 and Cell 3 are the interference cells.

9.3.8.3.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 12 and forward UE of Category ≥ 2 that support enhanced performance requirement Type B.

9.3.8.3.2.3 Minimum conformance requirements

For the parameters specified in Table 9.3.8.3.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.8.3.2.3-2 and by the following:

a) the ratio of the throughput obtained for the Type B receiver with NAICS assistance information when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources with specified $\hat{E}_s/N_{oc}$ and that obtained for the Type B receiver without NAICS assistance information when transmitting the transport format indicated by each reported wideband CQI index subject to interference sources with the same specified $\hat{E}_s/N_{oc}$ shall be $\geq \gamma$;

Table 9.3.8.3.2.3-1: Fading test for single antenna (TDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			10	9	9
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Uplink downlink configuration			2		
Special subframe configuration			4		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.34	N/A	N/A
$\hat{E}_s/N_{oc}$		dB	N/A	3.28	0.74
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.66	-94.72	-97.26
N_{oc}		dB[mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna port 0,1	Antenna port 0,1
Beamforming Model			As specified in Section B.4.3		
CSI reference signals			Antenna ports 15,16	N/A	N/A
CSI-RS periodicity and subframe offset			5/3	N/A	N/A
CSI-RS reference signal configuration			2	N/A	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	3 / 0001000000000000	3 / 0001000000000000
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
CSI process	CSI-RS		CSI-RS	N/A	N/A
	CSI-IM		CSI-IM	N/A	N/A
	Reporting mode		PUCCH 1-1	N/A	N/A
	CodeBookSubsetRestriction bitmap		000001	N/A	N/A
	Reporting periodicity	ms	N_{pd} = 5	N/A	N/A
	CQI delay	ms	8	N/A	N/A
	Physical channel for CQI/ PMI reporting		PUSCH (Note 3)	N/A	N/A
	PUCCH Report Type for CQI/PMI		2	N/A	N/A
	PUCCH channel for RI reporting		PUCCH Format 2	N/A	N/A
	PUCCH report type for RI		3	N/A	N/A
	cqi-pmi-ConfigurationIndex		3	N/A	N/A
	ri-ConfigIndex		805 (Note 5)	N/A	N/A
CSI-IM periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A	N/A
CSI-IM configuration			6	N/A	N/A
CSI process for PDSCH scheduling			CSI process	N/A	N/A
Quasi-co-located CSI-RS			CSI-RS	N/A	N/A
Quasi-co-located CRS			Same Cell ID as Cell 1	N/A	N/A
Reference measurement channel			Note 2	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
NeighCellsInfo-r12 (Note 6)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}
Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink					

	before SF#(n+4)
Note 2:	Reference measurement channel RC.11 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3:	To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.
Note 4:	All cells are time-synchronous.
Note 5:	RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.
Note 6:	NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 9.3.8.3.2.3-2: Minimum requirement (TDD)

	Test 1
γ	0.925
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.3.8.3.2.

9.3.8.3.2.4 Test description

9.3.8.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48.
2. The parameter settings for the cell 1 are set up according to Table 9.3.8.3.2.-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.3.8.3.2.4.3.

9.3.8.3.2.4.2 Test procedure

1. Set the cell 1, 2 and 3 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.3.8.3.2.5-1 as appropriate.
2. SS shall not setup NAICS-AssistanceInfo for the next test step.
3. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\mathrm{NAICS_OFF}}$.
4. SS shall setup NAICS-AssistanceInfo as per TS 36.508 [7] clause 5.2A.6.1.

5. The SS shall transmit PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{NAICS_ON}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.

6. If the ratio ($t_{\text{NAICS_ON}} / t_{\text{NAICS_OFF}}$) $\geq \gamma$ then pass the UE for this test. Otherwise fail the UE.

7. The SS shall release all NAICS configuration in the UE using procedure in TS 36.508 [7] clause 5.2A.6.1 with the condition NAICS_RELEASE.

9.3.8.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.3.8.3.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	Tm10-v1120		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.3.8.3.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.3.8.3.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	805	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.3.8.3.2.4.3-4: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 9.3.8.3.2.4.3-5: CQI-ReportConfig-v1130-DEFAULT

Derivation Path: 36.508 clause 4.6.3, Table 4.6.3-2ABA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
simultaneousAckNackAndCQI-Format3-r11	Not present	PUCCH Format 2	
cqi-ReportPeriodicProcExtToReleaseList-r11	Not present		
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	3		
ri-ConfigIndex-r11	805		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToReleaseList-r11	Not present		
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	1 entry		
csi-IM-ConfigId-r11[1]	2	CSI-IM 1	
resourceConfig-r11[1]	6		
subframeConfig-r11[1]	3		
}			
csi-ProcessToReleaseList-r11	Not present		
csi-ProcessToAddModList-r11SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	1 entry		
csi-ProcessId-r11[1]	3	CSI process 2	
csi-RS-ConfigNZPId-r11[1]	1		
csi-IM-ConfigId-r11[1]	2		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	0		
codebookSubsetRestriction-r11[1]	0x000001		
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	3		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11[1]	Not present		
cqi-ReportAperiodicProc-r11[1] SEQUENCE {			
cqi-ReportModeAperiodic-r11	rm31		
trigger01-r11	1		
trigger10-r11	1		
trigger11-r11	1		
}			
}			
}			
}			

9.3.8.3.2.5 Test requirement

Table 9.3.8.3.2.5-1: Test Parameters for Fading test for single antenna (TDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10		
Transmission mode			10	9	9
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Uplink downlink configuration			2		
Special subframe configuration			4		
Cyclic Prefix			Normal	Normal	Normal
Cell ID			0	1	6
SNR		dB	8.97	N/A	N/A
$\hat{E}_s/N_{oc}$		dB	N/A	4.08	1.54
$\hat{I}_{or}^{(j)}$		dB [mW/15kHz]	-89.03	-93.92	-96.46
N_{oc}		dB[mW/15kHz]	-98		
Propagation channel			EPA5	EPA5	EPA5
Correlation and antenna configuration			Low 2 x 2	Low 2 x 2	Low 2 x 2
Cell-specific reference signals			Antenna ports 0,1	Antenna port 0,1	Antenna port 0,1
Beamforming Model			As specified in Section B.4.3		
CSI reference signals			Antenna ports 15,16	N/A	N/A
CSI-RS periodicity and subframe offset			5/3	N/A	N/A
CSI-RS reference signal configuration			2	N/A	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	N/A	3 / 0001000000000000	3 / 0001000000000000
Interference model			N/A	As specified in clause B.6.4	As specified in clause B.6.4
CSI process	CSI-RS		CSI-RS	N/A	N/A
	CSI-IM		CSI-IM	N/A	N/A
	Reporting mode		PUCCH 1-1	N/A	N/A
	CodeBookSubsetRestriction bitmap		000001	N/A	N/A
	Reporting periodicity	ms	N_{pd} = 5	N/A	N/A
	CQI delay	ms	8	N/A	N/A
	Physical channel for CQI/ PMI reporting		PUSCH (Note 3)	N/A	N/A
	PUCCH Report Type for CQI/PMI		2	N/A	N/A
	PUCCH channel for RI reporting		PUCCH Format 2	N/A	N/A
	PUCCH report type for RI		3	N/A	N/A
	cqi-pmi-ConfigurationIndex		3	N/A	N/A
	ri-ConfigIndex		805 (Note 5)	N/A	N/A
CSI-IM periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A	N/A
CSI-IM configuration			6	N/A	N/A
CSI process for PDSCH scheduling			CSI process	N/A	N/A
Quasi-co-located CSI-RS			CSI-RS	N/A	N/A
Quasi-co-located CRS			Same Cell ID as Cell 1	N/A	N/A
Reference measurement channel			Note 2	N/A	N/A
Max number of HARQ transmissions			1	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
NeighCellsInfo-r12 (Note 6)	p-aList-r12		N/A	{dB-6, dB-3, dB0}	{dB-6, dB-3, dB0}
	transmissionModeList-r12		N/A	{2,3,4,8,9}	{2,3,4,8,9}

Note 1:	If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2:	Reference measurement channel RC.11 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3:	To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.
Note 4:	All cells are time-synchronous.
Note 5:	RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.
Note 6:	NeighCellsInfo-r12 is described in subclause 6.3.2 of TS 36.331 [5].

Table 9.3.8.3.2-2: Minimum requirement (TDD)

	Test 1
γ	0.915
UE Category	≥2

9.4 Reporting of Precoding Matrix Indicator (PMI)

The minimum performance requirements of PMI reporting are defined based on the precoding gain, expressed as the relative increase in throughput when the transmitter is configured according to the UE reports compared to the case when the transmitter is using random precoding. When the transmitter uses random precoding, for each PDSCH allocation a precoder is randomly generated and applied to the PDSCH. A fixed transport format (FRC) configured.

The requirements for transmission mode 6 and transmission mode 9 with 4 TX are specified in terms of the ratio

$$\gamma = \frac{t_{ue}}{t_{rnd}}$$

In the definition of γ, for PUSCH 3-1 single PMI and PUSCH 1-2 multiple PMI requirements, t_{rnd} is 60% of the maximum throughput obtained at SNR_{rnd} using random precoding, and t_{ue} the throughput measured at SNR_{rnd} with precoders configured according to the UE reports.

For the PUCCH 2-1 single PMI requirement, t_{rnd} is 60% of the maximum throughput obtained at SNR_{rnd} using random precoding on a randomly selected full-size subband in set S subbands, and t_{ue} the throughput measured at SNR_{rnd} with both the precoder and the preferred full-size subband applied according to the UE reports;

For PUSCH 2-2 multiple PMI requirements, t_{rnd} is 60% of the maximum throughput obtained at SNR_{rnd} using random precoding on a randomly selected full-size subband in set S subbands, and t_{ue} the throughput measured at SNR_{rnd} with both the subband precoder and a randomly selected full-size subband (within the preferred subbands) applied according to the UE reports.

The requirements for transmission mode 9 with 8 TX and transmission mode 9 with 4TX enhanced codebook are specified in terms of the ratio

$$\gamma = \frac{t_{ue,\,follow1,\,follow2}}{t_{rnd1,\,rnd2}}$$

In the definition of γ, for PUSCH 3-1 single PMI and PUSCH 1-2 multiple PMI requirements, $t_{follow1,\,follow2}$ is 70% of the maximum throughput obtained at $SNR_{follow1,\,follow2}$ using the precoders configured according to the UE reports, and $t_{rnd1,\,rnd2}$ is the throughput measured at $SNR_{follow1,\,follow2}$ with random precoding.

9.4.1 Single PMI

9.4.1.1 PMI Reporting – PUSCH 3-1 (Single PMI) (Cell-Specific Reference Symbols)

9.4.1.1.1 FDD PMI Reporting – PUSCH 3-1 (Single PMI)

9.4.1.1.1.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.1.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.4.1.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.4.1.1.1.3-2.

Table 9.4.1.1.1.3-1: PMI test for single-layer (FDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
Propagation channel			EVA5
Precoding granularity		PRB	50
Correlation and antenna configuration			Low 2 x 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 3-1
Reporting interval		ms	1
PMI delay (Note 2)		ms	8
Measurement channel			R.10 FDD
OCNG Pattern			OP.1 FDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity) Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			

Table 9.4.1.1.1.3-2: Minimum requirement (FDD)

Parameter	Test 1
γ	1.1
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.1.1.1.

9.4.1.1.1.4 Test description

9.4.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands
2. The parameter settings for the cell are set up according to Table 9.4.1.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.1.1.1.4.3.

9.4.1.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.4.1.1.1.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-1 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC.SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2
3. Set SNR to SNR_{rnd} . The SS shall transmit PDSCH with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4 every subframe. Measure t_{ue} according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$ If the ratio (throughput / t_{rnd}) $\geq \gamma$ which is specified in table 9.4.1.1.1.5-1, then the test is pass. Otherwise, the test is fail.

9.4.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.1.1.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.1.1.1.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			

Table 9.4.1.1.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

9.4.1.1.1.5 Test requirement

Table 9.4.1.1.1.5-1: Test requirement (FDD)

Parameter	Test 1
γ	1.09

The ratio of throughput using precoding matrix of PMI reports from the UE to using random precoding matrix shall equal or exceed the value specified in table 9.4.1.1.1.5.

9.4.1.1.2 TDD PMI Reporting – PUSCH 3-1 (Single PMI)

9.4.1.1.2.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.1.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.1.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.4.1.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in 9.4.1.1.2.3-2.

Table 9.4.1.1.2.3-1: PMI test for single-layer (TDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EVA5
Precoding granularity		PRB	50
Correlation and antenna configuration			Low 2 x 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 3-1
Reporting interval		ms	1
Minimum PMIdelay (Node-2)		ms	10 or 11
Measurement channel			R.10 TDD
OCNG Pattern			OP.1 TDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing
Note 1: For random precoder selection, the precoder shall be updated in each available downlink transmission instance Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)			

Table 9.4.1.1.2.3-2: Minimum requirement (TDD)

Parameter	Test 1
γ	1.1
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.1.1.2.

9.4.1.1.2.4 Test description

9.4.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.1.1.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2.Message contents are defined in clause 9.4.1.1.2.4.3.

9.4.1.1.2.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.1.1.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-1 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2.
3. Set SNR to SNR_{rnd} . The SS shall transmit PDSCH with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure t_{ue} according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$

9.4.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.1.1.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.1.1.2.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			

Table 9.4.1.1.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

9.4.1.1.2.5 Test requirement

Table 9.4.1.1.2.5-1: Test requirement (TDD)

Parameter	Test 1
γ	1.09

9.4.1.2 PMI Reporting – PUCCH 2-1 (Single PMI) (Cell-Specific Reference Symbols)

9.4.1.2.1 FDD PMI Reporting – PUCCH 2-1 (Single PMI)

9.4.1.2.1.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward. Applicability requires support for FGI bit 2.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.1.2.1.3 Minimum conformance requirements

For the parameters specified in Table 9.4.1.2.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.4.1.2.1.3-2.

Table 9.4.1.2.1.3-1: PMI test for single-layer (FDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
Propagation channel			EVA5
Correlation and antenna configuration			Low 4 x 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6
	σ	dB	3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
PMI delay		ms	8 or 9
Reporting mode			PUCCH 2-1 (Note 6)
Reporting periodicity		ms	N_P = 2
Physical channel for CQI reporting			PUSCH (Note 3)
PUCCH Report Type for wideband CQI/PMI			2
PUCCH Report Type for subband CQI			1
Measurement channel			R.14-1 FDD
OCNG Pattern			OP.1/2 FDD
Precoding granularity		PRB	6 (full size)
Number of bandwidth parts (*J*)			3
K			1
cqi-pmi-ConfigIndex			1
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}

Note 1: For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity)

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1.

Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.

Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to “0” and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS 36.211 [4] according to the latest PMI report on PUCCH.

Table 9.4.1.2.1.3-2: Minimum requirement (FDD)

	Test 1
γ	1.2
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.1.2.1.

9.4.1.2.1.4 Test description

9.4.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.1.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.1.2.1.4.3.

9.4.1.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.4.1.2.1.3-1 as appropriate.
2. The SS shall transmit every subframe PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.14-1 FDD) on a randomly selected full-size subband with a randomly selected precoding matrix from the codebook (Table 6.3.4.2.3-2 in TS 36.211 [8]), regardless of the SB and PMI reports from the UE. Note that each full-size subband and each precoding matrix shall be selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. The SS shall transmit PDCCH DCI format 0 in downlink SF#1, #3, #7 and #9 to schedule UL RMC in uplink subframes #5, #7, #1 and #3 (Table A.4.1-1). The UE will send ACK/NACK and periodic CSI reports using PUSCH.
   Establish t_{rnd} and SNR_{rnd} according to annex G.5.2.
3. Set SNR to SNR_{rnd} . The SS shall transmit every subframe PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.14-1 FDD) on the full-size subband and with the latest precoding matrix reported by the UE. When the UE reports a non-full-size subband, the SS schedules the recent reported subband for bandwidth part with j=1 with the latest reported precoding matrix. Note that the SS shall send PDSCH in the same full-size subband and with the latest reported precoding matrix until next UE subband report is available. The SS sends downlink MAC padding bits on the DL RMC.
   The SS shall transmit PDCCH DCI format 0 in downlink SF#1, #3, #7 and #9 to schedule UL RMC in uplink subframes #5, #7, #1 and #3 (Table A.4.1-1). The UE will send ACK/NACK and periodic CSI reports using PUSCH. Measure t_{ue} according to Annex G.5.3.
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$ If the ratio (throughput / t_{rnd}) $\geq \gamma$ which is specified in table 9.4.1.2.2.5-1, then the test is pass. Otherwise, the test is fail.

9.4.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.1.2.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.1.2.1.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n4TxAntenna-tm6	1111111111111111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.1.2.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	1	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
subbandCQI	1		
}			
ri-ConfigIndex	483	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.4.1.2.1.5 Test requirement

Table 9.4.1.2.1.5-1: Test requirement (FDD)

	Test 1
γ	1.19
UE Category	≥1

The ratio of throughput using precoding matrix of PMI reports from the UE to using random precoding matrix shall equal or exceed the value specified in table 9.4.1.2.1.5.

9.4.1.2.2 TDD PMI Reporting – PUCCH 2-1 (Single PMI)

9.4.1.2.2.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.1.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward. Applicability requires support for FGI bit 2.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.1.2.2.3 Minimum conformance requirements

For the parameters specified in Table 9.4.1.2.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in 9.4.1.2.2.3-2.

Table 9.4.1.2.2.3-1: PMI test for single-layer (TDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EVA5
Correlation and antenna configuration			Low 4 x 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6
	σ	dB	3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
PMI delay		ms	10
Reporting mode			PUCCH 2-1 (Note 6)
Reporting periodicity		ms	N_P = 5
Physical channel for CQI reporting			PUSCH (Note 3)
PUCCH Report Type for wideband CQI/PMI			2
PUCCH Report Type for subband CQI			1
Measurement channel			R.14-1 TDD
OCNG Pattern			OP.1/2 TDD
Precoding granularity		PRB	6 (full size)
Number of bandwidth parts (*J*)			3
K			1
cqi-pmi-ConfigIndex			4
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoder shall be updated in each available downlink transmission instance

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1.

Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.

Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to “0” and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS 36.211 [4] according to the latest PMI report on PUCCH.

Table 9.4.1.2.2.3-2: Minimum requirement (TDD)

Parameter	Test 1
γ	1.2
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.1.2.2.

9.4.1.2.2.4 Test description

9.4.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.1.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2.Message contents are defined in clause 9.4.1.2.2.4.3.

9.4.1.2.2.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.1.2.2.3-1 as appropriate.
2. The SS shall transmit every subframe PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.14-1 TDD) on a randomly selected full-size subband with a randomly selected precoding matrix from the codebook (Table 6.3.4.2.3-2 in TS 36.211 [8]), regardless of the SB and PMI reports from the UE. Note that each full-size subband and each precoding matrix shall be selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC.
   The SS shall transmit PDCCH DCI format 0 in downlink SF#4 and #9 to schedule UL RMC in uplink subframes #8 and #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CSI reports using PUSCH.
   Establish t_{rnd} and SNR_{rnd} according to annex G.5.2.
3. Set SNR to SNR_{rnd} . The SS shall transmit every subframe PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.14-1 TDD) on the full-size subband and with the latest precoding matrix reported by the UE. When the UE reports a non-full-size subband, the SS schedules the recent reported subband for bandwidth part with j=1 with the latest reported precoding matrix. Note that the SS shall send PDSCH in the same full-size subband and with the latest reported precoding matrix until next UE subband report is available. The SS sends downlink MAC padding bits on the DL RMC.
   The SS shall transmit PDCCH DCI format 0 in downlink SF#4 and #9 to schedule UL RMC in uplink subframes #8 and #3 (Table A.4.1-2). The UE will send ACK/NACK and periodic CSI reports using PUSCH.
   Measure t_{ue} according to Annex G.5.3.
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$ If the ratio (throughput / t_{rnd}) $\geq \gamma$ which is specified in table 9.4.1.2.2.5-1, then the test is pass. Otherwise, the test is fail.

9.4.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.1.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.1.2.2.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n4TxAntenna-tm6	1111111111111111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.1.2.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	4	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
subbandCQI	1		
}			
ri-ConfigIndex	484	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.4.1.2.2.5 Test requirement

Table 9.4.1.2.2.5-1: Test requirement (TDD)

Parameter	Test 1
γ	1.19
UE Category	≥1

9.4.1.3 PMI Reporting – PUSCH 3-1 (Single PMI) (CSI Reference Symbols)

9.4.1.3.1

9.4.1.3.1_D FDD Reporting of PMI – PUSCH 3-1 (Single PMI) for eDL MIMO

9.4.1.3.1_D.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.1.3.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.1.3.1_D.3 Minimum conformance requirements

For the parameters specified in Table 9.4.1.3.1_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.3.1_D.3-2.

Table 9.4.1.3.1_D.3-1: PMI test for single-layer (FDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Propagation channel			EPA5
Precoding granularity		PRB	50
Correlation and antenna configuration			Low ULA 4 x 2
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
Beamforming model			Annex B.4.3
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/ 1
CSI-RS reference signal configuration			6
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 FFFF
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-3
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 3-1
Reporting interval		ms	5
PMI delay (Note 2)		ms	8
Measurement channel			R.44 FDD
OCNG Pattern			OP.1 FDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}

Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity).

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: PDSCH _RA= 0 dB, PDSCH_RB= 0 dB in order to have the same PDSCH and OCNG power per subcarrier at the receiver.

Table 9.4.1.3.1_D.3-2: Minimum requirement (FDD)

Parameter	Test 1
γ	1.2
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.1.3.1.

9.4.1.3.1_D.4 Test description

9.4.1.3.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.1.3.1_D.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.1.3.1_D.4.3.

9.4.1.3.1_D.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.4.1.3.1_D.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-2 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC.SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2
3. Set SNR to SNR_{rnd} . The SS shall transmit PDSCH with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4 in subframe #0, #5. Measure t_{ue} according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$ If the ratio (throughput / t_{rnd}) $\geq \gamma$ which is specified in table 9.4.1.3.1_D.5-1, then the test is pass. Otherwise, the test is fail.

9.4.1.3.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.1.3.1_D.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 9.4.1.3.1_D.4.3-2: *Void*

Table 9.4.1.3.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0000 FFFF		
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.1.3.1_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic –r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.4.1.3.1_D.4.3-5: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	6	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.4.1.3.1_D.5 Test requirement

Table 9.4.1.3.1_D.5-1: Test requirement (FDD)

Parameter	Test 1
γ	1.19

The ratio of throughput using precoding matrix of PMI reports from the UE to using random precoding matrix shall equal or exceed the value specified in table 9.4.1.1.1_D.5.

9.4.1.3.2_D TDD Reporting of PMI – PUSCH 3-1 (Single PMI) for eDL-MIMO

9.4.1.3.2_D.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.1.3.2_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 104.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.1.3.2_D.3 Minimum conformance requirements

For the parameters specified in Table 9.4.1.3.2_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.3.2_D.3-2.

Table 9.4.1.3.2_D.3-1: PMI test for single-layer (TDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EVA5
Precoding granularity		PRB	50
Antenna configuration			8 x 2
Correlation modelling			High, Cross polarized
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,22
Beamforming model			Annex B.4.3
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/ 4
CSI-RS reference signal configuration			0
CodeBookSubsetRestriction bitmap			0x0000 0000 001F FFE0 0000 0000 FFFF
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-6
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 3-1
Reporting interval		ms	5
PMI delay (Note 2)		ms	10
Measurement channel			R.45-1 TDD for UE Category 1, R.45 TDD for UE Category 2-8
OCNG Pattern			OP.1 TDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity).

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#4 and #9 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#3 and #8.

Note 4: Randomization of the principle beam direction shall be used as specified in B.2.3A.4

Table 9.4.1.3.2_D.3-2: Minimum requirement (TDD)

Parameter	Test 1
γ	3
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.1.3.2.

9.4.1.3.2_D.4 Test description

9.4.1.3.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure 47 for UE with 2Rx RF band and Annex A, Figure A.47a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.1.3.2_D.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.1.3.2_D.4.3.

9.4.1.3.2_D.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.1.3.2_D.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish $t_{ue,\,follow1,\,follow2}$ and $SNR_{follow1,\,follow2}$ according to annex G.5.2a.
3. Set SNR to $SNR_{follow1,\,follow2}$. The SS shall transmit PDSCH with randomly selected precoding matrix from codebook (Table 7.2.4-1 in TS 36.213 [10]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure $t_{rnd1,\,rnd2}$ according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue,\,follow1,\,follow2}}{t_{rnd1,\,rnd2}}$ If the ratio (throughput / $t_{rnd1,\,rnd2}$) ≥ γ which is specified in table 9.4.1.3.2_D.5-1, then the test is pass. Otherwise, the test is fail.

9.4.1.3.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.1.3.2_D.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 9.4.1.3.2_D.4.3-2: *Void*

Table 9.4.1.3.2_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 001F FFE0 0000 0000 FFFF		
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.1.3.2_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic –r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.4.1.3.2_D.4.3-5: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.4.1.3.2_D.4.3-6: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.4.1.3.2_D.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an8	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-6	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.4.1.3.2_D.5 Test requirement

Table 9.4.1.3.2_D.5-1: Test requirement (TDD)

Parameter	Test 1
γ	2.99

The ratio of throughput using precoding matrix of PMI reports from the UE to using random precoding matrix shall equal or exceed the value specified in table 9.4.1.3.2_D.5.

9.4.1.4 PMI Reporting – PUCCH 1-1 (Single PMI) (CSI Reference Symbol)

9.4.1.4.1 FDD PMI Reporting with 4Tx enhanced codebook – PUCCH 1-1 (Single PMI) for eDL MIMO Enhancement

9.4.1.4.1.1 Test purpose

To verify reporting accuracy of the Precoding Matrix Indicator (PMI) reporting with 4Tx enhanced codebook (Single PMI) for eDL MIMO Enhancement.

9.4.1.4.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE releases 12 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.1.4.1.3 Minimum conformance requirements

For the parameters specified in Table 9.4.1.4.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.4.1.3-2.

Table 9.4.1.4.1.3-1: PMI test for single-layer (FDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Propagation channel			EPA5
Precoding granularity		PRB	50
Correlation and antenna configuration			High XP 4 x 2
Beamforming model			Annex B.4.3
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
CSI-RS periodicity and subframe offset T_{CSI-RS} / I_{CSI-RS}			5/ 1
CSI-RS reference signal configuration			6
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 FFFF 0000 00FF
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-3
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUCCH 1-1 submode1
Reporting interval		ms	5
PMI delay (Note 2)		ms	10
Physical channel for CQI/PMI reporting			PUSCH (Note 3)
PUCCH Report Type for CQI/second PMI			2b
Physical channel for RI reporting			PUSCH
PUCCH Report Type for RI/ first PMI			5
cqi-pmi-ConfigurationIndex			4
ri-ConfigIndex			1
Measurement channel			R.60 FDD
OCNG Pattern			OP.1 FDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}

Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity)

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH.

Note 4: PDSCH _RA= 0 dB, PDSCH_RB= 0 dB in order to have the same PDSCH and OCNG power per subcarrier at the receiver.

Note 5: Randomization of the principle beam direction shall be used as specified in B.2.3A.4

Table 9.4.1.4.1.3-2: Minimum requirement (FDD)

Parameter	Test 1
γ	1.8
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.1.4.1.

9.4.1.4.1.4 Test description

9.4.1.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.4.1.4.1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in 9.4.1.4.1.4.3.

9.4.1.4.1.4.2 Test procedure

1.Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.4.1.4.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall transmit PDCCH DCI format 0 in downlink SF#3 and #8 to schedule to schedule UL RMC in subframe #2 and #7 (Table A.4.1-1). Establish $t_{ue,\,follow1,\,follow2}$ and $SNR_{follow1,\,follow2}$ according to annex G.5.2a.

3. Set SNR to $SNR_{follow1,\,follow2}$. The SS shall transmit PDSCH with randomly selected precoding matrix from codebook (Table 7.2.4-0A in TS 36.213 [10]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities.The SS sends downlink MAC padding bits on the DL RMC. The SS shall transmit PDCCH DCI format 0 in downlink SF#3 and #8 to schedule to schedule UL RMC in subframe #2 and #7 (Table A.4.1-1). Measure the average throughput. Measure $t_{rnd1,\,rnd2}$ according to Annex G.5.3.

4. Calculate $\gamma = \dfrac{t_{ue,\,follow1,\,follow2}}{t_{rnd1,\,rnd2}}$

9.4.1.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.1.4.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
csi-RS-Config-r10	CSI-RS-Config-r10		
antennaInfo-v1250	AntennaInfoDedicated-v1250		
}			

Table 9.4.1.4.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.4.1.4.1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0000 FFFF 0000 00FF		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.4.1.4.1.4.3-4: *AntennaInfoDedicated-v1250*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-v1250 ::= SEQUENCE {			
alternativeCodebookEnabledFor4TX-r12	TRUE		
}			

Table 9.4.1.4.1.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.4.1.4.1.4.3-6: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-pmi-ConfigIndex	4	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	submode1		
}			
ri-ConfigIndex	1		
}			
}			

Table 9.4.1.4.1.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	6	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
}			

9.4.1.4.1.5 Test requirement

Table 9.4.1.4.1.5 -1: Test requirement (FDD)

Parameter	Test 1
γ	1.79
UE Category	≥1

The ratio of throughput using precoding matrix of PMI reports from the UE to using random precoding matrix shall equal or exceed the value specified in Table 9.4.1.4.1.5-1.

9.4.1.4.2 TDD PMI Reporting with 4Tx enhanced codebook – PUCCH 1-1 (Single PMI) for eDL MIMO Enhancement

9.4.1.4.2.1 Test purpose

To verify reporting accuracy of the Precoding Matrix Indicator (PMI) reporting with 4Tx enhanced codebook (Single PMI) for eDL MIMO Enhancement.

9.4.1.4.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.1.4.2.3 Minimum conformance requirements

For the parameters specified in Table 9.4.1.4.2.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.4.2.3-2.

Table 9.4.1.4.2.3-1: PMI test for single-layer (TDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EPA5
Precoding granularity		PRB	50
Correlation and antenna configuration			High XP 4 x 2
Beamforming model			Annex B.4.3
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $I_{CSI\text{-}RS}$			5/ 4
CSI-RS reference signal configuration			6
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 FFFF 0000 00FF
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-3
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUCCH 1-1 submode1
Reporting interval		ms	5
PMI delay (Note 2)		ms	15
Physical channel for CQI/PMI reporting			PUSCH (Note 3)
PUCCH Report Type for CQI/second PMI			2b
Physical channel for RI reporting			PUSCH
PUCCH Report Type for RI/ first PMI			5
cqi-pmi-ConfigurationIndex			4
ri-ConfigIndex			1
Measurement channel			R.60 TDD
OCNG Pattern			OP.1 TDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity)
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH.
Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#4 and #9 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#3 and #8.
Note 5: Randomization of the principle beam direction shall be used as specified in B.2.3A.4.

Table 9.4.1.4.2.3-2: Minimum requirement (TDD)

Parameter	Test 1
γ	1.8
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.1.4.2.

9.4.1.4.2.4 Test description

9.4.1.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.1.4.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.1.4.2.4.3.

9.4.1.4.2.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.1.4.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall transmit PDCCH DCI format 0 in downlink SF#4 and #9 to schedule to schedule UL RMC in subframe #3 and #8 (Table A.4.1-2). Establish $t_{ue,\,follow1,\,follow2}$ and $SNR_{follow1,\,follow2}$ according to annex G.5.2a.
3. Set SNR to $SNR_{follow1,\,follow2}$. The SS shall transmit PDSCH with randomly selected precoding matrix from codebook (Table 7.2.4-0A in TS 36.213 [10]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities.The SS sends downlink MAC padding bits on the DL RMC. The SS shall transmit PDCCH DCI format 0 in downlink SF#4 and #9 to schedule to schedule UL RMC in subframe #3 and #8 (Table A.4.1-2). Measure $t_{rnd1,\,rnd2}$ according to Annex G.5.3
4. Calculate $\gamma = \dfrac{t_{ue,\,follow1,\,follow2}}{t_{rnd1,\,rnd2}}$

9.4.1.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.1.4.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
csi-RS-Config-r10	CSI-RS-Config-r10		
antennaInfo-v1250	AntennaInfoDedicated-v1250		
}			

Table 9.4.1.4.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.4.1.4.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0000 FFFF 0000 00FF		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.4.1.4.2.4.3-4: *AntennaInfoDedicated-v1250*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-v1250 ::= SEQUENCE {			
alternativeCodebookEnabledFor4TX-r12	TRUE		
}			

Table 9.4.1.4.2.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.4.1.4.2.4.3-6: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-pmi-ConfigIndex	4	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	submode1		
}			
ri-ConfigIndex	1		
}			
}			

Table 9.4.1.4.2.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	6	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
}			

Table 9.4.1.4.2.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.4.1.4.2.4.3-9: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
Release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

9.4.1.4.2.5 Test requirement

Table 9.4.1.4.2.5 -1: Test requirement (FDD)

Parameter	Test 1
γ	1.79
UE Category	≥1

The ratio of throughput using precoding matrix of PMI reports from the UE to using random precoding matrix shall equal or exceed the value specified in Table 9.4.1.4.2_G.5-1.

9.4.2 Multiple PMI

9.4.2.1 PMI Reporting – PUSCH 1-2 (Multiple PMI) (Cell-Specific Reference Symbols)

9.4.2.1.1 FDD PMI Reporting – PUSCH 1-2 (Multiple PMI)

9.4.2.1.1.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.2.1.1.2 Test applicability

This test applies to E-UTRA FDD UE release 8 of UE category 2-5.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.4.2.1.1.3-2.

Table 9.4.2.1.1.3-1 PMI test for single-layer (FDD)

Parameter		Unit	Test 1
Bandwidth		MHz	20
Transmission mode			6
Propagation channel			EPA5
Precoding granularity (only for reporting and following PMI)		PRB	8
Correlation and antenna configuration			Low 2 x 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 1-2
Reporting interval		ms	1
PMI delay		ms	8
Measurement channel			R.30 FDD
OCNG Pattern			OP.1 FDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
Note 1: For random precoder selection, the precoders shall be updated in each TTI (1 ms granularity) Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)			

Table 9.4.2.1.1.3-2: Minimum requirement (FDD)

Parameter	Test 1
γ	1.2
UE Category	2-5

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.1.1.

9.4.2.1.1.4 Test description

9.4.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 20MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.4.2.1.1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.1.1.4.3.

9.4.2.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.4.2.1.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-1 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2

3. Set SNR to SNR_{rnd} . The SS shall transmit PDSCH with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4 every subframe. Measure the average throughput.
   Measure t_{ue} according to Annex G.5.3

4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$

9.4.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.1.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.2.1.1.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.2.1.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

9.4.2.1.1.5 Test requirement

Table 9.4.2.1.1.5-1: Test requirement (FDD)

Parameter	Test 1
γ	1.19
UE Category	2-5

9.4.2.1.1_1 FDD PMI Reporting – PUSCH 1-2 (Multiple PMI) (Release 9 and forward)

9.4.2.1.1_1.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.2.1.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.1.1_1.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.1.1_1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.4.2.1.1_1.3-2.

Table 9.4.2.1.1_1.3-1: PMI test for single-layer (FDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
Propagation channel			EPA5
Precoding granularity (only for reporting and following PMI)		PRB	6
Correlation and antenna configuration			Low 2 x 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 1-2
Reporting interval		ms	1
PMI delay		ms	8
Measurement channel			R.11-3 FDD for UE Category 1, R.11 FDD for UE Category 2-8
OCNG Pattern			OP.1/2 FDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}

Note 1: For random precoder selection, the precoders shall be updated in each TTI (1 ms granularity)

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Note 3: One/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2 shall be used.

Table 9.4.2.1.1_1.3-2: Minimum requirement (FDD)

Parameter	Test 1
γ	1.2
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.1.1.

9.4.2.1.1_1.4 Test description

9.4.2.1.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.2.1.1_1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.1.1_1.4.3.

9.4.2.1.1_1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.4.2.1.1_1.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.11-3 FDD for UE Category 1 with allocation centred within the transmission bandwidth configuration or R.11 FDD for UE Category2-8) with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-1 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2
3. Set SNR to SNR_{rnd} . The SS shall transmit PDSCH via PDCCH DCI format 1B for C-RNTI to transmit the DL RMC (R.11-3 FDD for UE Category 1 with allocation centred within the transmission bandwidth configuration or R.11 FDD for UE Category 2-8) with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4 every subframe. Measure the average throughput.
   Measure t_{ue} according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$

9.4.2.1.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.1.1_1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.2.1.1_1.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.2.1.1_1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

9.4.2.1.1_1.5 Test requirement

Table 9.4.2.1.1_1.5-1: Test requirement (FDD)

Parameter	Test 1
γ	1.19
UE Category	≥1

9.4.2.1.2 TDD PMI Reporting – PUSCH 1-2 (Multiple PMI)

9.4.2.1.2.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.2.1.2.2 Test applicability

This test applies to E-UTRA TDD UE release 8 of UE category 2-5.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.4.2.1.2.3-2.

Table 9.4.2.1.2.3-1: PMI test for single-layer (TDD)

Parameter		Unit	Test 1
Bandwidth		MHz	20
Transmission mode			6
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EPA5
Precoding granularity (only for reporting and following PMI)		PRB	8
Correlation and antenna configuration			Low 2 x 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 1-2
Reporting interval		ms	1
Minimum PMI delay		ms	10 or 11
Measurement channel			R.30 TDD
OCNG Pattern			OP.1 TDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoders shall be updated in each available downlink transmission instance

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Table 9.4.2.1.2.3-2: Minimum requirement (TDD)

Parameter	Test 1
γ	1.2
UE Category	2-5

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.1.2.

9.4.2.1.2.4 Test description

9.4.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 20MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.2.1.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.1.2.4.3.

9.4.2.1.2.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.2.1.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-1 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2
3. Set SNR to SNR_{rnd} . The SS shall transmit PDSCH with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure t_{ue} according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$

9.4.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.1.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.2.1.2.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			

Table 9.4.2.1.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

9.4.2.1.2.5 Test requirement

Table 9.4.2.1.2.5-1: Test requirement (TDD)

Parameter	Test 1
γ	1.19
UE Category	2-5

9.4.2.1.2_1 TDD PMI Reporting – PUSCH 1-2 (Multiple PMI) (Release 9 and forward)

9.4.2.1.2_1.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.2.1.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.1.2_1.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.1.2_1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.4.2.1.2_1.3-2.

Table 9.4.2.1.2_1.3-1: PMI test for single-layer (TDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EPA5
Precoding granularity (only for reporting and following PMI)		PRB	6
Correlation and antenna configuration			Low 2 x 2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3
	σ	dB	0
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 1-2
Reporting interval		ms	1
PMI delay		ms	10 or 11
Measurement channel			R.11-3 TDD for UE Category 1 R.11 TDD for UE Category 2-8
OCNG Pattern			OP.1/2 TDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoders shall be updated in each available downlink transmission instance

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Note 3: One/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2 shall be used.

Table 9.4.2.1.2_1.3-2: Minimum requirement (TDD)

Parameter	Test 1
γ	1.2
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.1.2.

9.4.2.1.2_1.4 Test description

9.4.2.1.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10 for UE with 2Rx RF band and Annex A, Figure A.10a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.2.1.2_1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.1.2_1.4.3.

9.4.2.1.2_1.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.2.1.2_1.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.11-3 TDD for UE Category 1 with allocation centred within the transmission bandwidth configuration or R.11 TDD for UE Category2-8) with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-1 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2
3. Set SNR to SNR_{rnd} . The SS shall transmit PDSCH via PDCCH DCI format 1B for C-RNTI to transmit the DL RMC (R.11-3 TDD for UE Category 1 with allocation centred within the transmission bandwidth configuration or R.11 TDD for UE Category 2-8) with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure t_{ue} according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$

9.4.2.1.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.1.2_1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.2.1.2_1.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n2TxAntenna-tm6	1111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.2.1.2_1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

9.4.2.1.2_1.5 Test requirement

Table 9.4.2.1.2_1.5-1: Test requirement (TDD)

Parameter	Test 1
γ	1.19
UE Category	≥1

9.4.2.2 PMI Reporting – PUSCH 2-2 (Multiple PMI) (Cell-Specific Reference Symbols)

9.4.2.2.1 FDD PMI Reporting – PUSCH 2-2 (Multiple PMI)

9.4.2.2.1.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.2.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward. Applicability requires support of FGI bit 1.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.2.1.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.2.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.4.2.2.1.3-2.

Table 9.4.2.2.1.3-1: PMI test for single-layer (FDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
Propagation channel			EVA5
Correlation and antenna configuration			Low 4 x 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6
	σ	dB	3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
PMI delay		ms	8
Reporting mode			PUSCH 2-2
Reporting interval		ms	1
Measurement channel			R.14-2 FDD
OCNG Pattern			OP.1/2 FDD
Subband size (*k*)		RBs	3 (full size)
Number of preferred subbands (*M*)			5
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}

Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity)

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Note 3: One/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2 shall be used

Table 9.4.2.2.1.3-2: Minimum requirement (FDD)

	Test 1
γ	1.2
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.2.1.

9.4.2.2.1.4 Test description

9.4.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.4.2.2.1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.2.1.4.3.

9.4.2.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.4.2.2.1.3-1 as appropriate.

2. The SS shall transmit every subframe PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.14-2 FDD) on a randomly selected full-size subband with a randomly selected precoding matrix from the codebook (Table 6.3.4.2.3-2 in TS 36.211 [8]), regardless of the SB and PMI reports from the UE. Note that each full-size subband and each precoding matrix shall be selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC.
The SS shall transmit PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. The UE will send aperiodic CSI report on PUSCH.
Establish t_{rnd} and SNR_{rnd} according to annex G.5.2.

3. Set SNR to SNR_{rnd}. The SS shall transmit every subframe PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.14-2 FDD) on one full-size subband selected among the M preferred subbands and the corresponding subband precoding matrix reported by the UE. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same M preferred subbands are reported subsequently, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC.
The SS shall transmit PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. The UE will send aperiodic CSI report on PUSCH.
Measure t_{ue} according to Annex G.5.3.

4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$

9.4.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.2.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.2.2.1.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n4TxAntenna-tm6	1111111111111111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.2.2.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm22		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

9.4.2.2.1.5 Test requirement

Table 9.4.2.2.1.5-1: Test requirement (FDD)

	Test 1
γ	1.19
UE Category	≥1

9.4.2.2.2 TDD PMI Reporting – PUSCH 2-2 (Multiple PMI)

9.4.2.2.2.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward. Applicability requires support of FGI bit 1.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.2.2.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.2.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.4.2.2.2.3-2.

Table 9.4.2.2.2.3-1: PMI test for single-layer (TDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EVA5
Correlation and antenna configuration			Low 4 x 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6
	σ	dB	3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
PMI delay		ms	10
Reporting mode			PUSCH 2-2
Reporting interval		ms	1
Measurement channel			R.14-2 TDD
OCNG Pattern			OP.1/2 TDD
Subband size (*k*)		RBs	3 (full size)
Number of preferred subbands (*M*)			5
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoders shall be updated in each available downlink transmission instance

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Note 3: One/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2 shall be used

Table 9.4.2.2.2.3-2: Minimum requirement (TDD)

	Test 1
γ	1.15
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.2.2.

9.4.2.2.2.4 Test description

9.4.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.2.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.2.2.4.3.

9.4.2.2.2.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.2.2.2.3-1 as appropriate.
2. The SS shall transmit every subframe PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.14-2 TDD) on a randomly selected full-size subband with a randomly selected precoding matrix from the codebook (Table 6.3.4.2.3-2 in TS 36.211 [8]), regardless of the SB and PMI reports from the UE. Note that each full-size subband and each precoding matrix shall be selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC.
   The SS shall transmit PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. The UE will send aperiodic CSI report on PUSCH.
   Establish t_{rnd} and SNR_{rnd} according to annex G.5.2.
3. Set SNR to SNR_{rnd}. The SS shall transmit every subframe PDSCH via PDCCH DCI format 1B for C_RNTI to transmit the DL RMC (R.14-2 TDD) on one full-size subband selected among the M preferred subbands and the corresponding subband precoding matrix reported by the UE. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same M preferred subbands are reported subsequently, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC.
   The SS shall transmit PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. The UE will send aperiodic CSI report on PUSCH.
   Measure t_{ue} according to Annex G.5.3.
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$

9.4.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.4.2.2.2.4.3-2: *AntennaInfoDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm6		
codebookSubsetRestriction CHOICE{			
n4TxAntenna-tm6	1111111111111111		
}			
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.2.2.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm22		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

9.4.2.2.2.5 Test requirement

Table 9.4.2.2.2.5-1: Test requirement (TDD)

	Test 1
γ	1.14
UE Category	≥1

9.4.2.3 PMI Reporting – PUSCH 1-2 (Multiple PMI) (CSI Reference Symbols)

9.4.2.3.1

9.4.2.3.1_D FDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO

9.4.2.3.1_D.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.2.3.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.3.1_D.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.3.1_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.2.3.1_D.3-2.

Table 9.4.2.3.1_D.3-1: PMI test for single-layer (FDD) for eDL-MIMO

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Propagation channel			EVA5
Precoding granularity (only for reporting and following PMI)		PRB	6
Correlation and antenna configuration			Low ULA 4 x 2
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
Beamforming model			Annex B.4.3
CSI-RS periodicity and subframe offset $\boldsymbol{T}_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$			5/ 1
CSI-RS reference signal configuration			8
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 FFFF
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-3
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 1-2
Reporting interval		ms	5
PMI delay		ms	8
Measurement channel			R.45-1 FDD for UE Category 1, R.45 FDD for UE Category 2-8
OCNG Pattern			OP.7 FDD for UE Category 1 OP.1 FDD for UE Category 2-8
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}

Note 1: For random precoder selection, the precoders shall be updated in each TTI (1 ms granularity).
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Void
Note 4: PDSCH _RA= 0 dB, PDSCH_RB= 0 dB in order to have the same PDSCH and OCNG power per subcarrier at the receiver.

Table 9.4.2.3.1_D.3-2: Minimum requirement (FDD) for eDL-MIMO

Parameter	Test 1
γ	1.3
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.3.1.

9.4.2.3.1_D.4 Test description

9.4.2.3.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.2.3.1_D.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.3.1_D.4.3.

9.4.2.3.1_D.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.4.2.3.1_D.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-2 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2
3. Set SNR to SNR_{rnd}. The SS shall transmit PDSCH with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4 in subframe #0, #5. Measure the average throughput.
   Measure t_{ue} according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$ If the ratio (throughput / t_{rnd}) ≥ γ which is specified in table 9.4.2.3.1_D.5-1, then the test is pass. Otherwise, the test is fail.

9.4.2.3.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.3.1_D.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 9.4.2.3.1_D.4.3-2: *Void*

Table 9.4.2.3.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0000 FFFF		
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.2.3.1_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.4.2.3.1_D.4.3-5: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.4.2.3.1_D.5 Test requirement

Table 9.4.2.3.1_D.5-1: Test requirement (FDD) for eDL-MIMO

Parameter	Test 1
γ	1.29
UE Category	≥1

9.4.2.3.2_D TDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO

9.4.2.3.2_D.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.4.2.3.2_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 104.

9.4.2.3.2_D.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.3.2_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.2.3.2_D.3-2.

Table 9.4.2.3.2_D.3-1: PMI test for single-layer (TDD) for eDL-MIMO

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EVA5
Precoding granularity (only for reporting and following PMI)		PRB	6
Antenna configuration			8 x 2
Correlation modelling			High, Cross polarized
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,22
Beamforming model			Annex B.4.3
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/ 4
CSI-RS reference signal configuration			4
CodeBookSubsetRestriction bitmap			0x0000 0000 001F FFE0 0000 0000 FFFF
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-6
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 1-2
Reporting interval		ms	5 (Note 4)
PMI delay		ms	10
Measurement channel			R.45-1 TDD for UE Category 1, R.45 TDD for UE Category 2-8
OCNG Pattern			OP.7 TDD for UE Category 1 OP.1 TDD for UE Category 2-8
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoders shall be updated in each TTI (1 ms granularity).

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI. estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: One/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2 shall be

	used.
Note 4:	PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#4 and #9 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#3 and #8.
Note 5:	Randomization of the principle beam direction shall be used as specified in B.2.3A.4

Table 9.4.2.3.2_D.3-2: Minimum requirement (TDD) for eDL-MIMO

Parameter	Test 1
γ	3.5
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.3.2.

9.4.2.3.2_D.4 Test description

9.4.2.3.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure 47.
2. The parameter settings for the cell are set up according to Table 9.4.2.3.2_D.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.3.2_D.4.3.

9.4.2.3.2_D.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.2.3.2_D.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish $t_{ue,\,follow1,\,follow2}$ and $SNR_{follow1,\,follow2}$ according to annex G.5.2a.
3. Set SNR to $SNR_{follow1,\,follow2}$. The SS shall transmit PDSCH with randomly selected precoding matrix from codebook (Table 7.2.4-1 in TS 36.213 [10]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure $t_{rnd1,\,rnd2}$ according to Annex G.5.3.

4. Calculate $\gamma = \frac{t_{ue,\,follow1,\,follow2}}{t_{rnd1,\,rnd2}}$. If the ratio (throughput / $t_{rnd1,\,rnd2}$) ≥ γ which is specified in table 9.4.2.3.2_D.5-1, then the test is pass. Otherwise, the test is fail.

9.4.2.3.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.3.2_D.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 9.4.2.3.2_D.4.3-2: *Void*

Table 9.4.2.3.2_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 001F FFE0 0000 0000 FFFF		
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.4.2.3.2_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.4.2.3.2_D.4.3-5: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.4.2.3.2_D.4.3-6: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.4.2.3.2_D.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an8	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-6	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.4.2.3.2_D.5 Test requirement

Table 9.4.2.3.2_D.5-1: Test requirement (TDD) for eDL-MIMO

Parameter	Test 1
γ	3.49
UE Category	≥1

9.4.2.3.3 FDD PMI Reporting with 4Tx enhanced codebook - PUSCH 1-2 (Multiple PMI) for eDL-MIMO Enhancement

9.4.2.3.3.1 Test purpose

To verify reporting accuracy of the Precoding Matrix Indicator (PMI) reporting with 4Tx enhanced codebook (Multiple PMI) for eDL MIMO Enhancement.

9.4.2.3.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE releases 12 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.3.3.3 Minimum conformance requirements

For the parameter specified in Table 9.4.2.3.3.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.2.3.3.3-2.

Table 9.4.2.3.3.3-1: PMI test for dual-layer (FDD) for eDL-MIMO Enhancement

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Propagation channel			EVA5
Precoding granularity (only for reporting and following PMI)		PRB	6
Correlation and antenna configuration			High XP 4 x 2
Beamforming model			Annex B.4.3
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
CSI-RS periodicity and subframe offset T_{CSI-RS} / I_{CSI-RS}			5/ 1
CSI-RS reference signal configuration			8
CodeBookSubsetRestriction bitmap			0x0000 0000 FFFF 0000 FFFF 0000
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-3
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH1-2
Reporting interval		ms	5
PMI delay (Note 2)		ms	8
Measurement channel			R.45-1 FDD for UE Category 1, R.45 FDD for UE Category 2-8
Rank Number of PDSCH			2
OCNG Pattern			OP.7 FDD for UE Category 1 OP.1 FDD for UE Category 2-8
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}

Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity)
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 3: Void
Note 4: PDSCH _RA= 0 dB, PDSCH_RB= 0 dB in order to have the same PDSCH and OCNG power per subcarrier at the receiver.
Note 5: Randomization of the principle beam direction shall be used as specified in B.2.3A.4

Table 9.4.2.3.3.3-2: Minimum requirement (FDD) for eDL-MIMO Enhancement

Parameter	Test 1
γ	1.2
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.3.3.

9.4.2.3.3.4 Test description

9.4.2.3.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.2.3.3.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in 9.4.2.3.3.4.3.

9.4.2.3.3.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table9.4.2.3.3.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish $t_{ue,\,follow1,\,follow2}$ and $SNR_{follow1,\,follow2}$ according to annex G.5.2a.
3. Set SNR to $SNR_{follow1,\,follow2}$. The SS shall transmit PDSCH with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-2 in TS 36.211 [8]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities.The SS sends downlink MAC padding bits on the DL RMC SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4 every subframe. Measure the average throughput. Measure $t_{rnd1,\,rnd2}$ according to Annex G.5.3.
4. Calculate $\gamma = \frac{t_{ue,\,follow1,\,follow2}}{t_{rnd1,\,rnd2}}$

9.4.2.3.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.3.3.4.3-1: *PhysicalConfigDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated::= SEQUENCE {			
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
antennaInfo-v1250	AntennaInfoDedicated-v1250		
}			

Table 9.4.2.3.3.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.4.2.3.3.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 FFFF 0000 FFFF 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.4.2.3.3.4.3-4: *AntennaInfoDedicated-v1250*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-v1250 ::= SEQUENCE {			
alternativeCodebookEnabledFor4TX-r12	TRUE		
}			

Table 9.4.2.3.3.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
}			

Table 9.4.2.3.3.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
}			

9.4.2.3.3.5 Test requirement

Table 9.4.2.3.3.5-1: Test requirement (FDD) for eDL-MIMO Enhancement

Parameter	Test 1
γ	1.19
UE Category	≥1

9.4.2.3.4 TDD PMI Reporting with 4Tx enhanced codebook - PUSCH 1-2 (Multiple PMI) for eDL-MIMO Enhancement

9.4.2.3.4.1 Test purpose

To verify reporting accuracy of the Precoding Matrix Indicator (PMI) reporting with 4Tx enhanced codebook (Multiple PMI) for eDL MIMO Enhancement.

9.4.2.3.4.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 12 and forward. Applicability requires support for FGI bit 103.

Note: This test also applies to UE supporting 4Rx antenna ports

9.4.2.3.4.3 Minimum conformance requirements

For the parameters specified in Table 9.4.2.3.4.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in 9.4.2.3.4.3-2.

Table 9.4.2.3.4.3-1: PMI test for dual-layer (TDD) for eDL-MIMO Enhancement

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EVA5
Precoding granularity (only for reporting and following PMI)		PRB	6
Correlation and antenna configuration			XP High 4 x 2
Beamforming model			Annex B.4.3
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $I_{CSI\text{-}RS}$			5/ 4
CSI-RS reference signal configuration			4
CodeBookSubsetRestriction bitmap			0x0000 0000 FFFF 0000 FFFF 0000
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-3
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH1-2
Reporting interval		ms	5
PMI delay (Note 2)		ms	10
Measurement channel			R.61-1 TDD for UE Category 1, R.61 TDD for UE Category 2-8
Rank Number of PDSCH			2
OCNG Pattern			OP.1 TDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity)

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: One/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.1.1/2 shall be used.

Note 4: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#4 and #9 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#3 and #8.

Note 5: Randomization of the principle beam direction shall be used as specified in B.2.3A.4.

Table 9.4.2.3.4.3-2: Minimum requirement (TDD) for eDL-MIMO Enhancement

Parameter	Test 1
γ	1.2
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.4.2.3.4.

9.4.2.3.4.4 Test description

9.4.2.3.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11 for UE with 2Rx RF band and Annex A, Figure A.11a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.4.2.3.4.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.4.2.3.4.4.3.

9.4.2.3.4.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.4.2.3.4.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish $t_{ue,\,follow1,\,follow2}$ and $SNR_{follow1,\,follow2}$ according to annex G.5.2a.
3. Set SNR to $SNR_{follow1,\,follow2}$. The SS shall transmit PDSCH with randomly selected precoding matrix from codebook (Table 6.3.4.2.3-2 in TS 36.213 [10]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities.The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure $t_{rnd1,\,rnd2}$ according to Annex G.5.3
4. Calculate $\gamma = \frac{t_{ue,\,follow1,\,follow2}}{t_{rnd1,\,rnd2}}$

9.4.2.3.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.4.2.3.4.4.3-1: *PhysicalConfigDedicated*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated::= SEQUENCE {			
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
antennaInfo-v1250	AntennaInfoDedicated-v1250		
}			

Table 9.4.2.3.4.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.4.2.3.4.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 FFFF 0000 FFFF 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.4.2.3.4.4.3-4: *AntennaInfoDedicated-v1250*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-v1250 ::= SEQUENCE {			
alternativeCodebookEnabledFor4TX-r12	TRUE		
}			

Table 9.4.2.3.4.4.3-5: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
}			

Table 9.4.2.3.4.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
}			

Table 9.4.2.3.4.4.3-7: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.4.2.3.4.4.3-8: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
Release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests	TDD
}			

9.4.2.3.4.5 Test requirement

Table 9.4.2.3.4.5-1: Test requirement (TDD) for eDL-MIMO Enhancement

Parameter	Test 1
γ	1.19
UE Category	≥1

9.5 Reporting of Rank Indicator (RI)

The purpose of this test is to verify that the reported rank indicator accurately represents the channel rank. The accuracy of RI (CQI) reporting is determined by the relative increase of the throughput obtained when transmitting based on the reported rank compared to the case for which a fixed rank is used for transmission. Transmission mode 4 is used with the specified CodebookSubSetRestriction.

For fixed rank 1 transmission, the RI and PMI reporting is restricted to two single-layer precoders, For fixed rank 2 transmission, the RI and PMI reporting is restricted to one two-layer precoder, For follow RI transmission, the RI and PMI reporting is restricted to select the union of these precoders. Channels with low and high correlation are used to ensure that RI reporting reflects the channel condition.

9.5.1 RI Reporting (Cell-Specific Reference Symbols)

9.5.1.1 FDD RI Reporting– PUCCH 1-1

9.5.1.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank.

9.5.1.1.2 Test applicability

This test applies to E-UTRA FDD UE release 8 and 9 of UE category from 2 to 5.

9.5.1.1.3 Minimum conformance requirements

The minimum performance requirement in Table 9.5.1.1.3-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

For the parameters specified in Table 9.5.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.5.1.1.3-2.

Table 9.5.1.1.3-1: RI Test (FDD)

Parameter		Unit	Test 1	Test 2	Test 3
Bandwidth		MHz	10		
PDSCH transmission mode			4		
Downlink power allocation	ρ_A	dB	-3		
	ρ_B	dB	-3		
	σ	dB	0		
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI		
Propagation condition and antenna configuration			2 x 2 EPA5		
Antenna correlation			Low	Low	High
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=2 and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78
Maximum number of HARQ transmissions			1		
Reporting mode			PUCCH 1-1 (Note 4)		
Physical channel for CQI/PMI reporting			PUCCH Format 2		
PUCCH Report Type for CQI/PMI			2		
Physical channel for RI reporting			PUSCH (Note 3)		
PUCCH Report Type for RI			3		
Reporting periodicity		ms	N_P = 5		
PMI and CQI delay		ms	8		
cqi-pmi-ConfigurationIndex			6		
ri-ConfigurationInd			1 (Note 5)		

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between RI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic RI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Note 4: The bit field for precoding information in DCI format 2 shall be mapped as:
- For reported RI = 1 and PMI = 0 >> precoding information bit field index = 1
- For reported RI = 1 and PMI = 1 >> precoding information bit field index = 2
- For reported RI = 2 and PMI = 0 >> precoding information bit field index = 0

Note 5: To avoid the ambiguity of SS behaviour when applying CQI and PMI during rank switching, RI reports are to be applied at the SS with one subframe delay in addition to Note 1 to align with CQI and PMI reports.

Table 9.5.1.1.3-2: Minimum requirement (FDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.05	N/A
γ_2	1	N/A	1.1
UE Category	2-5	2-5	2-5

The normative reference for this requirement is TS 36.101 [2] clause 9.5.1.1.

9.5.1.1.4 Test description

9.5.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 9.5.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.1.1.4.3.

9.5.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.1.1.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and fixed RI as defined in Table 9.5.1.1.3-1. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-1). Measure the t_{fix} according to annex G.5.3.
3. Propagation conditions are set according to Annex B.1.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe (Table A.4.1-1).
5. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.1.1.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. Propagation conditions are set according to Table 9.5.1.1.3-1.
8. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-1). Measure $t_{reported}$ according to Annex G.5.3

   If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.1.1.5-1, then pass the UE for this test and go to step 9. Otherwise, fail the UE.
9. If all tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the Table 9.5.1.1.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.5.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	PhysicalConfigDedicated - DEFAULT using condition RBC		
}			

Table 9.5.1.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
N2TxAntenna-tm4	According to each test		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.5.1.1.4.3-3: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.5.1.1.4.3-4: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.5.1.1.5 Test requirement

Table 9.5.1.1.5-1: Test requirement (FDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.04	N/A
γ_2	0.99	N/A	1.09
UE Category	2-5	2-5	2-5

9.5.1.1_1 FDD RI Reporting– PUCCH 1-1 (Release 10)

9.5.1.1_1.1 Test purpose

Same test purpose as in clause 9.5.1.1.1.

9.5.1.1_1.2 Test applicability

This test applies to E-UTRA FDD UE release 10 of UE category from 2 to 8..

9.5.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.5.1.1.3 with the following exceptions:

- Instead of Table 9.5.1.1.3-1 → use Table 9.5.1.1_1.3-1.
- Instead of Table 9.5.1.1.3-2 → use Table 9.5.1.1_1.3-2.

Table 9.5.1.1_1.3-1: RI Test (FDD)

Parameter		Unit	Test 1	Test 2	Test 3	
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Downlink power allocation	ρ_A	dB	-3			
	ρ_B	dB	-3			
	σ	dB	0			
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI			
Propagation condition and antenna configuration			2 x 2 EPA5			
Antenna correlation			Low	Low	High	
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI	Fixed RI=2 and follow RI
SNR		dB	0	20	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78	-78
Maximum number of HARQ transmissions			1			
Reporting mode			PUCCH 1-1 (Note 4)			
Physical channel for CQI/PMI reporting			PUCCH Format 2			
PUCCH Report Type for CQI/PMI			2			
Physical channel for RI reporting			PUSCH (Note 3)			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	N_P = 5			
PMI and CQI delay		ms	8			
cqi-pmi-ConfigurationIndex			6			
ri-ConfigurationInd			1 (Note 5)			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between RI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic RI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Note 4: The bit field for precoding information in DCI format 2 shall be mapped as:
- For reported RI = 1 and PMI = 0 >> precoding information bit field index = 1
- For reported RI = 1 and PMI = 1 >> precoding information bit field index = 2
- For reported RI = 2 and PMI = 0 >> precoding information bit field index = 0

Note 5: To avoid the ambiguity of SS behaviour when applying CQI and PMI during rank switching, RI reports are to be applied at the SS with one subframe delay in addition to Note 1 to align with CQI and PMI reports.

Table 9.5.1.1_1.3-2: Minimum requirement (FDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.05	0.9 (Note 1)
γ_2	1	N/A	1.1 (Note 1)
UE Category	2-8	2-8	2-8

Note 1: For Test 3, the minimum requirements shall be fulfilled for at least one of γ_1 or γ_2.

9.5.1.1_1.4 Test description

Same test description as in clause 9.5.1.1.4 with the following exceptions:

- Instead of Table 9.5.1.1.3-1 → use Table 9.5.1.1_1.3-1.
- Instead of Table 9.5.1.1.3-2 → use Table 9.5.1.1_1.3-2.
- Instead of Table 9.5.1.1.5-1 → use Table 9.5.1.1_1.5-1.

9.5.1.1_1.4.1 Initial conditions

Same initial conditions as in clause 9.5.1.1.4.1.

9.5.1.1_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.1.1_1.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and fixed RI as defined in Table 9.5.1.1_1.3-1. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-1). Measure the t_{fix} according to annex G.5.3.
3. Propagation conditions are set according to Annex B.1.
4. For Test 3 the SS repeats steps 1 to 3 to get two values for t_{fix}, one value for fixed Rank 1 case and the other value for fixed Rank 2 case.
5. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe (Table A.4.1-1).
6. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.1.1_1.3-1.
7. The UE shall transmit RRC Connection Reconfiguration Complete message.
8. Propagation conditions are set according to Table 9.5.1.1_1.3-1.
9. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-1). Measure $t_{reported}$ according to Annex G.5.3
10. For Test 1 and Test 2 if the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.1.1_1.5-1, then pass the UE for Test 1 and Test 2.
11. For Test 3 if the ratio ($t_{reported}$ / t_{fix}) satisfies at least one of the γ_1 or γ_2 requirements in Table 9.5.1.1_1.5-1, then pass the UE for Test 3.
12. For a complete test case to pass the UE has to pass all test cases 1, 2 and 3. Otherwise, fail the UE.
13. If all tests have not been done, then repeat the same procedure (steps 1 to 12) with test conditions according to the Table 9.5.1.1_1.3-2 for the other Tests as appropriate.

9.5.1.1_1.4.3 Message contents

Same message contents as in clause 9.5.1.1.4.3.

9.5.1.1_1.5 Test requirement

Same test requirements as in clause 9.5.1.1.5 with the following exceptions:

- Instead of Table 9.5.1.1.5-1 → use Table 9.5.1.1_1.5-1

Table 9.5.1.1_1.5-1: Test requirement (FDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.04	0.89 (Note 1)
γ_2	0.99	N/A	1.09 (Note 1)
UE Category	2-8	2-8	2-8
Note 1: For Test 3, the minimum requirements shall be fulfilled for at least one of γ_1 or γ_2.			

9.5.1.1_2 FDD RI Reporting– PUCCH 1-1 (Release 11)

9.5.1.1_2.1 Test purpose

Same test purpose as in clause 9.5.1.1.1.

9.5.1.1_2.2 Test applicability

This test applies to E-UTRA FDD UE release 11 and forward of UE category ≥2.

9.5.1.1_2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.5.1.1.3 with the following exceptions:

- Instead of Table 9.5.1.1.3-1 → use Table 9.5.1.1_2.3-1.
- Instead of Table 9.5.1.1.3-2 → use Table 9.5.1.1_2.3-2.

Table 9.5.1.1_2.3-1: RI Test (FDD)

Parameter		Unit	Test 1	Test 2	Test 3
Bandwidth		MHz	10		
PDSCH transmission mode			4		
Downlink power allocation	ρ_A	dB	-3		
	ρ_B	dB	-3		
	σ	dB	0		
Propagation condition and antenna configuration			2 x 2 EPA5		
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI		
Antenna correlation			Low	Low	High
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78
Maximum number of HARQ transmissions			1		
Reporting mode			PUCCH 1-1 (Note 4)		
Physical channel for CQI/PMI reporting			PUCCH Format 2		
PUCCH Report Type for CQI/PMI			2		
Physical channel for RI reporting			PUSCH (Note 3)		
PUCCH Report Type for RI			3		
Reporting periodicity		ms	N_{pd}= 5		
PMI and CQI delay		ms	8		
cqi-pmi-ConfigurationIndex			6		
ri-ConfigurationInd			1 (Note 5)		

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between RI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic RI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Note 4: The bit field for precoding information in DCI format 2 shall be mapped as:
- For reported RI = 1 and PMI = 0 >> precoding information bit field index = 1
- For reported RI = 1 and PMI = 1 >> precoding information bit field index = 2
- For reported RI = 2 and PMI = 0 >> precoding information bit field index = 0

Note 5: To avoid the ambiguity of TE behaviour when applying CQI and PMI during rank switching, RI reports are to be applied at the TE with one subframe delay in addition to Note 1 to align with CQI and PMI reports.

Table 9.5.1.1_2.3-2: Minimum requirement (FDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.05	0.9
γ_2	1	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.1.1_2.4 Test description

Same test description as in clause 9.5.1.1.4 with the following exceptions:

- Instead of Table 9.5.1.1.3-1 → use Table 9.5.1.1_2.3-1.
- Instead of Table 9.5.1.1.3-2 → use Table 9.5.1.1_2.3-2.
- Instead of Table 9.5.1.1.5-1 → use Table 9.5.1.1_2.5-1.

9.5.1.1_2.5 Test requirement

Same test requirements as in clause 9.5.1.1.5 with the following exceptions:

- Instead of Table 9.5.1.1.5-1 → use Table 9.5.1.1_2.5-1

Table 9.5.1.1_2.5-1: Test requirement (FDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.04	0.89
γ_2	0.99	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.1.2 TDD RI Reporting – PUSCH 3-1

9.5.1.2.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank.

9.5.1.2.2 Test applicability

This test applies to E-UTRA TDD UE release 8 and 9, which support UE Category from 2 to 5.

9.5.1.2.3 Minimum conformance requirements

The minimum performance requirement in Table 9.5.1.2.3-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

For the parameters specified in Table 9.5.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.5.1.2.3-2.

Table 9.5.1.2.3-1: RI Test (TDD)

Parameter		Unit	Test 1	Test 2	Test 3
Bandwidth		MHz	10		
PDSCH transmission mode			4		
Downlink power allocation	ρ_A	dB	-3		
	ρ_B	dB	-3		
	σ	dB	0		
Uplink downlink configuration			2		
Special subframe configuration			4		
Propagation condition and antenna configuration			2 x 2 EPA5		
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI		
Antenna correlation			Low	Low	High
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=2 and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78
Maximum number of HARQ transmissions			1		
Reporting mode			PUSCH 3-1 (Note 3)		
Reporting interval		ms	5		
PMI and CQI delay		ms	10 or 11		
ACK/NACK feedback mode			Bundling		

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3: Reported wideband CQI and PMI are used and sub-band CQI is discarded.

Table 9.5.1.2.3-2: Minimum requirement (TDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.05	N/A
γ_2	1	N/A	1.1
UE Category	2-5	2-5	2-5

The normative reference for this requirement is TS 36.101 [2] clause 9.5.1.2.

9.5.1.2.4 Test description

9.5.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.

2. The parameter settings for the cell are set up according to Table 9.5.1.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.1.2.4.3.

9.5.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.1.2.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and fixed RI as defined in Table 9.5.1.2.3-1. The SS sends downlink MAC padding bits on the DL RMC. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the t_{fix} according to annex G.5.3
3. Propagation conditions are set according to Annex B.1.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in subframe#2 and #7 (Table A.4.1-2).
5. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.1.2.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. Propagation conditions are set according to Table 9.5.1.2.3-1.
8. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure $t_{reported}$ according to Annex G.5.3
   If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.1.2.5-1, then pass the UE for this test and go to step 9. Otherwise, fail the UE.
9. If all tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the Table 9.5.1.2.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.5.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.1.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
N2TxAntenna-tm4	According to each test		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.5.1.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.5.1.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	Not Present		
}			
}			

Table 9.5.1.2.4.3-4: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Bundling	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

9.5.1.2.5 Test requirement

Table 9.5.1.2.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.04	N/A
γ_2	0.99	N/A	1.09
UE Category	2-5	2-5	2-5

9.5.1.2_1 TDD RI Reporting – PUSCH 3-1 (Release 10)

9.5.1.2_1.1 Test purpose

Same test purpose as in clause 9.5.1.2.1.

9.5.1.2_1.2 Test applicability

This test applies to E-UTRA TDD UE release 10, which supports UE Category from 2 to 8.

9.5.1.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.5.1.2.3 with the following exceptions:

- Instead of Table 9.5.1.2.3-1 → use Table 9.5.1.2_1.3-1.
- Instead of Table 9.5.1.2.3-2 → use Table 9.5.1.2_1.3-2.

Table 9.5.1.2_1.3-1: RI Test (TDD)

Parameter		Unit	Test 1	Test 2	Test 3	
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Downlink power allocation	ρ_A	dB	-3			
	ρ_B	dB	-3			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
Propagation condition and antenna configuration			2 x 2 EPA5			
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI			
Antenna correlation			Low	Low	High	High
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI	Fixed RI=2 and follow RI
SNR		dB	0	20	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78	-78
Maximum number of HARQ transmissions			1			
Reporting mode			PUSCH 3-1 (Note 3)			
Reporting interval		ms	5			
PMI and CQI delay		ms	10 or 11			
ACK/NACK feedback mode			Bundling			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3: Reported wideband CQI and PMI are used and sub-band CQI is discarded.

Table 9.5.1.2_1.3-2: Minimum requirement (TDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.05	0.9 (Note 1)
γ_2	1	N/A	1.1 (Note 1)
UE Category	2-8	2-8	2-8

Note 1: For Test 3, the minimum requirements shall be fulfilled for at least one of γ_1 or γ_2.

9.5.1.2_1.4 Test description

9.5.1.2_1.4.1 Initial conditions

Same initial conditions as in clause 9.5.1.2.4.1.

9.5.1.2_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.1.2_1.3-1 as appropriate.

2. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and fixed RI as defined in Table 9.5.1.2_1.3-1. The SS sends downlink MAC padding bits on the DL RMC. The SS schedules the UL transmission to carry the PUSCH CQI feedback

via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the t_{fix} according to annex G.5.3

3. Propagation conditions are set according to Annex B.1.
4. For Test 3 the SS repeats steps 1 to 3 to get two values for t_{fix}, one value for fixed Rank 1 case and the other value for fixed Rank 2 case.
5. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in subframe#2 and #7 (Table A.4.1-2).
6. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.1.2_1.3-1.
7. The UE shall transmit RRC Connection Reconfiguration Complete message.
8. Propagation conditions are set according to Table 9.5.1.2_1.3-1.
9. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure $t_{reported}$ according to Annex G.5.3
10. For Test 1 and Test 2 if the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.1.2_1.5-1, then pass the UE for Test 1 and Test 2.
11. For Test 3 if the ratio ($t_{reported}$ / t_{fix}) satisfies at least one of the γ_1 or γ_2 requirements in Table 9.5.1.2_1.5-1, then pass the UE for Test 3.
12. For a complete test case to pass the UE has to pass all test cases 1, 2 and 3. Otherwise, fail the UE
13. If all tests have not been done, then repeat the same procedure (steps 1 to 12) with test conditions according to the Table 9.5.1.2_1.3-2 for the other Tests as appropriate.

9.5.1.2_1.4.3 Message contents

Same message contents as in clause 9.5.1.2.4.3.

9.5.1.2_1.5 Test requirement

Same test requirements as in clause 9.5.1.2.5 with the following exceptions:

- Instead of Table 9.5.1.2.5-1 → use Table 9.5.1.2_1.5-1

Table 9.5.1.2_1.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.04	0.89 (Note 1)
γ_2	0.99	N/A	1.09 (Note 1)
UE Category	2-8	2-8	2-8
Note 1: For Test 3, the minimum requirements shall be fulfilled for at least one of γ_1 or γ_2.			

9.5.1.2_2 TDD RI Reporting – PUSCH 3-1 (Release 11)

9.5.1.2_2.1 Test purpose

Same test purpose as in clause 9.5.1.2.1.

9.5.1.2_2.2 Test applicability

This test applies to E-UTRA TDD UE release 11 and forward, which supports UE Category ≥2.

9.5.1.2_2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.5.1.2.3 with the following exceptions:

- Instead of Table 9.5.1.2.3-1 → use Table 9.5.1.2_2.3-1.
- Instead of Table 9.5.1.2.3-2 → use Table 9.5.1.2_2.3-2.

Table 9.5.1.2_2.3-1: RI Test (TDD)

Parameter		Unit	Test 1	Test 2	Test 3
Bandwidth		MHz	10		
PDSCH transmission mode			4		
Downlink power allocation	ρ_A	dB	-3		
	ρ_B	dB	-3		
	σ	dB	0		
Uplink downlink configuration			2		
Special subframe configuration			4		
Propagation condition and antenna configuration			2 x 2 EPA5		
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI		
Antenna correlation			Low	Low	High
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78
Maximum number of HARQ transmissions			1		
Reporting mode			PUSCH 3-1 (Note 3)		
Reporting interval		ms	5		
PMI and CQI delay		ms	10 or 11		
ACK/NACK feedback mode			Bundling		

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3: Reported wideband CQI and PMI are used and sub-band CQI is discarded.

Table 9.5.1.2_2.3-2: Minimum requirement (TDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.05	0.9
γ_2	1	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.1.2_2.4 Test description

Same test description as in clause 9.5.1.2.4 with the following exceptions:

- Instead of Table 9.5.1.2.3-1 → use Table 9.5.1.2_2.3-1.

- Instead of Table 9.5.1.2.3-2 → use Table 9.5.1.2_2.3-2.
- Instead of Table 9.5.1.2.5-1 → use Table 9.5.1.2_2.5-1.

9.5.1.2_2.5 Test requirement

Same test requirements as in clause 9.5.1.2.5 with the following exceptions:

- Instead of Table 9.5.1.2.5-1 → use Table 9.5.1.2_2.5-1

Table 9.5.1.2_2.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.04	0.89
γ_2	0.99	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.2 RI Reporting (CSI Reference Symbols)

9.5.2.1

9.5.2.1_D FDD RI Reporting- PUCCH 1-1 for eDL-MIMO

9.5.2.1_D.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank.

9.5.2.1_D.2 Test applicability

This test applies to E-UTRA FDD UE release 10 and forward of Category 2-8. Applicability requires support for FGI bit 103.

9.5.2.1_D.3 Minimum conformance requirements

The minimum performance requirement in Table 9.5.2.1_D.3-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

For the parameters specified in Table 9.5.2.1_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.2.1_D.3-2.

Table 9.5.2.1_D.3-1: RI Test (FDD) for eDL-MIMO

Parameter		Unit	Test 1	Test 2	Test 3
Bandwidth		MHz	10		
PDSCH transmission mode			9		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Propagation condition and antenna configuration			2 x 2 EPA5		
Cell-specific reference signals			Antenna ports 0		
CSI reference signals			Antenna ports 15, 16		
Beamforming model			As specified in Annex B.4.3		
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1		
CSI reference signal configuration			6		
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI		
Antenna correlation			Low	Low	High
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78
Maximum number of HARQ transmissions			1		
Reporting mode			PUCCH 1-1		
Physical channel for CQI/PMI reporting			PUSCH (Note 3)		
PUCCH Report Type for CQI/PMI			2		
Physical channel for RI reporting			PUCCH Format 2		
PUCCH Report Type for RI			3		
Reporting periodicity		ms	N_{pd} = 5		
PMI and CQI delay		ms	8		
cqi-pmi-ConfigurationIndex			2		
ri-ConfigurationInd			1 (Note 4)		

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.9 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

Note 4: To avoid the ambiguity of TE behaviour when applying CQI and PMI during rank switching, RI reports are to be applied at the TE with one subframe delay in addition to Note 1 to align with CQI and PMI reports.

Table 9.5.2.1_D.3-2: Minimum requirement (FDD) for eDL-MIMO

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.05	0.9
γ_2	1	N/A	N/A
UE Category	2-8	2-8	2-8

The normative reference for this requirement is TS 36.101 [2] clause 9.5.2.1.

9.5.2.1_D.4 Test description

9.5.2.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 9.5.2.1_D.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.2.1_D.4.3.

9.5.2.1_D.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.2.1_D.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and fixed RI as defined in Table 9.5.2.1_D.3-1. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1). Measure the t_{fix} according to annex G.5.3.
3. Propagation conditions are set according to Annex B.1.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe(Table A.4.1-1).
5. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.2.1_D.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. Propagation conditions are set according to Table 9.5.2.1_D.3-1.
8. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1). Measure $t_{reported}$ according to Annex G.5.3

   If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.2.1_D.5-1, then pass the UE for this test and go to step 9. Otherwise, fail the UE.

9. If all tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the Table 9.5.2.1_D.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.5.2.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.2.1_D.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Table 9.5.2.1_D.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.5.2.1_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	According to each test	000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.5.2.1_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.5.2.1_D.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.5.2.1_D.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	6	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.5.2.1_D.5 Test requirement

Table 9.5.2.1_D.5-1: Test requirement (FDD) for eDL-MIMO

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.04	0.89
γ_2	0.99	N/A	N/A
UE Category	2-8	2-8	2-8

9.5.2.2_D TDD RI Reporting- PUCCH 1-1 for eDL-MIMO

9.5.2.2_D.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank.

9.5.2.2_D.2 Test applicability

This test applies to E-UTRA TDD UE Release 10 and forward of Category 2-8. Applicability requires support for FGI bit 103.

9.5.2.2_D.3 Minimum conformance requirements

The minimum performance requirement in Table 9.5.2.2_D.3-2 is defined as:

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

For the parameters specified in Table 9.5.2.2_D.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.2.2_D.3-2.

Table 9.5.2.2_D.3-1: RI Test (TDD) for eDL-MIMO

Parameter		Unit	Test 1	Test 2	Test 3
Bandwidth		MHz	10		
PDSCH transmission mode			9		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
	Pc	dB	0		
	σ	dB	0		
Uplink downlink configuration			1		
Special subframe configuration			4		
Propagation condition and antenna configuration			2 x 2 EPA5		
Cell-specific reference signals			Antenna ports 0		
CSI reference signals			Antenna ports 15, 16		
CSI reference signal configuration			4		
Beamforming model			As specified in Annex B.4.3		
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/4		
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI		
Antenna correlation			Low	Low	High
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78
Maximum number of HARQ transmissions			1		
Reporting mode			PUCCH 1-1		
Physical channel for CQI/ PMI reporting			PUSCH (Note 3)		
PUCCH report type for CQI/ PMI			2		
Physical channel for RI reporting			PUCCH Format 2		
Reporting periodicity		ms	N_{pd} = 5		
PMI and CQI delay		ms	10		
ACK/NACK feedback mode			Bundling		
cqi-pmi-ConfigurationIndex			4		
ri-ConfigurationInd			1		

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.9 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#3 and #8.

Table 9.5.2.2_D.3-2: Minimum requirement (TDD) for eDL-MIMO

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.05	0.9
γ_2	1	N/A	N/A
UE Category	2-8	2-8	2-8

The normative reference for this requirement is TS 36.101 [2] clause 9.5.2.2.

9.5.2.2_D.4 Test description

9.5.2.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 9.5.2.2_D.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.2.2_D.4.3.

9.5.2.2_D.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.2.2_D.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and fixed RI as defined in Table 9.5.2.2_D.3-1. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-2). Measure the t_{fix} according to annex G.5.3
3. Propagation conditions are set according to Annex B.1.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in subframe#3 and #8 (Table A.4.1-2).
5. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.2.2_D.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. Propagation conditions are set according to Table 9.5.2.2_D.3-1.
8. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and subframe #8 (Table A.4.1-2). Measure $t_{reported}$ according to Annex G.5.3

   If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.2.2_D.5-1, then pass the UE for this test and go to step 9. Otherwise, fail the UE.
9. If all tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the Table 9.5.2.2_D.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.5.2.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.2.2_D.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Table 9.5.2.2_D.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.5.2.2_D.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	According to each test	000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI	
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.5.2.2_D.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.5.2.2_D.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	4	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.5.2.2_D.4.3-6: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Bundling	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.5.2.2_D.4.3-7: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.5.2.2_D.4.3-8: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.5.2.2_D.5 Test requirement

Table 9.5.2.2_D.5-1: Test requirement (TDD) for eDL-MIMO

Parameter	Test 1	Test 2	Test 3
γ_1	N/A	1.04	0.89
γ_2	0.99	N/A	N/A
UE Category	2-8	2-8	2-8

9.5.3 RI Reporting (two CSI subframe sets are configured)

9.5.3.1_C FDD RI Reporting – PUCCH 1-0 for eICIC

9.5.3.1_C.1 FDD RI Reporting – PUCCH 1-0 for eICIC (non-MBSFN ABS)

9.5.3.1_C.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank under time domain resource restriction i.e. in case two CSI subframe sets are configured.

9.5.3.1_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE - Category 2-8 - release 10 and forward. Applicability requires support for FGI bit 115.

9.5.3.1_C.1.3 Minimum conformance requirements

The minimum performance requirement in Table 9.5.3.1_C.1.3-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$

For the parameters specified in Table 9.5.3.1_C.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.3.1_C.1.3-2.

Table 9.5.3.1_C.1.3-1: RI Test (FDD)

Parameter		Unit	Test 1		Test 2	
			Cell 1	Cell 2	Cell 1	Cell 2
Bandwidth		MHz	10		10	
PDSCH transmission mode			3	Note 10	3	Note 10
Downlink power allocation	ρ_A	dB	-3		-3	
	ρ_B	dB	-3		-3	
	σ	dB	0		0	
Propagation condition and antenna configuration			2 x 2 EPA5		2 x 2 EPA5	
CodeBookSubsetRestriction bitmap			01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI	N/A	01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI	N/A
Antenna correlation			Low		Low	
RI configuration			Fixed RI=1 and follow RI	N/A	Fixed RI=1 and follow RI	N/A
$\hat{E}_s / N_{oc2}$		dB	0	-12	20	6
$N_{oc}^{(j)}$	$N_{oc1}^{(j)}$	dBmW/15kHz	-98 (Note 3)	N/A	-102 (Note 3)	N/A
	$N_{oc2}^{(j)}$		-98 (Note 4)	N/A	-98 (Note 4)	N/A
	$N_{oc3}^{(j)}$		-98 (Note 5)	N/A	-94.8 (Note 5)	N/A
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-110	-78	-92
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN
Cell Id			0	1	0	1
Time Offset between Cells		μs	2.5 (synchronous cells)		2.5 (synchronous cells)	
ABS Pattern (Note 6)			N/A	10000000 10000000 10000000 10000000 10000000	N/A	10000000 10000000 10000000 10000000 10000000
RLM/RRM Measurement Subframe Pattern (Note 7)			10000000 10000000 10000000 10000000 10000000	N/A	10000000 10000000 10000000 10000000 10000000	N/A
CSI Subframe Sets (Note 8)	$C_{CSI,0}$		10000000 10000000 10000000 10000000 10000000	N/A	10000000 10000000 10000000 10000000 10000000	N/A
	$C_{CSI,1}$		01111111 01111111 01111111 01111111 01111111		01111111 01111111 01111111 01111111 01111111	
Number of control OFDM Symbols			3	3	3	3
Maximum number of HARQ transmissions			1		1	
Reporting mode			PUCCH 1-0		PUCCH 1-0	
Physical channel for CQI reporting			PUCCH Format 2		PUCCH Format 2	
PUCCH Report Type for CQI			4		4	

Physical channel for RI reporting		PUCCH Format 2		PUCCH Format 2	
PUCCH Report Type for RI		3		3	
Reporting periodicity	ms	N_{pd}= 10		N_{pd}= 10	
cqi-pmi-ConfigurationIndex		11		11	
ri-ConfigurationInd		5		5	
cqi-pmi-ConfigurationIndex2		10		10	
ri-ConfigurationInd2		2		2	
Cyclic prefix		Normal	Normal	Normal	Normal

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel in Cell 1 RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 3: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 5: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 6: ABS pattern as defined in TS 36.423 [14]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 7: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 8: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 9: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell 1 and Cell 2 is the same.
Note 10: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern OP.5 FDD as defined in Annex A.5.1.5.

Table 9.5.3.1_C.1.3-2: Minimum requirement (FDD)

	Test 1	Test 2
γ_1	0.9	1.05
UE Category	2-8	2-8

The normative reference for this requirement is TS 36.101 [2] clause 9.5.3.1.

9.5.3.1_C.1.4 Test description

9.5.3.1_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, FigureA.40.

2. The parameter settings for the cell are set up according to Table 9.5.3.1_C.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF (in Cell 1) according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.3.1_C.1.4.3.

9.5.3.1_C.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.3.1_C.1.3-1 and C.3.3-1 of Annex C.3.3 as appropriate.

2. The SS shall send PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to the UE reported CQI and fixed RI as defined in Table 9.5.3.1_C.1.3-1. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC.

3. Measure the t_{fix} according to annex G.5.3.

4. Propagation conditions are set according to Annex B.1.

5. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe (Table A.4.1-1).

6. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.3.1_C.1.3-1.

7. The UE shall transmit RRC Connection Reconfiguration Complete message.

8. Propagation conditions are set according to Table 9.5.3.1_C.1.3-1.

9. The SS shall send PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to the UE reported CQI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC.

10. Measure $t_{reported}$ according to Annex G.5.3

    If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.3.1_C.1.5-1, then pass the UE for this test and go to step 11. Otherwise, fail the UE.

11. If all tests have not been done, then repeat the same procedure (steps 1 to 10) with test conditions according to the Table 9.5.3.1_C.1.3-1 for the other Tests as appropriate. Otherwise pass the UE.

9.5.3.1_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.3.1_C.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	According to each test		
}			
ue-TransmitAntennaSelection CHOICE {	Release		
release	NULL		
}			
}			
}			
cqi-ReportConfig	*Not present*		
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
}			

Table 9.5.3.1_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'10000000100000001000 00001000000010000000'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 9.5.3.1_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{			
setup SEQUENCE{			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	11		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	5		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10 CHOICE{			
setup SEQUENCE{			
cqi-pmi-ConfigIndex2-r10	10		
ri-Configindex2-r10	2		
}			
}			
}			
}			
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'10000000100000001000 00001000000010000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'01111111011111110111 11110111111101111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

9.5.3.1_C.1.5 Test requirement

Table 9.5.3.1_C.1.5-1: Minimum requirement (FDD)

	Test 1	**Test 2**
γ_1	0.89	1.04
UE Category	2-8	2-8

9.5.3.2_C TDD RI Reporting – PUCCH 1-0 for eICIC

9.5.3.2_C.1 TDD RI Reporting – PUCCH 1-0 for eICIC (non-MBSFN ABS)

9.5.3.2_C.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank under time domain resource restriction i.e. in case two CSI subframe sets are configured.

9.5.3.2_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE - Category 2-8 -release 10 and forward. Applicability requires support for FGI bit 115.

9.5.3.2_C.1.3 Minimum conformance requirements

The minimum performance requirement in Table 9.5.3.2_C.1.3-2 is defined as:

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$.

For the parameters specified in Table 9.5.3.2_C.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.3.2_C.1.3-2.

Table 9.5.3.2_C.1.3-1: RI Test (TDD)

Parameter		Unit	Test1		Test2	
			Cell 1	Cell 2	Cell 1	Cell 2
Bandwidth		MHz	10		10	
PDSCH transmission mode			3	Note 11	3	Note 11
Uplink downlink configuration			1		1	
Special subframe configuration			4		4	
Downlink power allocation	ρ_A	dB	-3		-3	
	ρ_B	dB	-3		-3	
	σ	dB	0		0	
Propagation condition and antenna configuration			2 x 2 EPA5		2 x 2 EPA5	
CodeBookSubsetRestriction bitmap			01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI	N/A	01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI	N/A
Antenna correlation			Low		Low	
RI configuration			Fixed RI=1 and follow RI	N/A	Fixed RI=1 and follow RI	N/A
$\hat{E}_s / N_{oc2}$		dB	0	-12	20	6
$N_{oc}^{(j)}$	$N_{oc1}^{(j)}$	dB[mW/15kHz]	-98 (Note 4)	N/A	-102 (Note 4)	N/A
	$N_{oc2}^{(j)}$		-98 (Note 5)	N/A	-98 (Note 5)	N/A
	$N_{oc3}^{(j)}$		-98 (Note 6)	N/A	-94.8 (Note 6)	N/A
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-110	-78	-92
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN
Cell Id			0	1	0	1
Time Offset between Cells		μs	2.5 (synchronous cells)		2.5 (synchronous cells)	
ABS Pattern (Note 7)			N/A	0000000001 0000000001	N/A	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 8)			0000000001 0000000001	N/A	0000000001 0000000001	N/A
CSI Subframe Sets (Note 9)	$C_{CSI,0}$		0000000001 0000000001	N/A	0000000001 0000000001	N/A
	$C_{CSI,1}$		1100111000 1100111000		1100111000 1100111000	
Number of control OFDM Symbols			3	3	3	3
Maximum number of HARQ transmissions			1		1	
Reporting mode			PUCCH 1-0		PUCCH 1-0	
Physical channel for $C_{CSI,0}$ CQI and RI reporting			PUCCH Format 2		PUCCH Format 2	
PUCCH Report Type for CQI			4		4	

Physical channel for $C_{CSI,1}$ CQI and RI reporting		PUSCH (Note 3)		PUSCH (Note 3)	
PUCCH Report Type for RI		3		3	
Reporting periodicity	ms	N_{pd}= 10		N_{pd}= 10	
ACK/NACK feedback mode		Multiplexing		Multiplexing	
cqi-pmi-ConfigurationIndex		8		8	
ri-ConfigurationInd		5		5	
cqi-pmi-ConfigurationIndex2		9		9	
ri-ConfigurationInd2		0		0	
Cyclic prefix		Normal	Normal	Normal	Normal

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel in Cell 1 RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3: To avoid collisions between RI/CQI reports and HARQ-ACK it is necessary to report them on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#9 to allow periodic RI/CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe #3.
Note 4: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 5: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 6: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 7: ABS pattern as defined in TS 36.423 [14]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 8: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 9: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 10: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell 1 and Cell 2 is the same.
Note 11: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern OP.5 TDD as defined in Annex A.5.2.5.

Table 9.5.3.2_C.1.3-2: Minimum requirement (TDD)

	Test 1	Test 2
γ_1	0.9	1.05
UE Category	2-8	2-8

The normative reference for this requirement is TS 36.101 [2] clause 9.5.3.2.

9.5.3.2_C.1.4 Test description

9.5.3.2_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40.

2. The parameter settings for the cell are set up according to Table 9.5.3.2_C.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.3.2_C.1.4.3.

9.5.3.2_C.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.3.2_C.1.3-1 and C.3.3-1 of Annex C.3.3 as appropriate.

2. The SS shall send PDSCH in via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to the UE reported CQI and fixed RI as defined in Table 9.5.3.2_C.1.3-1. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC.
   The SS sends uplink scheduling information via PDCCH DCI format 0 in subframe #9 with CQI request bit set to 0 to schedule UL RMC in subframe #3 (Table A.4.1-2).

3. Measure the t_{fix} according to annex G.5.3.

4. Propagation conditions are set according to Annex B.1.

5. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-2).

6. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.3.2_C.1.3-1.

7. The UE shall transmit RRC Connection Reconfiguration Complete message.

8. Propagation conditions are set according to Table 9.5.3.2_C.1.3-1.

9. The SS shall send PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to the UE reported CQI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC.
   The SS sends uplink scheduling information via PDCCH DCI format 0 in subframe #9 with CQI request bit set to 0 to schedule UL RMC in subframe #3 (Table A.4.1-2).

10. Measure $t_{reported}$ according to Annex G.5.3
    If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.3.2_C.1.5-1, then pass the UE for this test and go to step 11. Otherwise, fail the UE.

11. If all tests have not been done, then repeat the same procedure (steps 1 to 10) with test conditions according to the Table 9.5.3.2_C.1.3-1 for the other Tests as appropriate. Otherwise pass the UE.

9.5.3.2_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.3.2_C.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2 Table 5.5.1.2-1			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	According to each test		
}			
ue-TransmitAntennaSelection CHOICE {	Release		
release	NULL		
}			
}			
}			
cqi-ReportConfig	*Not present*		
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
}			

Table 9.5.3.2_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE{			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 9.5.3.2_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{			
setup SEQUENCE{			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	8		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	5		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10 CHOICE{			
setup SEQUENCE{			
cqi-pmi-ConfigIndex2-r10	9		
ri-Configindex2-r10	0		
}			
}			
}			
}			
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001110001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 9.5.3.2_C.1.4.3-4: *TDD-Config-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

9.5.3.2_C.1.5 Test requirement

Table 9.5.3.2_C.1.5-1: Minimum requirement (TDD)

	Test 1	**Test 2**
γ_1	0.89	1.04
UE Category	2-8	2-8

9.5.4 RI Reporting (two CSI subframe sets and CRS assistance information are configured)

9.5.4.1_E FDD RI Reporting – PUCCH 1-0 for feICIC

9.5.4.1_E.1 FDD RI Reporting – PUCCH 1-0 for feICIC (non-MBSFN ABS)

9.5.4.1_E.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank under time domain resource restriction i.e. in case two CSI subframe sets are configured.

9.5.4.1_E.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE and CRS interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

9.5.4.1_E.1.3 Minimum conformance requirements

The minimum performance requirement in Table 9.5.4.1_E.1.3-2 is defined as:

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$.

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

In Table 9.5.4.1_E.1.3-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [5] including Cell 2 and Cell 3 is provided.

Table 9.5.4.1_E.1.3-1: RI Test (FDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10	10	10
PDSCH transmission mode			3	As defined in Note 1	As defined in Note 1
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3	-3	-3
	σ	dB	0	N/A	N/A
Propagation condition and antenna configuration			2×2 EPA5 (Note 2)	2×2 EPA5 (Note 2)	2×2 EPA5 (Note 2)
CodeBookSubsetRestriction bitmap			01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI	As defined in Note 1	As defined in Note 1
N_{oc} at antenna port	N_{oc1}	dB[mW/15kHz]	-98 (Note 3)	N/A	N/A
	N_{oc2}	dBmW/15kHz	-98 (Note 4)	N/A	N/A
	N_{oc3}	dB[mW/15kHz]	-93 (Note 5)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 9.5.4.1_E.1.3-2 for each test	12	10
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	Reference Value in Table 9.5.4.1_E.1.3-2 for each test	-86	-88
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 6)			N/A	10000000 10000000 10000000 10000000 10000000	10000000 10000000 10000000 10000000 10000000
RLM/RRM Measurement Subframe Pattern (Note 7)			10000000 10000000 10000000 10000000 10000000	N/A	N/A
CSI Subframe Sets (Note 8)	$C_{CSI,0}$		10000000 10000000 10000000 10000000 10000000	N/A	N/A
	$C_{CSI,1}$		01111111 01111111 01111111 01111111 01111111	N/A	N/A
Number of control OFDM symbols			3	Note 9	Note 9
Maximum number of HARQ transmissions			1	N/A	N/A
Reporting mode			PUCCH 1-0	N/A	N/A
Physical channel for CQI reporting			PUCCH format 2	N/A	N/A
PUCCH Report Type for CQI			4	N/A	N/A
Physical channel for RI reporting			PUCCH Format 2	N/A	N/A

PUCCH Report Type for RI		3	N/A	N/A
Reporting periodicity	ms	N_{pd}= 10	N/A	N/A
cqi-pmi-ConfigurationIndex		11	N/A	N/A
ri-ConfigurationInd		5	N/A	N/A
cqi-pmi-ConfigurationIndex2		10	N/A	N/A
ri-ConfigurationInd2		2	N/A	N/A
Cyclic prefix		Normal	Normal	Normal

Note 1: Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex TS 36.521-1 [10] C.3.3 applying OCNG pattern OP.5 FDD as defined in TS 36.521-1 [10] Annex A.5.1.5.
Note 2: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 3: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 5: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 6: ABS pattern as defined in TS 36.423 [14]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 7: Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 8: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331 [5].
Note 9: The number of control OFDM symbols is not available for ABS and is 3 for the subframe indicated by "0" of ABS pattern.
Note 10: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 11: Reference measurement channel in Cell 1 RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 12: The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 13: SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 9.5.4.1_E.1.3-2: Minimum requirement (FDD)

	Test 1	Test 2	Test 3
$\hat{E}_s / N_{oc2}$ for Cell 1 (dB)	4	20	20
$\hat{I}_{or}^{(j)}$ for Cell 1 (dB[mW/15kHz])	-94	-78	-78
Antenna correlation	High for Cell 1, low for Cell 2 and Cell 3	Low for Cell 1, Cell 2 and Cell 3	High for Cell 1, low for Cell 2 and Cell 3
γ_1	N/A	1.05	0.9
γ_2	1.05	N/A	N/A
UE Category	≥2	≥2	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.5.4.1.

9.5.4.1_E1.4 Test description

9.5.4.1_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Table 9.5.4.1_E.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF (in Cell 1) according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 9.5.4.1_E.1.4.3.

9.5.4.1_E.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.4.1_E.1.3-1 as appropriate.
2. Set the Cell 2 and Cell 3 as defined in Table 9.5.4.1_E.1.3-1 and according to Annex C3.3.
3. The SS shall send PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to the UE reported CQI and fixed RI as defined in Table 9.5.4.1_E.1.3-1. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC.
4. Measure t_{fix} during ABS according to annex G.5.3.
5. Propagation conditions are set according to Annex B.1.
6. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe (Table A.4.1-1).
7. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.4.1_E.1.3-1.
8. The UE shall transmit RRC Connection Reconfiguration Complete message.
9. Propagation conditions are set according to Table 9.5.4.1_E.1.3-1.
10. The SS shall send PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to the UE reported CQI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC.
11. Measure $t_{reported}$ during ABS according to Annex G.5.3

    If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.4.1_E.1.5-1, then pass the UE for this test and go to step 12. Otherwise, fail the UE.
12. If all tests have not been done, then repeat the same procedure (steps 1 to 11) with test conditions according to the Table 9.5.4.1_E.1.3-1 for the other Tests as appropriate. Otherwise pass the UE.

9.5.4.1_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 9.5.4.1_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD RI test performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'1000000010000000 1000000010000000 10000000'	BIT STRING (SIZE (40))	
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::=SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 9.5.4.1_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT: Additional FDD RI test performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 9.5.4.1_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD RI test performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{			
setup SEQUENCE{			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	11		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	5		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10 CHOICE{			
setup SEQUENCE{			
cqi-pmi-ConfigIndex2-r10	10		
ri-Configindex2-r10	2		
}			
}			
}			
}			
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'1000000010000000 1000000010000000 10000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'01111111 01111111 01111111 01111111 01111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

Table 9.5.4.1_E.1.4.3-4: *AntennaInfoDedicated-r10:* Additional FDD RI test performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm3 for Cell 1 Cell 2 and Cell 3 according to test	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex TS 36.521-1 [10] C.3.3 applying OCNG pattern OP.5 FDD as defined in TS 36.521-1 [10] Annex A.5.1.5.	
codebookSubsetRestriction-r10	01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI for Cell 1 Cell 2 and Cell 3 according to test	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex TS 36.521-1 [10] C.3.3 applying OCNG pattern OP.5 FDD as defined in TS 36.521-1 [10] Annex A.5.1.5.	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

9.5.4.1_E.1.5 Test requirement

Table 9.5.4.1_E.1.5-1: Test requirement (FDD)

	Test 1	**Test 2**	**Test 3**
$\hat{E}_s / N_{oc2}$ for Cell 1 (dB)	4	20	20
$\hat{I}_{or}^{(j)}$ for Cell 1 (dB[mW/15kHz])	-94	-78	-78
Antenna correlation	High for Cell 1, low for Cell 2 and Cell 3	Low for Cell 1, Cell 2 and Cell 3	High for Cell 1, low for Cell 2 and Cell 3
γ_1	N/A	1.04	0.89
γ_2	1.04	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.4.2_E TDD RI Reporting – PUCCH 1-0 for feICIC

9.5.4.2_E.1 TDD RI Reporting – PUCCH 1-0 for feICIC (non-MBSFN ABS)

9.5.4.2_E.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank under time domain resource restriction i.e. in case two CSI subframe sets are configured.

9.5.4.2_E.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE and CRS interference handling and ss-CCH interference handling – UE Category ≥2 release 11 and forward. Applicability requires support of FGI bit 115.

9.5.4.2_E.1.3 Minimum conformance requirements

The minimum performance requirement in Table 9.5.4.2_E.1.3-2 is defined as:

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$.

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

In Table 9.5.4.2_E.1.3-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [5] including Cell 2 and Cell 3 is provided.

Table 9.5.4.2_E.1.3-1: RI Test (TDD)

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10	10	10
PDSCH transmission mode			3	As defined in Note 1	As defined in Note 1
Uplink downlink configuration			1	1	1
Special subframe configuration			4	4	4
Downlink power allocation	ρ_A	dB	-3	-3	-3
	ρ_B	dB	-3	-3	-3
	σ	dB	0	N/A	N/A
Propagation condition and antenna configuration			2×2 EPA5 (Note 2)	2×2 EPA5 (Note 2)	2×2 EPA5 (Note 2)
CodeBookSubsetRestriction bitmap			01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI	As defined in Note 1	As defined in Note 1
N_{oc} at antenna port	N_{oc1}	dB[mW/15kHz]	-98](Note 3)	N/A	N/A
	N_{oc2}	dB[mW/15kHz]	-98 (Note 4)	N/A	N/A
	N_{oc3}	dB[mW/15kHz]	-93 (Note 5)	N/A	N/A
$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 9.5.4.2_E.1.3-2 for each test	12	10
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	Reference Value in Table 9.5.4.2_E.1.3-2 for each test	-86	-88
Subframe Configuration			Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	N/A	3	-1
Frequency shift between Cells		Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Note 6)			N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 7)			0000000001 0000000001	N/A	N/A
CSI Subframe Sets (Note 8)	$C_{CSI,0}$		0000000001 0000000001	N/A	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A	N/A
Number of control OFDM symbols			3	Note 9	Note 9
Maximum number of HARQ transmissions			1	N/A	N/A
Reporting mode			PUCCH 1-0	N/A	N/A
Physical channel for $C_{CSI,0}$ CQI and RI reporting			PUCCH format 2	N/A	N/A
Physical channel for $C_{CSI,1}$ CQI and RI reporting			PUSCH (Note)	N/A	N/A
PUCCH Report Type for CQI			4	N/A	N/A
PUCCH Report Type for RI			3	N/A	N/A
Reporting periodicity		ms	N_{pd}= 10	N/A	N/A
ACK/NACK feedback mode			Multiplexing	N/A	N/A
cqi-pmi-ConfigurationIndex			8	N/A	N/A
ri-ConfigurationInd			5	N/A	N/A
cqi-pmi-ConfigurationIndex2			9	N/A	N/A
ri-ConfigurationInd2			0	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Note 1:	Downlink physical channel setup in Cell 2 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern OP.5 TDD as defined in TS 36.521-1 [10] Annex A.5.2.5.
Note 2:	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 3:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 4:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 5:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 6:	ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 7:	Time-domain measurement resource restriction pattern for PCell measurements as defined in TS 36.331 [5].
Note 8:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in TS 36.331[5].
Note 9:	The number of control OFDM symbols is not available for ABS and is 3 for the subframe indicated by “0” of ABS pattern.
Note 10:	If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 11:	Reference measurement channel in Cell 1 RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 12:	The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 13:	SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.
Note 14:	To avoid collisions between RI/CQI reports and HARQ-ACK it is necessary to report them on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic RI/CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Table 9.5.4.2_E.1.3-2: Minimum requirement (TDD)

	Test 1	Test 2	Test 3
$\hat{E}_s / N_{oc2}$ for Cell 1 (dB)	4	20	20
$\hat{I}_{or}^{(j)}$ for Cell 1 (dB[mW/15kHz])	-94	-78	-78
Antenna correlation	High for Cell 1, low for Cell 2 and Cell 3	Low for Cell 1, Cell 2 and Cell 3	High for Cell 1, low for Cell 2 and Cell 3
γ_1	N/A	1.05	0.9
γ_2	1.05	N/A	N/A
UE Category	≥2	≥2	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.5.4.2.

9.5.4.2_E1.4 Test description

9.5.4.2_E.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.48 for antenna configuration 2x2.

2. The parameter settings for the cell are set up according to Table 9.5.4.2_E.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2 with exceptions listed in 5.2A.5. Message contents are defined in clause 9.5.4.2_E.1.4.3.

9.5.4.2_E.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.5.4.2_E.1.3-1 as appropriate.

2. Set the Cell 2 and Cell 3 as defined in Tables 9.5.4.2_E.1.3-1 and according to Annex C3.3.

3. The SS shall send PDSCH in via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to the UE reported CQI and fixed RI as defined in Table 9.5.4.2_E.1.3-1. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC.
   The SS sends uplink scheduling information via PDCCH DCI format 0 in subframe #4 and #9 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and #3 (Table A.4.1-2).

4. Measure t_{fix} during ABS according to annex G.5.3.

5. Propagation conditions are set according to Annex B.1.

6. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-2).

7. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.4.2_E.1.3-1.

8. The UE shall transmit RRC Connection Reconfiguration Complete message.

9. Propagation conditions are set according to Table 9.5.4.2_E.1.3-1.

10. The SS shall send PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to the UE reported CQI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC.
    The SS sends uplink scheduling information via PDCCH DCI format 0 in subframe #4 and #9 with CQI request bit set to 0 to schedule UL RMC in subframe #8 and #3 (Table A.4.1-2).

11. Measure $t_{reported}$ during ABS according to Annex G.5.3
    If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.4.2_E.1.5-1, then pass the UE for this test and go to step 12. Otherwise, fail the UE.

12. If all tests have not been done, then repeat the same procedure (steps 1 to 11) with test conditions according to the Table 9.5.4.2_E.1.3-1 for the other Tests as appropriate. Otherwise pass the UE.

9.5.4.2_E.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 5.2A.5.1 with the following exceptions:

Table 9.5.4.2_E.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD RI test performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
neighCellsCRS-Info-r11 ::= CHOICE {			
setup SEQUENCE {			
CRS-AssistancedInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11{		2 entries	
CRS-AssistancedInfo-r11 ::= SEQUENCE {			
physCellId-r11	126		Cell 2
	1		Cell 3
antennaPortsCount-r11	an2		Cell 2, Cell 3
mbsfn-SubframeConfigList-r11::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig{			Cell 2, Cell 3
MBSFN-SubframeConfig:: = SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'000000' B	non-MBSFN	
}			
}			
}			
}			
}			
}			
}			
}			

Table 9.5.4.2_E.1.4.3-2: PhysicalConfigDedicated-DEFAULT: Additional TDD RI test performance downlink power allocation

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		
}			

Table 9.5.4.2_E.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional TDD RI test performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10 CHOICE{			
setup SEQUENCE{			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	8		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	5		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10 CHOICE{			
setup SEQUENCE{			
cqi-pmi-ConfigIndex2-r10	9		
ri-Configindex2-r10	0		
}			
}			
}			
}			
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'0000000001 0000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'1100111000 1100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

Table 9.5.4.2_E.1.4.3-4: *PDSCH-ConfigDedicated-DEFAULT:* Additional TDD RI test performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.5.4.2_E.1.4.3-5: *AntennaInfoDedicated-r10:* Additional TDD RI test performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm3 for Cell 1 Cell 2 and Cell 3 according to test	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern OP.5 TDD as defined in TS 36.521-1 [10] Annex A.5.2.5.	
codebookSubsetRestriction-r10	01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI for Cell 1 Cell 2 and Cell 3 according to test	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with TS 36.521-1 [10] Annex C.3.3 applying OCNG pattern OP.5 TDD as defined in TS 36.521-1 [10] Annex A.5.2.5.	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 9.5.4.2_E.1.4.3-6: TDD-Config-DEFAULT: Additional TDD RI test performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.5.4.2_E.1.4.3-7: PUCCH-ConfigDedicated-DEFAULT*:* Additional TDD RI test performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing		
}			

9.5.4.2_E.1.5 Test requirement

Table 9.5.4.2_E.1.5-1: Test requirement (TDD)

	Test 1	Test 2	Test 3
$\hat{E}_s / N_{oc2}$ for Cell 1 (dB)	4	20	20
$\hat{I}_{or}^{(j)}$ for Cell 1 (dB[mW/15kHz])	-94	-78	-78
Antenna correlation	High for Cell 1, low for Cell 2 and Cell 3	Low for Cell 1, Cell 2 and Cell 3	High for Cell 1, low for Cell 2 and Cell 3
γ_1	N/A	1.04	0.89
γ_2	1.04	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.5 RI Reporting (with CSI processes)

9.5.5.1_F FDD RI Reporting with CSI processes for CoMP

9.5.5.1_F.1 FDD RI Reporting with Single CSI process for CoMP

9.5.5.1_F.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank with one CSI process configured.

9.5.5.1_F.1.2 Test applicability

This test applies to all types of E-UTRA FDD category ≥2 UEs release 11 and forward, supporting Maximum CSI processes of One on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.5.5.1_F.1.3 Minimum conformance requirements

Each CSI process is associated with a CSI-RS resource and a CSI-IM resource as shown in Table 9.5.5.1_F.1.3-1. For UE supports one CSI process CSI process 0 is configured for Test 1 and Test 2, but CSI process 1 is not configured for Test 2. The corresponding γ requirements for Test 1 and Test 2 shall be fulfilled. The requirement on reported RI for CSI process 1 in Test 2 is not applicable.

For UE supports multiple CSI processes, CSI process 0 is configured for Test 1 and CSI processes 0 and 1 are configured for Test 2. The corresponding γ requirements for Test 1 and Test 2 shall be fulfilled, and also the requirement on reported RI for CSI process 1 in Test 2.

The minimum performance requirement in Table 9.5.5.1_F.1.3-2 is defined as:

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be ≥ γ_1.

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be ≥ γ_2;

c) For Test 2, the RI reported for CSI process 1 shall be the same as the most recent RI reported for CSI process 0 if UE is configured with multiple CSI processes.

For the parameters specified in Table 9.5.5.1_F.1.3-2, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.5.1_F.1.3-3.

Table 9.5.5.1_F.1.3-1: Configuration of CSI processes

	CSI process 0	CSI process 1
CSI-RS resource	CSI-RS signal 0	CSI-RS signal 1
CSI-IM resource	CSI-IM resource 0	CSI-IM resource 1

Table 9.5.5.1_F.1.3-2: Test Parameters for RI Reporting with Single CSI process for CoMP (FDD)

Parameter		Unit	Test 1		Test 2	
			TP1	TP2	TP1	TP2
Bandwidth		MHz	10 MHz		10 MHz	
Transmission mode			10	10	10	10
Downlink power allocation	ρ_A	dB	0		0	
	ρ_B	dB	0		0	
	P_C	dB	0	0	0	0
	σ	dB	0		0	
SNR		dB	0	0	20	20
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-98	-78	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA 5 Low	EPA 5 Low	EPA 5 Low	EPA 5 High
Antenna configuration			2x2	2x2	2x2	2x2
Beamforming Model			As specified in Section B.4.3		As specified in Section B.4.3	
Timing offset between TPs		us	0		0	
Frequency offset between TPs		Hz	0		0	
Cell-specific reference signals			Antenna ports 0		Antenna ports 0	
CSI-RS signal 0			Antenna ports 15,16	N/A	Antenna ports 15,16	N/A
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A	5/1	N/A
CSI-RS 0 configuration			0	N/A	0	N/A
CSI-RS signal 1			N/A	Antenna ports 15,16	N/A	Antenna ports 15,16
CSI-RS 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A	5/1	N/A	5/1
CSI-RS 1 configuration			N/A	3	N/A	3
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			N/A	1 / 1000001000000000	N/A	1 / 1000001000000000
Zero-power CSI-RS 1 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			1 / 0011000000000000	N/A	1 / 0011000000000000	N/A
CSI-IM 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A	5/1	N/A
CSI-IM 0 configuration			2	N/A	2	N/A
CSI-IM 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A	5/1	N/A	5/1
CSI-IM 1 configuration			N/A	6	N/A	6
RI configuration			Fixed RI=2 and follow RI	N/A	Fixed RI=1 and follow RI	N/A
Physical channel for CQI/PMI reporting			PUSCH (Note 6)	N/A	PUSCH (Note 6)	PUSCH (Note 6)
PUCCH Report Type for CQI/PMI			2	N/A	2	2
Physical channel for RI reporting			PUCCH Format 2	N/A	PUCCH Format 2	PUCCH Format 2
PUCCH Report Type for RI			3	N/A	3	3

CSI process 0 (Note 7)	CSI-RS		CSI-RS 0	N/A	CSI-RS 0	N/A
	CSI-IM		CSI-IM 0	N/A	CSI-IM 0	N/A
	Reporting mode		PUCCH 1-1	N/A	PUCCH 1-1	N/A
	Reporting periodicity	ms	N_{pd} = 5	N/A	N_{pd} = 5	N/A
	CQI delay	ms	8	N/A	10	N/A
	cqi-pmi-ConfigurationIndex		6	N/A	6	N/A
	ri-ConfigIndex		1	N/A	1	N/A
CSI process 1 (Note 7, Note 9)	CSI-RS		N/A	N/A	N/A	CSI-RS 1
	CSI-IM		N/A	N/A	N/A	CSI-IM 1
	Reporting mode		N/A	N/A	N/A	PUCCH 1-1
	Reporting periodicity	ms	N/A	N/A	N/A	N_{pd} = 5
	CQI delay	ms	N/A	N/A	N/A	10
	cqi-pmi-ConfigurationIndex		N/A	N/A	N/A	4
	ri-ConfigIndex		N/A	N/A	N/A	1
CSI process for PDSCH scheduling			CSI process 0		CSI process 0	
Cell ID			0	6	0	6
Quasi-co-located CSI-RS			CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CRS			Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell ID as Cell 2
PMI for subframe 2, 3, 4, 7, 8 and 9			010000 for fixed RI = 2 010011 for UE reported RI	100000	000011 for fixed RI = 1 010011 for UE reported RI	N/A
PMI for subframe 1 and 6			100000	100000	100000	N/A
Max number of HARQ transmissions			1	N/A	1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: 3 symbols allocated to PDCCH.
Note 3: Reference measurement channel RC.13 FDD according to Table A.4-1. PDSCH transmission is scheduled on subframe 2, 3, 4, 7, 8 and 9 from TP1.
Note 4: TM10 OCNG is transmitted as specified in A.5.1.8 is transmitted on subframe 1 and 6 from TP1.
Note 5: TM10 OCNG is transmitted as specified in A.5.1.8 is transmitted on subframe 1, 2, 3, 4, 6, 7, 8 and 9 from TP2 for Test 1; TP2 is blanked for Test 2.
Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.
Note 7: If UE supports multiple CSI processes, CSI process 0 is configured as 'RI-reference CSI process' for CSI process 1.
Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.
Note 9: If UE supports one CSI process, CSI process 1 is not configured in Test 2.

Table 9.5.5.1_F.1.3-3: Minimum requirements for RI Reporting with Single CSI process for CoMP (FDD)

	Test 1	Test 2
γ_1	N/A	1.0
γ_2	1.0	N/A
UE Category	≥2	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.5.5.1.

9.5.5.1_F.1.4 Test description

9.5.5.1_F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2 for UE with 2Rx RF band and Annex A, Figure A.40a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.5.5.1_F.1.3-2.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.5.1_F.1.4.3.

9.5.5.1_F.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction, PMI for subframe for fixed Rank and the SNR according to Table 9.5.5.1_F.1.3-2 and C.3.2-1 of Annex C.3.2 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and fixed RI as defined in Table 9.5.5.1_F.1.3-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1).
3. Measure the t_{fix} (fixed Rank 1 or fixed Rank 2) according to annex G.5.3.
4. Propagation conditions are set according to Annex B.1.
5. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe (Table A.4.1-1).
6. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.5.1_F.1.5-2.
7. The UE shall transmit RRC Connection Reconfiguration Complete message.
8. Propagation conditions are set according to Table 9.5.5.1_F.1.5-2.
9. The SS shall send PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1).
10. Measure $t_{reported}$ according to Annex G.5.3

    If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.5.1_F.1.5-1, then pass the UE for this test and go to step 11. Otherwise, fail the UE.
11. If all tests have not been done, then repeat the same procedure (steps 1 to 10) with test conditions according to the Table 9.5.5.1_F.1.3-1 for the other Tests as appropriate. Otherwise pass the UE.

9.5.5.1_F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.5.1_F.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigZPToAddModList-r11	*CSI-RS-ConfigZP-r11-DEFAULT*		
cqi-ReportConfig-v1130	*CQI-ReportConfig-v1130-DEFAULT*		
}			

Table 9.5.5.1_F.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path:36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.5.5.1_F.1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
codebookSubsetRestriction-r10	Not present		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.5.5.1_F.1.4.3-4: *CQI-ReportConfig-v1130-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	6	CSI process 0	
cqi-FormatIndicatorPeriodic-r11 CHOICE {			
widebandCQI-r11 SEQUENCE {			
csi-ReportMode-r11	Not present		
}			
}			
ri-ConfigIndex-r11	1	CSI process 0	
csi-ConfigIndex-r11	Not present		
}			
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-ProcessToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	1 entry		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11[1]	0		
codebookSubsetRestriction-r11[1]	According to each test	010000 for fixed RI = 2, 000011 for fixed RI = 1, 010011 for UE reported RI	
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
pmi-RI-Report-r11	setup		
}			
}			
}			
}			

Table 9.5.5.1_F.1.4.3-5: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	For Zero-power CSI-RS 0 = 0011000000000000 For Zero-power CSI-RS 1 configuration = 1000001000000000	Parameter: *ZeroPowerCSI-RS*	
subframeConfig-r11	1	$\Delta_{\text{CSI-RS}}$ = $I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
}			

9.5.5.1_F.1.5 Test requirement

Table 9.5.5.1_F.1.5-1: Test requirements for RI Reporting with Single CSI process for CoMP (FDD)

	Test 1	**Test 2**
γ_1	N/A	0.99
γ_2	0.99	N/A
UE Category	≥2	≥2

Table 9.5.5.1_F.1.5-2: Test Parameters for RI Reporting with Single CSI process for CoMP (FDD)

Parameter		Unit	Test 1		Test 2	
			TP1	TP2	TP1	TP2
Bandwidth		MHz	10 MHz		10 MHz	
Transmission mode			10	10	10	10
Downlink power allocation	ρ_A	dB	0		0	
	ρ_B	dB	0		0	
	P_C	dB	0	0	0	0
	σ	dB	0		0	
SNR for UE with 2Rx RF band		dB	0	0	20	20
SNR for 4Rx UE without 2Rx RF band		dB	-3	-3	17	17
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-98	-78	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA 5 Low	EPA 5 Low	EPA 5 Low	EPA 5 High
Antenna configuration			2x2	2x2	2x2	2x2
Beamforming Model			As specified in Section B.4.3		As specified in Section B.4.3	
Timing offset between TPs		us	0		0	
Frequency offset between TPs		Hz	0		0	
Cell-specific reference signals			Antenna ports 0		Antenna ports 0	
CSI-RS signal 0			Antenna ports 15,16	N/A	Antenna ports 15,16	N/A
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A	5/1	N/A
CSI-RS 0 configuration			0	N/A	0	N/A
CSI-RS signal 1			N/A	Antenna ports 15,16	N/A	Antenna ports 15,16
CSI-RS 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A	5/1	N/A	5/1
CSI-RS 1 configuration			N/A	3	N/A	3
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			N/A	1 / 1000001000000000	N/A	1 / 1000001000000000
Zero-power CSI-RS 1 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			1 / 0011000000000000	N/A	1 / 0011000000000000	N/A
CSI-IM 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1	N/A	5/1	N/A
CSI-IM 0 configuration			2	N/A	2	N/A
CSI-IM 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A	5/1	N/A	5/1
CSI-IM 1 configuration			N/A	6	N/A	6
RI configuration			Fixed RI=2 and follow RI	N/A	Fixed RI=1 and follow RI	N/A
Physical channel for CQI/PMI reporting			PUSCH (Note 6)	N/A	PUSCH (Note 6)	PUSCH (Note 6)
PUCCH Report Type for CQI/PMI			2	N/A	2	2
Physical channel for RI reporting			PUCCH Format 2	N/A	PUCCH Format 2	PUCCH Format 2
PUCCH Report Type for RI			3	N/A	3	3

CSI process 0 (Note 7)	CSI-RS		CSI-RS 0	N/A	CSI-RS 0	N/A
	CSI-IM		CSI-IM 0	N/A	CSI-IM 0	N/A
	Reporting mode		PUCCH 1-1	N/A	PUCCH 1-1	N/A
	Reporting periodicity	ms	N_{pd} = 5	N/A	N_{pd} = 5	N/A
	CQI delay	ms	8	N/A	10	N/A
	cqi-pmi-ConfigurationIndex		6	N/A	6	N/A
	ri-ConfigIndex		1	N/A	1	N/A
CSI process 1 (Note 7, Note 9)	CSI-RS		N/A	N/A	N/A	CSI-RS 1
	CSI-IM		N/A	N/A	N/A	CSI-IM 1
	Reporting mode		N/A	N/A	N/A	PUCCH 1-1
	Reporting periodicity	ms	N/A	N/A	N/A	N_{pd} = 5
	CQI delay	ms	N/A	N/A	N/A	10
	cqi-pmi-ConfigurationIndex		N/A	N/A	N/A	4
	ri-ConfigIndex		N/A	N/A	N/A	1
CSI process for PDSCH scheduling			CSI process 0		CSI process 0	
Cell ID			0	6	0	6
Quasi-co-located CSI-RS			CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CRS			Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell ID as Cell 2
PMI for subframe 2, 3, 4, 7, 8 and 9			010000 for fixed RI = 2 010011 for UE reported RI	100000	000011 for fixed RI = 1 010011 for UE reported RI	N/A
PMI for subframe 1 and 6			100000	100000	100000	N/A
Max number of HARQ transmissions			1	N/A	1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: 3 symbols allocated to PDCCH.
Note 3: Reference measurement channel RC.13 FDD according to Table A.4-1. PDSCH transmission is scheduled on subframe 2, 3, 4, 7, 8 and 9 from TP1.
Note 4: TM10 OCNG is transmitted as specified in A.5.1.8 is transmitted on subframe 1 and 6 from TP1.
Note 5: TM10 OCNG is transmitted as specified in A.5.1.8 is transmitted on subframe 1, 2, 3, 4, 6, 7, 8 and 9 from TP2 for Test 1; TP2 is blanked for Test 2.
Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.
Note 7: If UE supports multiple CSI processes, CSI process 0 is configured as 'RI-reference CSI process' for CSI process 1.
Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.
Note 9: If UE supports one CSI process, CSI process 1 is not configured in Test 2.
Note 10: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

9.5.5.1_F.2 FDD RI Reporting with Multiple CSI processes for CoMP

Editor's Note: The test procedure to test the reported RI requirement for CSI process 1 in Test 2 for multiple CSI process is TBD

9.5.5.1_F.2.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank with multiple CSI process configured.

9.5.5.1_F.2.2 Test applicability

This test applies to all types of E-UTRA FDD category≥ 2 UEs release 11 and forward, supporting Maximum CSI processes of Three or Four on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.5.5.1_F.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.5.5.1_F.1.3

9.5.5.1_F.2.4 Test description

9.5.5.1_F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2 for UE with 2Rx RF band and Annex A, Figure A.40a for 4Rx capable UE without any 2Rx RF bands.
2. The parameter settings for the cell are set up according to Table 9.5.5.1_F.2.3-2.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.5.1_F.2.4.3.

9.5.5.1_F.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction, PMI for subframe for fixed Rank and the SNR according to Table 9.5.5.1_F.1.3-2 and C.3.2-1 of Annex C.3.2 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and fixed RI. The SS sends downlink MAC padding bits on the DL RMC. The transport format to be used is defined in Annex A.4 Table A.4-1. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1).
3. Measure the t_{fix} (fixed Rank 1 or fixed Rank 2) according to annex G.5.3.
4. Propagation conditions are set according to Annex B.1.
5. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe (Table A.4.1-1).
6. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.5.1_F.1.5-2.
7. The UE shall transmit RRC Connection Reconfiguration Complete message.
8. Propagation conditions are set according to Table 9.5.5.1_F.1.5-2.
9. The SS shall send PDSCH via PDCCH DCI format 2D for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The transport format to be used is defined in Annex A.4 Table A.4-1. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1).

10. Measure $t_{reported}$ according to Annex G.5.3

    If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.5.1_F.2.5-1, then pass the UE for this test and go to step 11. Otherwise, fail the UE.

11. If all tests have not been done, then repeat the same procedure (steps 1 to 10) with test conditions according to the Table 9.5.5.1_F.1.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.5.5.1_F.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.5.1_F.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.8.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigNZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF {	2 entry		
CSI-RS-ConfigNZP-r11	CSI-RS-ConfigNZP-r11-DEFAULT		
}			
csi-RS-ConfigZPToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF {	2 entry		
CSI-RS-ConfigZP-r11	CSI-RS-ConfigZP-r11-DEFAULT		
}			
}			

Table 9.5.5.1_F.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.5.5.1_F.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
codebookSubsetRestriction-r10	Not present		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.5.5.1_F.2.4.3-4: *CQI-ReportConfig- v1130-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	2 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	For CSI process 0 = 1 For CSI process 1 = 2		
cqi-pmi-ConfigIndex-r11	For CSI process 0 = 6 For CSI process 1 = 4		
cqi-FormatIndicatorPeriodic-r11 CHOICE {			
widebandCQI-r11 SEQUENCE {			
csi-ReportMode-r11	Not present		
}			
}			
ri-ConfigIndex-r11	1		
csi-ConfigIndex-r11	Not present		
}			
}			
}			
}			
cqi-ReportBoth-r11 SEQUENCE {			
csi-IM-ConfigToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF SEQUENCE {	2 entry		
csi-IM-ConfigId-r11	For CSI-IM 0 = 1 For CSI-IM 1 = 2		
resourceConfig-r11	For CSI-IM 0 = 2 For CSI-IM 1 = 6		
subframeConfig-r11	1		
}			
csi-ProcessToAddModList-r11 SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF SEQUENCE {	2 entry		
p-C-AndCBSRList-r11[1] SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11	0		
codebookSubsetRestriction-r11	According to each test	010000 for fixed RI = 2, 000011 for fixed RI = 1, 010011 for UE reported RI	
}			
cqi-ReportBothProc-r11[1] SEQUENCE {			
ri-Ref-CSI-ProcessId-r11	1		
pmi-RI-Report-r11	setup		
}			
cqi-ReportPeriodicProcId-r11	For CSI process 0 = 1 For CSI process 1 = 2		
}			
}			
}			

Table 9.5.5.1_F.2.4.3-5: *CSI-RS-ConfigNZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {			
csi-RS-ConfigNZPId-r11	For CSI-RS 0 = 1 For CSI-RS 1 = 2		
resourceConfig-r11	For CSI-RS 0 = 0 For CSI-RS 1 = 3		
}			

Table 9.5.5.1_F.2.4.3-6: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	For Zero-power CSI-RS 0 = 1 For Zero-power CSI-RS 1 = 2		
resourceConfigList-r11	For Zero-power CSI-RS 0 = 0011000000000000 For Zero-power CSI-RS 1 = 1000001000000000		
}			

9.5.5.1_F.2.5 Test requirement

Table 9.5.5.1_F.2.5-1: Test requirements for RI Reporting with Multiple CSI processes for CoMP (FDD)

	Test 1	**Test 2**
γ_1	N/A	0.99
γ_2	0.99	N/A
UE Category	≥2	≥2

9.5.5.2_F TDD RI Reporting with CSI processes for CoMP

9.5.5.2_F.1 TDD RI Reporting with Single CSI process for CoMP

9.5.5.2_F.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank with one CSI process configured.

9.5.5.2_F.1.2 Test applicability

This test applies to all types of E-UTRA TDD category ≥2 UEs release 11 and forward, supporting Maximum CSI processes of One on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.5.5.2_F.1.3 Minimum conformance requirements

Each CSI process is associated with a CSI-RS resource and a CSI-IM resource as shown in Table 9.5.5.2_F.1.3-1. For UE supports one CSI process CSI process 0 is configured for Test 1 and Test 2, but CSI process 1 is not configured for Test 2.The corresponding γ requirements for Test 1 and Test 2 shall be fulfilled. The requirement on reported RI for CSI process 1 in Test 2 is not applicable.

For UE supports multiple CSI processes, CSI process 0 is configured for Test 1 and CSI processes 0 and 1 are configured for Test 2. The corresponding γ requirements for Test 1 and Test 2 shall be fulfilled, and also the requirement on reported RI for CSI process 1 in Test 2.

The minimum performance requirement in Table 9.5.5.2_F.1.3-2 is defined as:

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$.

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

c) For Test 2, the RI reported for CSI process 1 shall be the same as the most recent RI reported for CSI process 0 if UE is configured with multiple CSI processes

For the parameters specified in Table 9.5.5.2_F.1.3-2, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.5.2_F.1.3-3.

Table 9.5.5.2_F.1.3-1: Configuration of CSI processes

	CSI process 0	CSI process 1
CSI-RS resource	CSI-RS signal 0	CSI-RS signal 1
CSI-IM resource	CSI-IM resource 0	CSI-IM resource 1

Table 9.5.5.2_F.1.3-2: Test Parameters for RI Reporting with Single CSI process for CoMP (TDD)

Parameter		Unit	Test 1		Test 2	
			TP1	TP2	TP1	TP2
Bandwidth		MHz	10 MHz		10 MHz	
Transmission mode			10	10	10	10
Downlink power allocation	ρ_A	dB	0		0	
	ρ_B	dB	0		0	
	P_C	dB	0	0	0	0
	σ	dB	0		0	
Uplink downlink configuration			2	2	2	2
Special subframe configuration			4	4	4	4
SNR		dB	0	0	20	20
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-98	-78	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA 5 Low	EPA 5 Low	EPA 5 Low	EPA 5 High
Antenna configuration			2x2	2x2	2x2	2x2
Beamforming Model			As specified in Section B.4.3		As specified in Section B.4.3	
Timing offset between TPs		us	0		0	
Frequency offset between TPs		Hz	0		0	
Cell-specific reference signals			Antenna ports 0		Antenna ports 0	
CSI-RS signal 0			Antenna ports 15,16	N/A	Antenna ports 15,16	N/A
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3	N/A	5/3	N/A
CSI-RS 0 configuration			0	N/A	0	N/A
CSI-RS signal 1			N/A	Antenna ports 15,16	N/A	Antenna ports 15,16
CSI-RS 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A	5/3	N/A	5/3
CSI-RS 1 configuration			N/A	3	N/A	3
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			N/A	3 / 1000001000000000	N/A	3 / 1000001000000000
Zero-power CSI-RS 1 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			3 / 0011000000000000	N/A	3 / 0011000000000000	N/A
CSI-IM 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3	N/A	5/3	N/A
CSI-IM 0 configuration			2	N/A	2	N/A
CSI-IM 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A	5/3	N/A	5/3
CSI-IM 1 configuration			N/A	6	N/A	6
RI configuration			Fixed RI=2 and follow RI	N/A	Fixed RI=1 and follow RI	N/A
CSI process 0 (Note 6, 7)	CSI-RS		CSI-RS 0	N/A	CSI-RS 0	N/A
	CSI-IM		CSI-IM 0	N/A	CSI-IM 0	N/A
	Reporting mode		PUSCH 3-1	N/A	PUSCH 3-1	N/A
	Reporting Interval	ms	*5*	N/A	*5*	N/A
	CQI delay	ms	11	N/A	11	N/A
CSI process 1 (Note 6, 7, 9)	CSI-RS		N/A	N/A	N/A	CSI-RS 1
	CSI-IM		N/A	N/A	N/A	CSI-IM 1
	Reporting mode		N/A	N/A	N/A	PUSCH 3-1
	Reporting Interval	ms	N/A	N/A	N/A	*5*
	CQI delay	ms	N/A	N/A	N/A	11
CSI process for PDSCH scheduling			CSI process 0		CSI process 0	
Cell ID			0	6	0	6
Quasi-co-located CSI-RS			CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CRS			Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell ID as Cell 2
PMI for subframe 4 and 9			010000 for fixed RI = 2 010011 for UE	100000	000011 for fixed RI = 1 010011 for UE	N/A

		reported RI		reported RI	
PMI for subframe 3 and 8		100000	100000	100000	N/A
Max number of HARQ transmissions		1	N/A	1	N/A
ACK/NACK feedback mode		Multiplexing	N/A	Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: 3 symbols allocated to PDCCH
Note 3: Reference measurement channel RC.13 TDD according to Table A.4-1. PDSCH transmission is scheduled on subframe 4 and 9 from TP1.
Note 4: TM10 OCNG as specified in A.5.2.8 is transmitted on subframe 3 and 8 from TP1.
Note 5: TM10 OCNG as specified in A.5.2.8 is transmitted on subframe 3, 4, 8 and 9 from TP2 for Test 1; TP2 is blanked for Test 2.
Note 6: Reported wideband CQI and PMI are used and sub-band CQI is discarded.
Note 7: If UE supports multiple CSI processes, CSI process 0 is configured as 'RI-reference CSI process' for CSI process 1.
Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#3and #8 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#7 and #2.
Note 9: If UE supports one CSI process, CSI process 1 is not configured in Test 2.

Table 9.5.5.2_F.1.3-3: Minimum requirements for RI Reporting with Single CSI process for CoMP (TDD)

	Test 1	Test 2
γ_1	N/A	1.0
γ_2	1.0	N/A
UE Category	≥2	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.5.5.2.

9.5.5.2_F.1.4 Test description

9.5.5.2_F.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2 for UE with 2Rx RF band and Annex A, Figure A.40a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.5.5.2_F.1.3-2.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.5.2_F.1.4.3.

9.5.5.2_F.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction, PMI for subframe for fixed Rank and the SNR according to Table 9.5.5.2_F.1.3-1 as and C.3.3-1 of Annex C.3.3 as appropriate.

2. The SS shall send PDSCH in via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and fixed RI as defined in Table 9.5.5.2_F.1.3-2. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2).

3. Measure the t_{fix} according to annex G.5.3.

4. Propagation conditions are set according to Annex B.1.

5. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2).

6. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.5.2_F.1.3-1.

7. The UE shall transmit RRC Connection Reconfiguration Complete message.

8. Propagation conditions are set according to Table 9.5.5.2_F.1.5-2.

9. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 in subframe #2 and #7 (Table A.4.1-2).

10. Measure $t_{reported}$ according to Annex G.5.3.

    If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.5.2_F.1.5-1, then pass the UE for this test and go to step 12. Otherwise, fail the UE.

11. If all tests have not been done, then repeat the same procedure (steps 1 to 10) with test conditions according to the Table 9.5.5.2_F.1.3-1 for the other Tests as appropriate. Otherwise pass the UE.

9.5.5.2_F.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.5.2_F.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
pdsch-ConfigDedicated	*PDSCH-ConfigDedicated-DEFAULT*		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-ConfigZPToAddModList-r11	*CSI-RS-ConfigZP-r11-DEFAULT*		
cqi-ReportConfig-v1130	*CQI-ReportConfig-v1130-DEFAULT*		
}			

Table 9.5.5.2_F.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.5.5.2_F.1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.5.5.2_F.1.4.3-4: *CQI-ReportConfig- v1130-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	10	CSI process 0	
ri-ConfigIndex-r11	1	CSI process 0	
csi-ConfigIndex-r11 CHOICE {			
setup SEQUENCE {			
cqi-pmi-ConfigIndex2-r11	According to each test	For CSI process 1: Test 1 = N/A Test 2 = 15	
ri-ConfigIndex2-r11	According to each test	For CSI process 1: Test 1 = N/A Test 2 = 1	
}			
}			
}			
}			
}			

Table 9.5.5.2_F.1.4.3-5: *CSI-RS-ConfigZP-r11-DEFAULT*

Derivation Path: 36.3508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-ConfigZP-r11 ::= SEQUENCE {			
csi-RS-ConfigZPId-r11	1		
resourceConfigList-r11	For Zero-power CSI-RS 0 = 0011000000000000 For Zero-power CSI-RS 1 configuration = 1000001000000000	Parameter: *ZeroPowerCSI-RS*	
subframeConfig-r11	3	$\Delta_{\text{CSI-RS}}$ = $I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
}			

9.5.5.2_F.1.5 Test requirement

Table 9.5.5.2_F.1.5-1: Test requirements for RI Reporting with Single CSI process for CoMP (FDD)

	Test 1	Test 2
γ_1	N/A	0.99
γ_2	0.99	N/A
UE Category	≥2	≥2

Table 9.5.5.2_F.1.5-2: Test Parameters for RI Reporting with Single CSI process for CoMP (TDD)

Parameter		Unit	Test 1		Test 2	
			TP1	TP2	TP1	TP2
Bandwidth		MHz	10 MHz		10 MHz	
Transmission mode			10	10	10	10
Downlink power allocation	ρ_A	dB	0		0	
	ρ_B	dB	0		0	
	P_C	dB	0	0	0	0
	σ	dB	0		0	
Uplink downlink configuration			2	2	2	2
Special subframe configuration			4	4	4	4
SNR for UE with 2Rx RF band		dB	0	0	20	20
SNR for 4Rx UE without 2Rx RF band		dB	-3	-3	17	17
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-98	-78	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			EPA 5 Low	EPA 5 Low	EPA 5 Low	EPA 5 High
Antenna configuration			2x2	2x2	2x2	2x2
Beamforming Model			As specified in Section B.4.3		As specified in Section B.4.3	
Timing offset between TPs		us	0		0	
Frequency offset between TPs		Hz	0		0	
Cell-specific reference signals			Antenna ports 0		Antenna ports 0	
CSI-RS signal 0			Antenna ports 15,16	N/A	Antenna ports 15,16	N/A
CSI-RS 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3	N/A	5/3	N/A
CSI-RS 0 configuration			0	N/A	0	N/A
CSI-RS signal 1			N/A	Antenna ports 15,16	N/A	Antenna ports 15,16
CSI-RS 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A	5/3	N/A	5/3
CSI-RS 1 configuration			N/A	3	N/A	3
Zero-power CSI-RS 0 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			N/A	3 / 1000001000000000	N/A	3 / 1000001000000000
Zero-power CSI-RS 1 configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap			3 / 0011000000000000	N/A	3 / 0011000000000000	N/A
CSI-IM 0 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/3	N/A	5/3	N/A
CSI-IM 0 configuration			2	N/A	2	N/A
CSI-IM 1 periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			N/A	5/3	N/A	5/3
CSI-IM 1 configuration			N/A	6	N/A	6
RI configuration			Fixed RI=2 and follow RI	N/A	Fixed RI=1 and follow RI	N/A
CSI process 0 (Note 6, 7)	CSI-RS		CSI-RS 0	N/A	CSI-RS 0	N/A
	CSI-IM		CSI-IM 0	N/A	CSI-IM 0	N/A
	Reporting mode		PUSCH 3-1	N/A	PUSCH 3-1	N/A
	Reporting Interval	ms	*5*	N/A	*5*	N/A
	CQI delay	ms	11	N/A	11	N/A
CSI process 1 (Note 6, 7, 9)	CSI-RS		N/A	N/A	N/A	CSI-RS 1
	CSI-IM		N/A	N/A	N/A	CSI-IM 1
	Reporting mode		N/A	N/A	N/A	PUSCH 3-1
	Reporting Interval	ms	N/A	N/A	N/A	*5*
	CQI delay	ms	N/A	N/A	N/A	11
CSI process for PDSCH scheduling			CSI process 0		CSI process 0	
Cell ID			0	6	0	6
Quasi-co-located CSI-RS			CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CRS			Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell ID as Cell 2
PMI for subframe 4 and 9			010000 for fixed RI = 2	100000	000011 for fixed RI = 1	N/A

		010011 for UE reported RI		010011 for UE reported RI	
PMI for subframe 3 and 8		100000	100000	100000	N/A
Max number of HARQ transmissions		1	N/A	1	N/A
ACK/NACK feedback mode		Multiplexing	N/A	Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: 3 symbols allocated to PDCCH
Note 3: Reference measurement channel RC.13 TDD according to Table A.4-1. PDSCH transmission is scheduled on subframe 4 and 9 from TP1.
Note 4: TM10 OCNG as specified in A.5.2.8 is transmitted on subframe 3 and 8 from TP1.
Note 5: TM10 OCNG as specified in A.5.2.8 is transmitted on subframe 3, 4, 8 and 9 from TP2 for Test 1; TP2 is blanked for Test 2.
Note 6: Reported wideband CQI and PMI are used and sub-band CQI is discarded.
Note 7: If UE supports multiple CSI processes, CSI process 0 is configured as 'RI-reference CSI process' for CSI process 1.
Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#3and #8 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#7 and #2.
Note 9: If UE supports one CSI process, CSI process 1 is not configured in Test 2.
Note 10: The SNR requirement for 4Rx capable UEs is as specified in 9.1.1.4.1. For 4Rx UE without 2Rx RF bands SNR requirement is reduced by [3] dB

9.5.5.2_F.2 TDD RI Reporting with Multiple CSI processes for CoMP

Editor's Note: The test procedure to test the reported RI requirement for CSI process 1 in Test 2 for multiple CSI process is TBD

9.5.5.2_F.2.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank with Multiple CSI processes configured.

9.5.5.2_F.2.2 Test applicability

This test applies to all types of E-UTRA TDD category ≥2 UEsrelease 11 and forward, supporting Maximum CSI processes of Three or Four on a component carrier within a band with PDSCH transmission mode 10.

Note: This test also applies to UE supporting 4Rx antenna ports

9.5.5.2_F.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 9.5.5.2_F.1.3

9.5.5.2_F.2.4 Test description

9.5.5.2_F.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.40 for antenna configuration 2x2 for UE with 2Rx RF band and Annex A, Figure A.40a for 4Rx capable UE without any 2Rx RF bands.

2. The parameter settings for the cell are set up according to Table 9.5.5.2_F.2.3-2.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.5.5.2_F.2.4.3.

9.5.5.2_F.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction, PMI for subframe for fixed Rank and the SNR according to Table 9.5.5.2_F.1.3-2 as and C.3.3-1 of Annex C.3.3 as appropriate.

2. The SS shall send PDSCH in via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and fixed RI. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2).

3. Measure the t_{fix} according to annex G.5.3.

4. Propagation conditions are set according to Annex B.1.

5. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2).

6. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.5.5.2_F.1.5-2.

7. The UE shall transmit RRC Connection Reconfiguration Complete message.

8. Propagation conditions are set according to Table 9.5.5.2_F.5.3-2.

9. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2).

10. Measure $t_{reported}$ according to Annex G.5.3

    If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.5.5.2_F.2.5-1, then pass the UE for this test and go to step 12. Otherwise, fail the UE.

11. If all tests have not been done, then repeat the same procedure (steps 1 to 10) with test conditions according to the Table 9.5.5.2_F.1.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.5.5.2_F.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.5.5.2_F.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*CQI-ReportConfig-r10-DEFAULT* using condition RBC		
antennaInfo CHOICE {			
explicitValue	AntennaInfoDedicated		
}			
}			

Table 9.5.5.2_F.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.5.5.2_F.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm10-v1130		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 9.5.5.2_F.2.4.3-4: *CQI-ReportConfig- v1130-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-v1130 ::= SEQUENCE {			
cqi-ReportPeriodic-v1130 SEQUENCE {			
cqi-ReportPeriodicProcExtToAddModList-r11 SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF SEQUENCE {	1 entry		
cqi-ReportPeriodicProcExtId-r11[1] SEQUENCE {			
cqi-ReportPeriodicProcExtId-r11	1		
cqi-pmi-ConfigIndex-r11	6	CSI process 0	
}			
ri-ConfigIndex-r11	1	CSI process 0	
csi-ConfigIndex-r11 CHOICE {			
setup SEQUENCE {			
cqi-pmi-ConfigIndex2-r11	According to each test	For CSI process 1: Test 1 = N/A Test 2 = 4	
ri-ConfigIndex2-r11	According to each test	For CSI process 1: Test 1 = N/A Test 2 = 1	
}			
}			
}			
}			
}			

Table 9.5.5.2_F.2.4.3-5: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	For CSI-RS 0 configuration = 0 For CSI-RS1 configuration = 3	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE {			
release			
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	5		
zeroTxPowerSubframeConfig-r10	3		
}			
}			
}			

Table 9.5.5.2_F.2.4.3-6: *CSI-Process*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-Process-r11::= SEQUENCE {			
CSI-ProcessId-r11	1		
CSI-RS-ConfigNZPId-r11	According to each CSI process	For CSI-RS 0 = 1 For CSI-RS 1 = 2	
CSI-IM-ConfigId-r11	1		
p-C-AndCBSRList-r11 SEQUENCE (SIZE (1..2)) OF SEQUENCE {	1 entry		
p-C-r11	0		
codebookSubsetRestriction-r11	According to each test		
}			

9.5.5.2_F.2.5 Test requirement

Table 9.5.5.2_F.2.5-1: Test requirements for RI Reporting with Multiple CSI processes for CoMP (TDD)

	Test 1	Test 2
γ_1	N/A	0.99
γ_2	0.99	N/A
UE Category	≥2	≥2

9.6 Additional requirements for carrier aggregation

This clause includes requirements for the reporting of channel state information (CSI) with the UE configured for carrier aggregation. The purpose is to verify that the channel state for each cell is correctly reported with multiple cells configured for periodic reporting.

Unless otherwise stated, the logical carriers PCC / SCC are mapped on physical frequencies as defined in Table 9.6-1.

Table 9.6-1: PCC/SCCs frequency mapping

CA Configuration	PCC-SCC mapping	Notes
Intra-band CA	CC1-CC2	1
Inter-band CA (CA_x-y)	Bx-By (if not supported by the UE, then By-Bx)	2
Note 1: Notation CCi-CCj means PCC on component carrier CCi and SCC on component carrier CCj, with CCi/j frequencies defined in the corresponding intra-band contiguous / non-contiguous CA band in TS 36.508.		
Note 2: Notation Bi–Bj means PCC on component Band i and SCC on component Band j, with single Band i/j frequencies defined in TS 36.508.		

9.6.1 Periodic reporting on multiple cells (Cell-Specific Reference Symbols)

9.6.1.1_A FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA

9.6.1.1_A.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA(2DL CA)

9.6.1.1_A.1.1 Test purpose

To verify that the UE reports different CQI indices for Pcell and Scell if each cell experiences a different SNR.

9.6.1.1_A.1.2 Test applicability

This test applies to

all types of E-UTRA FDD release 10 and forward UE of category 3 or higher that support inter-band OR intra-band contiguous DL CA.

This test also applies to all types of E-UTRA FDD release 11 and forward UE of category 3 or higher that support intra-band non contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.1_A.1.3 Minimum conformance requirements

The following requirements apply to UE Category ≥3. For the parameters specified in Table 9.6.1.1_A.1.3-1 and Table 9.6.1.1_A.1.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell reported shall be such that

$$\text{wideband CQI}_{\text{Pcell}} - \text{wideband CQI}_{\text{Scell}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.1_A.1.3-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD)

Parameter		Unit	Pcell	Scell
PDSCH transmission mode			1	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for CQI reporting			PUCCH Format 2	
PUCCH Report Type			4	
Reporting periodicity		Ms	N_{pd} = 10	
cqi-pmi-ConfigurationIndex			11	16 [shift of 5 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.				

Table 9.6.1.1_A.1.3-2: PUCCH 1-0 static test (FDD)

Test number	Bandwidth combination
1	10MHz for both cells
2	20MHz for both cells
3	5MHz for both cells
4	5MHz for PCell and 10MHz for SCell
5	5MHz for PCell and 15MHz for SCell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.1.

9.6.1.1_A.1.4 Test description

9.6.1.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.1_A.1.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.1_A.1.4.1-1

Table 9.6.1.1_A.1.4.1-1: Test point selection for PUCCH 1-0 static test

CA Applicability	Bandwidth combination

	10+10	20+20	5+5	5+10	5+15
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test 3	Test4	Test 5
Intra-band contiguous CA (CA2_C)	Test 1	Test 2	Test 3	Test4	Test 5
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test 1	Test 2	Test 3	Test4	Test 5
Note 1: Only one test point is tested. Select the first UE supported CA bandwidth combination (moving from left to right) and then choose any one of the UE supported CA capabilities.					

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure group A.45 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 9.6.1.1_A.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.1_A.1.4.3.

9.6.1.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.1_A.1.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.1_A.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.1_A.1.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.1_A.1.4.3-7.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.1_A.1.5-1 as appropriate.

5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.

6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cell. For each CSI report calculate the respective difference $CQI_{P\text{-}S}$ = wideband CQI_{Pcell} – wideband CQI_{Scell}.

7. If more than 1800 values of $CQI_{P\text{-}S}$ are ≥ 2 pass the UE. Otherwise fail the UE.

9.6.1.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.1_A.1.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.1_A.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.1_A.1.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	setup		
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	11	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {	widebandCQI		
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.1_A.1.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicatedSCell-r10-DEFAULT*		
}			

Table 9.6.1.1_A.1.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 9.6.1.1_A.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.1_A.1.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	16		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

9.6.1.1_A.1.5 Test requirement

Table 9.6.1.1_A.1.5-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD)

Parameter		**Unit**	**Pcell**	**Scell**
PDSCH transmission mode			1	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-88	-94
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-91	-97
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for CQI reporting			PUCCH Format 2	
PUCCH Report Type			4	
Reporting periodicity		Ms	N_{pd} = 10	
cqi-pmi-ConfigurationIndex			11	16 [shift of 5 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1. Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2				

The pass fail decision is as specified in the test procedure in clause 9.6.1.1_A.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.1_A.2 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (3DL CA)

9.6.1.1_A.2.1 Test purpose

To verify that the UE reports different CQI indices for Pcell and Scells if each cell experiences a different SNR.

9.6.1.1_A.2.2 Test applicability

This test case applies to all types of E-UTRA FDD release 10 and forward UE of category 5 or higher that support 3DL Intra-band contiguous CA or 3DL Inter-band CA, or 3DL with Intra-band contiguous and Inter-band CA.
This test case also applies to all types of E-UTRA FDD release 11 and forward UE of category 5 or higher that support 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.1_A.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥5. For the parameters specified in Table 9.6.1.1_A.2.3-1 and Table 9.6.1.1_A.2.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2 reported shall be such that

$$\text{wideband CQI}_{\text{Pcell}} - \text{wideband CQI}_{\text{Scell1}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.1_A.2.3-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD, 3 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2
PDSCH transmission mode			1		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			21	26 [shift of 5 ms relative to Pcell]	31 [shift of 10 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.					

Table 9.6.1.1_A.2.3-2: PUCCH 1-0 static test (FDD, 3DL CA)

Test number	Bandwidth combination (MHz)
1	3x20
2	20+20+15
3	20+20+10
4	20+15+15
5	20+15+10
6	20+10+10
7	15+15+10
8	20+10+5
9	20+15+5
10	10+10+5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.1.

9.6.1.1_A.2.4 Test description

9.6.1.1_A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.1_A.2.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.1_A.2.4.1-1.

Table 9.6.1.1_A.2.4.1-1: Test point selection for PUCCH 1-0 static test

CA Applicability	Bandwidth combination									
	3x20	20+20+15	20+20+10	20+15+15	20+15+10	20+10+10	15+15+10	20+10+5	20+15+5	10+10+5
Intra-band contiguous (CA_C)	Test 1	Test 2	Test 3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Inter-band (CA_A_2)	Test 1	Test 2	Test 3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Inter-band (CA_A_3)	Test 1	Test 2	Test 3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Intra-band non-contiguous (CA_N)	Test 1	Test 2	Test 3	Test4	Test5	Test6	Test7	Test8	Test9	Test10
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.										

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC..

2. The parameter settings for the cell are set up according to Table 9.6.1.1_A.2.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.1_A.2.4.3.

9.6.1.1_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.1_A.2.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.1_A.2.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.1_A.2.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.1_A.2.4.3-7.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.1_A.2.5-1 as appropriate.

5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.

6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1} and the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2}.

7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.1_A.2.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.1_A.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.1_A.2.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	setup		
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	21	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {	widebandCQI		
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.1_A.2.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicatedSCell-r10-DEFAULT*		
}			

Table 9.6.1.1_A.2.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 9.6.1.1_A.2.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.1_A.2.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	26		Scell1
	31		Scell2
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

9.6.1.1_A.2.5 Test requirement

Table 9.6.1.1_A.2.5-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD, 3 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2
PDSCH transmission mode			1		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-89	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			21	26 [shift of 5 ms relative to Pcell]	31 [shift of 10 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.					
Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.1_A.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.1_A.3 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (4DL CA)

9.6.1.1_A.3.1 Test purpose

To verify that the UE reports different CQI indices for Pcell and Scells if each cell experiences a different SNR.

9.6.1.1_A.3.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of category 8 or higher that support 4DL Intra-band contiguous CA or 4DL Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.
This test case also applies to all types of E-UTRA FDD release 11 and forward UE of category 8 or higher that support 4DL with Intra-band non-contiguous and Inter-band CA, or 4DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.1_A.3.3 Minimum conformance requirements

The following requirements for 4DL CA apply to UE Category ≥8. For CA with 4 DL CC, for the parameters specified in Table 9.6.1.1_A.3.3-1 and Table 9.6.1.1_A.3.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of PCell and SCell1 reported, and the difference between the wideband CQI indices of SCell 1 and SCell2, and SCell 1 and SCell 3 reported shall be such that

$$\text{wideband CQI}_{\text{PCell}} - \text{wideband CQI}_{\text{SCell1}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell3}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.1_A.3.3-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD, 3 and 4 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2, 3
PDSCH transmission mode			1		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			21	26 (shift of 5 ms relative to Pcell)	31 for Scell2 (shift of 10 ms relative to Pcell) , 36 for Scell3 (shift of 15ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.					

Table 9.6.1.1_A.3.3-2: PUCCH 1-0 static test (FDD, 4DL CA)

Test number	Bandwidth combination (MHz)
1	4x20
2	20+20+20+10
3	20+20+10+10
4	20+10+10+5
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2. The test coverage for different number of component carriers is defined in 9.1.1.3. Note 2: If more than one cell can be configured as PCell, choose one with the smallest bandwidth as PCell. If all the cells which can be configured as PCell have the same bandwidth, randomly choose one as PCell. Randomly associate the other cells to SCell 1, SCell 2 and SCell3.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.1.

9.6.1.1_A.3.4 Test description

9.6.1.1_A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.1_A.3.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.1_A.3.4.1-1.

Table 9.6.1.1_A.3.4.1-1: Test point selection for PUCCH 1-0 static test

CA Applicability	Bandwidth combination			
	4x20	20+20+20+10	20+20+10+10	20+10+10+5
Intra-band contiguous (CA_C)	Test 1	Test 2	Test 3	Test 4
Inter-band (CA_A_2)	Test 1	Test 2	Test 3	Test 4
Inter-band (CA_A_3)	Test 1	Test 2	Test 3	Test 4
Intra-band non-contiguous (CA_N)	Test 1	Test 2	Test 3	Test 4
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.				

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 9.6.1.1_A.3.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.1_A.3.4.3.

9.6.1.1_A.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.1_A.3.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.1_A.3.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.1_A.3.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.1_A.3.4.3-7.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.1_A.3.5-1 as appropriate.

5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.

6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband $CQI_{Scell1,}$ the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2} and the respective difference $CQI_{S1\text{-}S3}$ = wideband CQI_{Scell1} – wideband CQI_{Scell3}.

7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2, more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S3}$ are ≥ 2, pass the UE. Otherwise fail the UE.9.6.1.1_A.3.4.3Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.1_A.3.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.1_A.3.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.1_A.3.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	setup		
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	21	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {	widebandCQI		
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.1_A.3.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicatedSCell-r10-DEFAULT*		
}			

Table 9.6.1.1_A.3.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 9.6.1.1_A.3.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.1_A.3.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	26		Scell1
	31		Scell2
	36		Scell3
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

9.6.1.1_A.3.5 Test requirement

Table 9.6.1.1_A.3.5-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD, 3 and 4 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2, 3
PDSCH transmission mode			1		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	[-89]	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			21	26 (shift of 5 ms relative to Pcell)	31 for Scell2 (shift of 10 ms relative to Pcell) , 36 for Scell3 (shift of 15ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1. Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.1_A.3.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.1_A.4 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (5DL CA)

Editor's notes: This test case is incomplete. The following items are missing or are incomplete:

- Some test parameters in minimum requirements are still in square brackets

9.6.1.1_A.4.1 Test purpose

To verify that the UE reports different CQI indices for Pcell and Scells if each cell experiences a different SNR.

9.6.1.1_A.4.2 Test applicability

This test case applies to all types of E-UTRA FDD release 11 and forward UE of category 8 and 11 or higher that support 5DL with Intra-band contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Inter-band CA or 5DL with Intra-band non-contiguous and Intra-band contiguous CA.
This test case also applies to all types of E-UTRA FDD release 12 and forward UE of category 8 and 11 or higher that support 5DL Inter-band CA,

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.1_A.4.3 Minimum conformance requirements

The following requirements for 5DL CA apply to UE Category 8 and ≥11. For CA with 5 DL CC, for the parameters specified in Table 9.6.1.1_A.4.3-1 and Table 9.6.1.1_A.4.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of PCell and SCell1 reported, and the difference between the wideband CQI indices of SCell 1 and SCell2, SCell 1 and SCell 3, and SCell 1 and SCell 4 reported shall be such that

$$\text{wideband CQI}_{\text{PCell}} - \text{wideband CQI}_{\text{SCell1}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell3}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell4}} \geq [2]$$

for more than 90% of the time.

Table 9.6.1.1_A.4.3-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD, 5 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2, 3, 4
PDSCH transmission mode			1		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 40		
cqi-pmi-ConfigurationIndex			41	46 (shift of 5 ms relative to Pcell)	51 for Scell 2 (shift of 10 ms relative to Pcell), 56 for Scell 3 (shift of 15ms relative to Pcell), 61 for Scell4 (shift of 20ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.					

Table 9.6.1.1_A.4.3-2: PUCCH 1-0 static test (FDD, 5DL CA)

Test number	Bandwidth combination (MHz)
1	5x20
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2. The test coverage for different number of component carriers is defined in 9.1.1.3. Note 2: If more than one cell can be configured as PCell, choose one with the smallest bandwidth as PCell. If all the cells which can be configured as PCell have the same bandwidth, randomly choose one as PCell. Randomly associate the other cells to SCell1, SCell2, SCell3 and SCell4.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.1.

9.6.1.1_A.4.4 Test description

9.6.1.1_A.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.1_A.4.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.1_A.4.4.1-1.

Table 9.6.1.1_A.4.4.1-1: Test point selection for PUCCH 1-0 static test

CA Applicability	Bandwidth combination
	5x20
Intra-band contiguous (CA5_C)	Test 1
Inter-band (CA5_A2)	Test 1
Inter-band (CA5_A3)	Test 1
Inter-band (CA5_A4)	Test 1
Inter-band (CA5_A5)	Test 1
Intra-band non-contiguous (CA5_N2)	Test 1
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.	

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 9.6.1.1_A.4.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.1_A.4.4.3.

9.6.1.1_A.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.1_A.4.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.1_A.4.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.1_A.4.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.1_A.4.4.3-7.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.1_A.4.5-1 as appropriate.

5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.

6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1}, the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2}, the respective difference $CQI_{S1\text{-}S3}$ = wideband CQI_{Scell1} – wideband CQI_{Scell3} and the respective difference $CQI_{S1\text{-}S4}$ = wideband CQI_{Scell1} – wideband CQI_{Scell4}.

7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S3}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S4}$ are ≥ 2 and if all the conditions are met, then pass the UE. Otherwise fail the UE.

9.6.1.1_A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.1_A.4.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.1_A.4.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.1_A.4.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	setup		
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	41	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {	widebandCQI		
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.1_A.4.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicatedSCell-r10-DEFAULT*		
}			

Table 9.6.1.1_A.4.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	CQI-ReportConfigSCell-r10-DEFAULT		
}			
}			

Table 9.6.1.1_A.4.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.1_A.4.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	46		Scell1
	51		Scell2
	56		Scell3
	61		Scell4
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

9.6.1.1_A.4.5 Test requirement

Table 9.6.1.1_A.4.5-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD, 5 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2, 3, 4
PDSCH transmission mode			1		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	[-89]	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 40		
cqi-pmi-ConfigurationIndex			41	46 (shift of 5 ms relative to Pcell)	51 for Scell 2 (shift of 10 ms relative to Pcell), 56 for Scell 3 (shift of 15ms relative to Pcell), 61 for Scell4 (shift of 20ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1. Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.1_A.4.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.2_A TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA

9.6.1.2_A.1 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (2DL CA)

9.6.1.2_A.1.1 Test purpose

To verify that the UE reports different CQI indices for Pcell and Scell if each cell experiences a different SNR.

9.6.1.2_A.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward with category 3 or higher that support intra-band contiguous DL CA or inter band DL CA.

This test applies to all types of E-UTRA TDD UE release 11 and forward with category 3 or higher that support intra-band non-contiguous DL CA.

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.2_A.1.3 Minimum conformance requirements

The following requirements apply to UE Category ≥3. For the parameters specified in Table 9.6.1.2_A.1.3-1 and Table 9.6.1.2_A.1.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell reported shall be such that

$$\text{wideband CQI}_{\text{Pcell}} - \text{wideband CQI}_{\text{Scell}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.2_A.1.3-1: PUCCH 1-0 static test on multiple cells (TDD, 2 DL CA)

Parameter		Unit	Pcell	Scell
PDSCH transmission mode			1	
Uplink downlink configuration			2	
Special subframe configuration			4	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for CQI reporting			PUCCH Format 2	
PUCCH Report Type			4	
Reporting periodicity		ms	N_{pd} = 10	
cqi-pmi-ConfigurationIndex			8	13 [shift of 5 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.				

Table 9.6.1.2_A.1.3-2: PUCCH 1-0 static test (TDD, 2 DL CA)

Test number	Bandwidth combination
1	20MHz for both cells
2	15MHz for PCell and 20MHz for SCell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.2.

9.6.1.2_A.1.4 Test description

9.6.1.2_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.2_A.1.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.2_A.1.4.1-1.

Table 9.6.1.2_A.1.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for 2DL CA

CA Capability	Bandwidth Combination	
	20+20	20+15
Inter-band CA (two bands) (CA2_A2)	Test 1	N/A
Intra-band contiguous CA (CA2_C)	Test 1	Test 2
Intra-band non-contiguous CA (with two sub-blocks) (CA2_N2)	Test 1	N/A
Note 1: Only one test point is tested. Select the first Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure group A.45 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.2_A.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.2_A.1.4.3.

9.6.1.2_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.2_A.1.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.2_A.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.2_A.1.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.2_A.1.4.3-7.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.2_A.1.5-1 as appropriate.

5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cell. For each CSI report calculate the respective difference CQI_{P-S} = wideband CQI_{Pcell} – wideband CQI_{Scell}.
7. If more than 1800 values of CQI_{P-S} are ≥ 2 pass the UE. Otherwise fail the UE.

9.6.1.2_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.2_A.1.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.2_A.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.2_A.1.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	8	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.2_A.1.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.2_A.1.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.2_A.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.2_A.1.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	13		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

9.6.1.2_A.1.5 Test requirement

Table 9.6.1.2_A.1.5-1: PUCCH 1-0 static test on multiple cells (TDD, 2 DL CA)

Parameter		Unit	Pcell	Scell
PDSCH transmission mode			1	
Uplink downlink configuration			2	
Special subframe configuration			4	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-88	-94
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-91	-97
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for CQI reporting			PUCCH Format 2	
PUCCH Report Type			4	
Reporting periodicity		ms	N_{pd} = 10	
cqi-pmi-ConfigurationIndex			8	13 [shift of 5 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.				
Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2				

The pass fail decision is as specified in the test procedure in clause 9.6.1.2_A.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.2_A.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (3DL CA)

9.6.1.2_A.2.1 Test purpose

To verify that the UE reports different CQI indices for Pcell and Scells if each cell experiences a different SNR.

9.6.1.2_A.2.2 Test applicability

This test case applies to all types of E-UTRA TDD release 10 and forward UE of category 5 or higher that support 3DL Intra-band contiguous CA or 3DL Inter-band CA, or 3DL with Intra-band contiguous and Inter-band CA.

This test case also applies to all types of E-UTRA TDD release 11 and forward UE of category 5 or higher that support 3DL Intra-band non-contiguous CA or 3DL with Intra-band non-contiguous and Inter-band CA, or 3DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.2_A.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥5. For the parameters specified in Table 9.6.1.2_A.2.3-1 and Table 9.6.1.2_A.2.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2 reported shall be such that

$$\text{wideband CQI}_{\text{Pcell}} - \text{wideband CQI}_{\text{Scell1}} \geq 2$$

wideband CQI_{SCell1} – wideband $CQI_{SCell2} \geq 2$

for more than 90% of the time.

Table 9.6.1.2_A.2.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD, 3 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2
PDSCH transmission mode			1		
Uplink downlink configuration			2		
Special subframe configuration			4		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			18	23 [shift of 5 ms relative to Pcell]	28 [shift of 10 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.					

Table 9.6.1.2_A.2.3-2: PUCCH 1-0 static test (TDD, 3DL CA)

Test number	Bandwidth combination (MHz)
1	3x20
2	20+20+15
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.2.

9.6.1.2_A.2.4 Test description

9.6.1.2_A.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.2_A.2.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.2_A.2.4.1-1

Table 9.6.1.2_A.2.4.1-1: Test point selection for PUCCH 1-0 static test

CA Applicability	Bandwidth combination

	3x20	20+20+15
Intra-band contiguous (CA_C)	Test 1	Test 2
Inter-band (CA_A_2)	Test 1	Test 2
Inter-band (CA_A_3)	Test 1	Test 2
Intra-band non-contiguous (CA_N)	Test 1	Test 2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.2_A.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.2_A.2.4.3.

9.6.1.2_A.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.2_A.2.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.2_A.2.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.2_A.2.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.2_A.2.4.3-7.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.2_A.2.5-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1} and the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2}.
7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.2_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.2_A.2.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.2_A.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.2_A.2.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	18	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.2_A.2.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.2_A.2.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.2_A.2.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.2_A.2.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	23		Scell1
	28		Scell2
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

9.6.1.2_A.2.5 Test requirement

Table 9.6.1.2_A.2.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD, 3 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2
PDSCH transmission mode			1		
Uplink downlink configuration			2		
Special subframe configuration			4		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-89	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			18	23 [shift of 5 ms relative to Pcell]	28 [shift of 10 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.					
Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.2_A.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.2_A.3 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (4DL CA)

9.6.1.2_A.3.1 Test purpose

To verify that the UE reports different CQI indices for Pcell and Scells if each cell experiences a different SNR.

9.6.1.2_A.3.2 Test applicability

This test case applies to all types of E-UTRA TDD release 11 and forward UE of category 8 or higher that support 4DL Intra-band contiguous CA or 4DL Inter-band CA, or 4DL with Intra-band contiguous and Inter-band CA.
This test case also applies to all types of E-UTRA TDD release 11 and forward UE of category 8 or higher that support 4DL Intra-band non-contiguous CA or 4DL with Intra-band non-contiguous and Inter-band CA, or 4DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports.

9.6.1.2_A.3.3 Minimum conformance requirements

The following requirements apply to UE Category ≥8. For the parameters specified in Table 9.6.1.2_A.3.3-1 and Table 9.6.1.2_A.3.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2, and SCell1 and SCell3 reported shall be such that

$$\text{wideband CQI}_{\text{Pcell}} - \text{wideband CQI}_{\text{Scell1}} \geq 2$$

wideband CQI_{SCell1} – wideband $CQI_{SCell2} \geq 2$

wideband CQI_{SCell1} – wideband $CQI_{SCell3} \geq 2$

for more than 90% of the time.

Table 9.6.1.2_A.3.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD, 4 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2, 3
PDSCH transmission mode			1		
Uplink downlink configuration			2		
Special subframe configuration			4		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			18	23 (shift of 5 ms relative to Pcell)	28 (shift of 10 ms relative to Pcell), 33 for Scell3 (shift of 15 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.					

Table 9.6.1.2_A.3.3-2: PUCCH 1-0 static test (TDD, 4DL CA)

Test number	Bandwidth combination (MHz)
1	4x20
2	20+20+20+15
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.2.

9.6.1.2_A.3.4 Test description

9.6.1.2_A.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.2_A.3.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.2_A.3.4.1-1

Table 9.6.1.2_A.3.4.1-1: Test point selection for PUCCH 1-0 static test

CA Applicability	Bandwidth combination	
	4x20	20+20+20+15
Intra-band contiguous (CA4_C)	Test 1	Test 2
Inter-band (CA4_A2)	Test 1	Test 2
Inter-band (CA4_A3)	Test 1	Test 2
Inter-band (CA4_A4)	Test 1	Test 2
Intra-band non-contiguous (CA4_N2)	Test 1	Test 2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.2_A.3.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.2_A.3.4.3.

9.6.1.2_A.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.2_A.3.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.2_A.3.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.2_A.3.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.2_A.3.4.3-7.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.2_A.3.5-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1}, the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2} and the respective difference $CQI_{S1\text{-}S3}$ = wideband CQI_{Scell1} – wideband CQI_{Scell3}.
7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2, more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S3}$ are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.2_A.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.2_A.3.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.2_A.3.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.2_A.3.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	18	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.2_A.3.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.2_A.3.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.2_A.3.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.2_A.3.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	23		Scell1
	28		Scell2
	33		Scell3
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

9.6.1.2_A.3.5 Test requirement

Table 9.6.1.2_A.3.5-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD, 4 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2, 3
PDSCH transmission mode			1		
Uplink downlink configuration			2		
Special subframe configuration			4		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-89	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			18	23 (shift of 5 ms relative to Pcell)	28 (shift of 10 ms relative to Pcell), 33 for Scell3 (shift of 15 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1. Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.2_A.3.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.2_A.4 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (5DL CA)

Editor's notes: This test case is incomplete. The following item is incomplete:

- Test parameters in minimum requirements are still in square brackets

9.6.1.2_A.4.1 Test purpose

To verify that the UE reports different CQI indices for Pcell and Scells if each cell experiences a different SNR.

9.6.1.2_A.4.2 Test applicability

This test case applies to all types of E-UTRA TDD release 11 and forward UE of category 8 and 11 or higher that support 5DL Intra-band contiguous CA or 5DL Inter-band CA, or 5DL with Intra-band contiguous and Inter-band CA. This test case also applies to all types of E-UTRA TDD release 11 and forward UE of category 8 and 11 or higher that support 5DL Intra-band non-contiguous CA or 5DL with Intra-band non-contiguous and Inter-band CA, or 5DL with Intra-band non-contiguous and Intra-band contiguous CA.

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.2_A.4.3 Minimum conformance requirements

The following requirements for 5DL CA apply to UE Category 8 and ≥11. For CA with 5 DL CC, for the parameters specified in 9.6.1.1_A.4.3-1 and Table 9.6.1.1_A.4.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of PCell and SCell1 reported, and the difference between the wideband CQI indices of SCell 1 and SCell2, SCell 1 and SCell 3, and SCell 1 and SCell 4 reported shall be such that

$$\text{wideband CQI}_{\text{PCell}} - \text{wideband CQI}_{\text{SCell1}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell3}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell4}} \geq [2]$$

for more than 90% of the time.

Table 9.6.1.2_A.4.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD, 5 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2, 3, 4
PDSCH transmission mode			1		
Uplink downlink configuration			2		
Special subframe configuration			4		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 40		
cqi-pmi-ConfigurationIndex			38	43 (shift of 5 ms relative to Pcell)	48 (shift of 10 ms relative to Pcell), 53 for Scell3 (shift of 15ms relative to Pcell), 58 for Scell4 (shift of 20ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.					

Table 9.6.1.2_A.4.3-2: PUCCH 1-0 static test (TDD, 5 DL CA)

Test number	Bandwidth combination (MHz)
1	5x20
2	15+4x20
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2. The test coverage for different number of component carriers is defined in 9.1.1.3.	
Note 2: If more than one cell can be configured as PCell, choose one of the cells with the smallest bandwidth as PCell. Mapping of PCell and Scells to the CCs shall be constant for all the iterations during the test. Each execution of the test shall use the same mapping.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.2.

9.6.1.2_A.4.4 Test description

9.6.1.2_A.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.2_A.4.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.2_A.4.4.1-1

Table 9.6.1.2_A.4.4.1-1: Test point selection for PUCCH 1-0 static test

CA Applicability	Bandwidth combination	
	5x20	15+4X20
Intra-band (CA5_C)	Test 1	Test 2
Inter-band (CA5_A2)	Test 1	Test 2
Inter-band (CA5_A3)	Test 1	Test 2
Inter-band (CA5_A4)	Test 1	Test 2
Inter-band (CA5_A5)	Test 1	Test 2
Intra-band non-contiguous (CA5_N2)	Test 1	Test 2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.		

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.2_A.4.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.2_A.4.4.3.

9.6.1.2_A.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.2_A.4.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.2_A.4.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.2_A.4.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.2_A.4.4.3-7.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.2_A.4.5-1 as appropriate.

5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.

6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1}, the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2}, the respective difference $CQI_{S1\text{-}S3}$ = wideband CQI_{Scell1} – wideband CQI_{Scell3} and the respective difference $CQI_{S1\text{-}S4}$ = wideband CQI_{Scell1} – wideband CQI_{Scell4}.

7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S3}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S4}$ are ≥ 2 and if all the conditions are met, then pass the UE. Otherwise fail the UE.

9.6.1.2_A.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.2_A.4.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.2_A.4.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.2_A.4.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	38	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.2_A.4.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicatedSCell-r10-DEFAULT*		
}			

Table 9.6.1.2_A.4.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.2_A.4.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.2_A.4.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	43		Scell1
	48		Scell2
	53		Scell3
	58		Scell4
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

9.6.1.2_A.4.5 Test requirement

Table 9.6.1.2_A.4.5-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD, 5 DL CA)

Parameter		Unit	Pcell	Scell1	Scell2, 3, 4
PDSCH transmission mode			1		
Uplink downlink configuration			2		
Special subframe configuration			4		
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-89	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 40		
cqi-pmi-ConfigurationIndex			38	43 (shift of 5 ms relative to Pcell)	48 (shift of 10 ms relative to Pcell), 53 for Scell3 (shift of 15ms relative to Pcell), 58 for Scell4 (shift of 20ms relative to Pcell)

Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2

The pass fail decision is as specified in the test procedure in clause 9.6.1.2_A.4.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.3 TDD-FDD CA for FDD PCell

9.6.1.3.1 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (2DL CA)

9.6.1.3.1.1 Test purpose

To verify that the UE reports different CQI indices for FDD PCell and SCell if each cell experiences a different SNR.

9.6.1.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD UE release 12 and forward that support 2DL CA with FDD as PCell (UE categories 5 and onwards).

Note: This test also applies to UE supporting 4Rx antenna ports.

9.6.1.3.1.3 Minimum conformance requirements

The following requirements apply to UE Category ≥3. For TDD-FDD CA with FDD PCell with 2 DL CC , for the parameters specified in Table 9.6.1.3.1.3-1 and Table 9.6.1.3.1.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell reported shall be such that

wideband CQI_{Pcell} – wideband $CQI_{Scell} \geq 2$

for more than 90% of the time.

Table 9.6.1.3.1.3-1: PUCCH 1-0 static test on multiple cells (TDD-FDD CA with FDD PCell, 2DL CA)

Parameter		Unit	PCell	SCell
PDSCH transmission mode			1	
Uplink downlink configuration			N/A	2
Special subframe configuration			N/A	4
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for CQI reporting			PUCCH Format 2	
PUCCH Report Type			4	
Reporting periodicity		ms	N_{pd} = 10	
cqi-pmi-ConfigurationIndex			9	14 (shift of 5 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1.				

Table 9.6.1.3.1.3-2: PUCCH 1-0 static test (TDD-FDD CA with FDD PCell, 2DL CA)

Test number	Bandwidth combination
1	20MHz for FDD cell and 20MHz for TDD cell
2	10MHz for FDD cell and 20MHz for TDD cell
3	15MHz for FDD cell and 20MHz for TDD cell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2A. The test coverage for different number of component carriers is defined in 9.1.1.3.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.3.

9.6.1.3.1.4 Test description

9.6.1.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.3.1.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.3.1.4.1-1.

Table 9.6.1.3.1.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (2DL CA)

CA Applicability	Bandwidth combination		
	20+20	10+20	15+20
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test3
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure group A.45 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.3.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.3.1.4.3.

9.6.1.3.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.3.1.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.3.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.3.1.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.3.1.4.3-7, *TDD-Config-DEFAULT* is defined in Table 9.6.1.3.1.4.3-8.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.3.1.5-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cell. For each CSI report calculate the respective difference $CQI_{P\text{-}S}$ = wideband CQI_{Pcell} – wideband CQI_{Scell}.
7. If more than 1800 values of $CQI_{P\text{-}S}$ are ≥ 2 pass the UE. Otherwise fail the UE.

9.6.1.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.3.1.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.3.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.3.1.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	9	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.3.1.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicatedSCell-r10-DEFAULT*		
}			

Table 9.6.1.3.1.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.3.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.3.1.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	14		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

Table 9.6.1.3.1.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2	SCell	TDD
specialSubframePatterns	ssp4	SCell	TDD
}			

9.6.1.3.1.5 Test requirement

Table 9.6.1.3.1.3-1: PUCCH 1-0 static test on multiple cells (TDD-FDD CA with FDD PCell, 2DL CA)

Parameter		Unit	PCell	SCell
PDSCH transmission mode			1	
Uplink downlink configuration			N/A	2
Special subframe configuration			N/A	4
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-88	-94
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-91	-97
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for CQI reporting			PUCCH Format 2	
PUCCH Report Type			4	
Reporting periodicity		ms	N_{pd} = 10	
cqi-pmi-ConfigurationIndex			9	14 (shift of 5 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1.				
Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2				

The pass fail decision is as specified in the test procedure in clause 9.6.1.3.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.3.2 TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (3DL CA)

9.6.1.3.2.1 Test purpose

To verify that the UE reports different CQI indices for FDD PCell and SCells if each cell experiences a different SNR.

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.3.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD UE release 12 and forward that support 3DL CA with FDD as PCell (UE categories 5 and onwards).

9.6.1.3.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥5. For TDD-FDD CA with FDD PCell with 3DL CC, for the parameters specified in Table 9.6.1.3.2.3-1 and Table 9.6.1.3.2.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2 reported shall be such that

$$\text{wideband CQI}_{\text{Pcell}} - \text{wideband CQI}_{\text{Scell1}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.3.2.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD-FDD CA with FDD PCell, 3DL CA)

Parameter		Unit	PCell	SCell1	SCell2
PDSCH transmission mode			1		
Uplink downlink configuration			N/A	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	2
Special subframe configuration			N/A	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	4
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			19	24 (shift of 5 ms relative to Pcell)	29 (shift of 10 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1.					

Table 9.6.1.3.2.3-2: PUCCH 1-0 static test (TDD-FDD CA with FDD PCell, 3DL CA)

Test number	Bandwidth combination (MHz)
1	20MHz for FDD cell and 2x20MHz for TDD cell
2	15MHz for FDD cell and 2x20MHz for TDD cell
3	10MHz for FDD cell and 2x20MHz for TDD cell
4	2x20MHz for FDD cell and 20MHz for TDD cell
5	20+15MHz for FDD cell and 20MHz for TDD cell
6	20+10MHz for FDD cell and 20MHz for TDD cell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2A. The test coverage for different number of component carriers is defined in 9.1.1.3. Note 2: If more than one cell can be configured as PCell, choose one with the smallest bandwidth as PCell. If all the cells which can be configured as PCell have the same bandwidth, randomly choose one as PCell. Randomly associate the other cells to SCell 1 and SCell 2.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.3.

9.6.1.3.2.4 Test description

9.6.1.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.3.2.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.3.2.4.1-1

Table 9.6.1.3.2.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (3DL CA)

CA Applicability		Bandwidth combination					
	FDD cell	20	15	10	2x20	20+15	20+10
	TDD cell	2x20	2x20	2x20	20	20	20
Inter-band CA (two bands) (CA3_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Inter-band CA (three bands) (CA3_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Intra-band non-contiguous CA (with two sub-blocks) (CA3_N2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.							

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.3.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.3.2.4.3.

9.6.1.3.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.3.2.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.3.2.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.3.2.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.3.2.4.3-7, *TDD-Config-DEFAULT* is defined in Table 9.6.1.3.2.4.3-8.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.3.2.5-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1} and the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2}.

7. If more than 1800 values of CQI_{P-S1} are ≥ 2 and more than 1800 values of CQI_{S1-S2} are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.3.2.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.3.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.3.2.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	19	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.3.2.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.3.2.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.3.2.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.3.2.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	24	SCell1	
	29	SCell2	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

Table 9.6.1.3.2.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2	2 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
	sa2	SCell 2	
specialSubframePatterns	ssp4	4 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
	ssp4	SCell 2	
}			

9.6.1.3.2.5 Test requirement

Table 9.6.1.3.2.5-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD-FDD CA with FDD PCell, 3DL CA)

Parameter		Unit	PCell	SCell1	SCell2
PDSCH transmission mode			1		
Uplink downlink configuration			N/A	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	2
Special subframe configuration			N/A	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	4
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-89	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			19	24 (shift of 5 ms relative to Pcell)	29 (shift of 10 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1. Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.3.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.3.3 TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (4DL CA)

9.6.1.3.3.1 Test purpose

To verify that the UE reports different CQI indices for FDD PCell and SCells if each cell experiences a different SNR.

9.6.1.3.3.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD UE release 12 and forward that support 4DL CA with FDD as PCell (UE categories 8 and onwards).

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.3.3.3 Minimum conformance requirements

The following requirements for 4DL CA apply to UE Category ≥8. For TDD-FDD CA with FDD PCell with 4 DL CC, for the parameters specified in 9.6.1.3.3.3-1 and Table 9.6.1.3.3.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of PCell and SCell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2, and SCell1 and SCell3 reported shall be such that

$$\text{wideband CQI}_{\text{PCell}} - \text{wideband CQI}_{\text{SCell1}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell3}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.3.3.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD-FDD CA with FDD PCell, 4DL CA)

Parameter		Unit	PCell	SCell1	SCell2, 3
PDSCH transmission mode			1		
Uplink downlink configuration			N/A	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	2
Special subframe configuration			N/A	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	4
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			19	24 (shift of 5 ms relative to Pcell)	29 for SCell 2 (shift of 10 ms relative to Pcell) , 34 for SCell 3 (shift of 15ms relative to PCell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.					

Table 9.6.1.3.3.3-2: PUCCH 1-0 static test (TDD-FDD CA with FDD PCell, 4 DL CA)

Test number	Bandwidth combination (MHz)
1	20MHz for FDD cell and 3x20MHz for TDD cell
2	2x20MHz for FDD cell and 2x20MHz for TDD cell
3	20+15MHz for FDD cell and 2x20MHz for TDD cell
4	2x15MHz for FDD cell and 2x20MHz for TDD cell
5	2x20+15MHz for FDD cell and 20MHz for TDD cell
6	2x15+20MHz for FDD cell and 20MHz for TDD cell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2A. The test coverage for different number of component carriers is defined in 9.1.1.3. Note 2: If more than one cell can be configured as PCell, choose one with the smallest bandwidth as PCell. If all the cells which can be configured as PCell have the same bandwidth, randomly choose one as PCell. Randomly associate the other cells to SCell 1, SCell 2 and SCell3.	

The normative reference for this requirement is TS 36101 [2] clause 9.6.1.3.

9.6.1.3.3.4 Test description

9.6.1.3.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.3.3.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.3.3.4.1-1

Table 9.6.1.3.3.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (4DL CA)

CA Applicability		Bandwidth combination					
	FDD cell	20	2x20	20+15	2x15	2x20+15	2x15+20
	TDD cell	3x20	2x20	2x20	2x20	20	20
Inter-band CA (two bands) (CA4_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Inter-band CA (three bands) (CA4_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Inter-band CA (four bands) (CA4_A4)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.							

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.3.3.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.3.3.4.3.

9.6.1.3.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined in Table 9.6.1.3.3.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.3.3.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.3.3.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.3.3.4.3-7.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.3.3.5-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1}, the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2} and the respective difference $CQI_{S1\text{-}S3}$ = wideband CQI_{Scell1} – wideband CQI_{Scell3}.

7. If more than 1800 values of CQI_{P-S1} are ≥ 2, more than 1800 values of CQI_{S1-S2} are ≥ 2 and more than 1800 values of CQI_{S1-S3} are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.3.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.3.3.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.3.3.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.3.3.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	19	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.3.3.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.3.3.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.3.3.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.3.3.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	24		SCell1
	29		SCell2
	34		SCell3
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

Table 9.6.1.3.3.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2	2 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
	sa2	SCell 2	
specialSubframePatterns	ssp4	4 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
	ssp4	SCell 2	
}			

9.6.1.3.3.5 Test requirement

Table 9.6.1.3.3.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD-FDD CA with FDD PCell, 4DL CA)

Parameter		Unit	PCell	SCell1	SCell2, 3
PDSCH transmission mode			1		
Uplink downlink configuration			N/A	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	2
Special subframe configuration			N/A	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	4
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-89	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			19	24 (shift of 5 ms relative to Pcell)	29 for SCell 2 (shift of 10 ms relative to Pcell) , 34 for SCell 3 (shift of 15ms relative to PCell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1. Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.3.3.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.3.4 TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (5DL CA)

Editor's notes: This test case is incomplete. The following items are missing or are incomplete:

- Some test parameters in minimum requirements are still in square brackets

- Annex G is still absent.

- The test applicability needs to be added to TS36.521-2

9.6.1.3.4.1 Test purpose

To verify that the UE reports different CQI indices for FDD PCell and SCells if each cell experiences a different SNR.

9.6.1.3.4.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD UE release 12 and forward that support 5DL CA with FDD as PCell (UE categories 8 or 11 and onwards).

9.6.1.3.4.3 Minimum conformance requirements

The following requirements for 5DL CA apply to UE Category 8 and ≥11. For TDD-FDD CA with FDD PCell with 5 DL CC, for the parameters specified in Table 9.6.1.3.4.3-1 and Table 9.6.1.3.4.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of PCell and SCell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2, SCell1 and SCell3, and SCell 1 and SCell 4 reported shall be such that

$$\text{wideband CQI}_{\text{PCell}} - \text{wideband CQI}_{\text{SCell1}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell3}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell4}} \geq [2]$$

for more than 90% of the time.

Table 9.6.1.3.4.3-1: PUCCH 1-0 static test on multiple cells (TDD-FDD CA with FDD PCell, 5 DL CA)

Parameter		Unit	PCell	SCell1	SCell2, SCell3, SCell4
PDSCH transmission mode			1		
Uplink downlink configuration			N/A	2 for TDD Cell N/A for FDD Cell	
Special subframe configuration			N/A	4 for TDD Cell N/A for FDD Cell	
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 40		
cqi-pmi-ConfigurationIndex			39	54 (shift of 5 ms relative to Pcell)	59 for SCell 2 (shift of 10 ms relative to Pcell), 64 for SCell 3 (shift of 15 ms relative to Pcell), 69 for SCell 4 (shift of 20 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1.					

Table 9.6.1.3.4.3-2: PUCCH 1-0 static test (TDD-FDD CA with FDD PCell, 5 DL CA)

Test number	Bandwidth combination (MHz)
1	15MHz+2×20MHz for FDD cell and 2x20MHz for TDD cell
2	2×15MHz+20MHz for FDD cell and 2x20MHz for TDD cell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2A. The test coverage for different number of component carriers is defined in 9.1.1.3.	

The normative reference for this requirement is TS 36101 [2] clause 9.6.1.3.

9.6.1.3.4.4 Test description

9.6.1.3.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.3.4.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.3.4.4.1-1

Table 9.6.1.3.4.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (5DL CA)

CA Applicability		Bandwidth combination	
	FDD cell	2x20+15	2x15+20
	TDD cell	2x20	2x20
Inter-band CA (two bands) (CA5_A2)		Test 1	Test 2
Inter-band CA (three bands) (CA5_A3)		Test 1	Test 2
Inter-band CA (four bands) (CA5_A4)		Test 1	Test 2
Inter-band CA (five bands) (CA5_A5)		Test 1	Test 2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders.
2. The parameter settings for the cell are set up according to Table 9.6.1.3.4.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.3.4.4.3.

9.6.1.3.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined in Table 9.6.1.3.4.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.3.4.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.3.4.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.3.4.4.3-7.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.3.4.3-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1}, the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2} and the respective difference $CQI_{S1\text{-}S3}$ = wideband CQI_{Scell1} – wideband CQI_{Scell3} and the respective difference $CQI_{S1\text{-}S4}$ = wideband CQI_{Scell1} – wideband CQI_{Scell4}.
7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2, more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2, more than 1800 values of $CQI_{S1\text{-}S3}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S4}$ are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.3.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.3.4.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.3.4.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.3.4.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	39	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.3.4.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.3.4.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.3.4.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.3.4.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	54	SCell1	
	59	SCell2	
	64	SCell3	
	69	SCell4	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

Table 9.6.1.3.4.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2	PCell	TDD
	sa2	2 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	
specialSubframePatterns	ssp4	PCell	TDD
	ssp4	4 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	
}			

9.6.1.3.4.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.6.1.3.4.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.4 TDD-FDD CA for TDD PCell

9.6.1.4.1 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (2DL CA)

9.6.1.4.1.1 Test purpose

To verify that the UE reports different CQI indices for TDD PCell and SCell if each cell experiences a different SNR.

9.6.1.4.1.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD UE release 12 and forward that support 2DL CA with TDD PCell (UE categories 5 and onwards).

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.4.1.3 Minimum conformance requirements

The following requirements apply to UE Category ≥3. For TDD-FDD CA with TDD PCell with 2 DL CC , for the parameters specified in Table 9.6.1.4.1.3-1 and Table 9.6.1.4.1.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell reported shall be such that

$$\text{wideband CQI}_{\text{Pcell}} - \text{wideband CQI}_{\text{Scell}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.4.1.3-1: PUCCH 1-0 static test on multiple cells (TDD-FDD CA with TDD PCell, 2 DL CA)

Parameter		Unit	PCell	SCell
PDSCH transmission mode			1	
Uplink downlink configuration			2	N/A
Special subframe configuration			4	N/A
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for CQI reporting			PUCCH Format 2	
PUCCH Report Type			4	
Reporting periodicity		ms	N_{pd} = 10	
cqi-pmi-ConfigurationIndex			8	13 (shift of 5 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1.				

Table 9.6.1.4.1.3-2: PUCCH 1-0 static test (TDD-FDD CA with TDD PCell, 2 DL CA)

Test number	Bandwidth combination
1	20MHz for TDD cell and 20MHz for FDD cell
2	20MHz for TDD cell and 10MHz for FDD cell
3	20MHz for TDD cell and 15MHz for FDD cell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2A. The test coverage for different number of component carriers is defined in 9.1.1.3.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.4.

9.6.1.4.1.4 Test description

9.6.1.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA otherwise Mid Range as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.4.1.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.4.1.4.1-1.

Table 9.6.1.4.1.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (2DL CA)

CA Applicability	Bandwidth combination		
	20+20	20+10	20+15
Inter-band CA (two bands) (CA2_A2)	Test 1	Test 2	Test3
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure group A.45 as appropriate for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.4.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.4.1.4.3.

9.6.1.4.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.4.1.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.4.1.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.4.1.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.4.1.4.3-7, *TDD-Config-DEFAULT* is defined in Table 9.6.1.4.1.4.3-8.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.4.1.5-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cell. For each CSI report calculate the respective difference $CQI_{P\text{-}S}$ = wideband CQI_{Pcell} – wideband CQI_{Scell}.
7. If more than 1800 values of $CQI_{P\text{-}S}$ are ≥ 2 pass the UE. Otherwise fail the UE.

9.6.1.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.4.1.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.4.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.4.1.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	8	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.4.1.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicatedSCell-r10-DEFAULT*		
}			

Table 9.6.1.4.1.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.4.1.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.4.1.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	13		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

Table 9.6.1.4.1.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2	PCell	
	sa2	2 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
specialSubframePatterns	ssp4	PCell	
	ssp4	4 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
}			

9.6.1.4.1.5 Test requirement

Table 9.6.1.4.1.5-1: PUCCH 1-0 static test on multiple cells (TDD-FDD CA with TDD PCell, 2 DL CA)

Parameter		Unit	PCell	SCell
PDSCH transmission mode			1	
Uplink downlink configuration			2	N/A
Special subframe configuration			4	N/A
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-88	-94
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-91	-97
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for CQI reporting			PUCCH Format 2	
PUCCH Report Type			4	
Reporting periodicity		ms	N_{pd} = 10	
cqi-pmi-ConfigurationIndex			8	13 (shift of 5 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1.				
Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2				

The pass fail decision is as specified in the test procedure in clause 9.6.1.4.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.4.2 TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (3DL CA)

9.6.1.4.2.1 Test purpose

To verify that the UE reports different CQI indices for TDD PCell and SCells if each cell experiences a different SNR.

9.6.1.4.2.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD UE release 12 and forward that support 3DL CA with TDD as PCell (UE categories 5 and onwards).

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.4.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥5. For TDD-FDD CA with TDD PCell with 3 DL CC, for the parameters specified in Table 9.6.1.4.2.3-1 and Table 9.6.1.4.2.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2 reported shall be such that

$$\text{wideband CQI}_{\text{Pcell}} - \text{wideband CQI}_{\text{Scell1}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.4.2.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD-FDD CA with TDD PCell, 3DL CA)

Parameter		Unit	PCell	SCell1	SCell2
PDSCH transmission mode			1		
Uplink downlink configuration			2	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	N/A
Special subframe configuration			4	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	N/A
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			18	23 (shift of 5 ms relative to Pcell)	28 (shift of 10 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1.					

Table 9.6.1.4.2.3-2: PUCCH 1-0 static test (TDD-FDD CA with TDD PCell, 3DL CA)

Test number	Bandwidth combination (MHz)
1	2x20MHz for TDD cell and 20MHz for FDD cell
2	2x20MHz for TDD cell and 15MHz for FDD cell
3	2x20MHz for TDD cell and 10MHz for FDD cell
4	2x20MHz for FDD cell and 20MHz for TDD cell
5	20+15MHz for FDD cell and 20MHz for TDD cell
6	20+10MHz for FDD cell and 20MHz for TDD cell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2A. The test coverage for different number of component carriers is defined in 9.1.1.3.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.4.

9.6.1.4.2.4 Test description

9.6.1.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.4.2.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.4.2.4.1-1.

Table 9.6.1.4.2.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (3DL CA)

CA Applicability		Bandwidth combination					
	TDD cell	2x20	2x20	2x20	20	20	20
	FDD cell	20	15	10	2x20	20+15	20+10
Inter-band CA (two bands) (CA3_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Inter-band CA (three bands) (CA3_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Intra-band non-contiguous CA (with two sub-blocks) (CA3_N2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.							

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.
2. The parameter settings for the cell are set up according to Table 9.6.1.4.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.4.2.4.3.

9.6.1.4.2.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined Table 9.6.1.4.2.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.4.2.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.4.2.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.4.2.4.3-7, *TDD-Config-DEFAULT* is defined in Table 9.6.1.4.2.4.3-8.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.4.2.5-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1} and the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2}.
7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.4.2.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.4.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.4.2.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	18	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.4.2.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.4.2.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.4.2.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.4.2.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	23	SCell 1	
	28	SCell 2	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

Table 9.6.1.4.2.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2	PCell	
	sa2	2 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
specialSubframePatterns	ssp4	PCell	
	ssp4	4 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
}			

9.6.1.4.2.5 Test requirement

Table 9.6.1.4.2.5-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD-FDD CA with TDD PCell, 3DL CA)

Parameter		Unit	PCell	SCell1	SCell2
PDSCH transmission mode			1		
Uplink downlink configuration			2	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	N/A
Special subframe configuration			4	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	N/A
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	-89	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			18	23 (shift of 5 ms relative to Pcell)	28 (shift of 10 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1. Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.4.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.4.3 TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (4DL CA)

9.6.1.4.3.1 Test purpose

To verify that the UE reports different CQI indices for TDD PCell and SCells if each cell experiences a different SNR.

9.6.1.4.3.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD UE release 12 and forward that support 4DL CA with TDD as PCell (UE categories 8 and onwards).

Note: This test also applies to UE supporting 4Rx antenna ports

9.6.1.4.3.3 Minimum conformance requirements

The following requirements for 4DL CA apply to UE Category ≥8. For TDD-FDD CA with TDD PCell with 4 DL CC, for the parameters specified in Table 9.6.1.4.3.3-1 and Table 9.6.1.4.3.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of PCell and SCell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2, and SCell1 and SCell3 reported shall be such that

$$\text{wideband CQI}_{\text{PCell}} - \text{wideband CQI}_{\text{SCell1}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq 2$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell3}} \geq 2$$

for more than 90% of the time.

Table 9.6.1.4.3.3-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD-FDD CA with TDD PCell, 4DL CA)

Parameter		Unit	PCell	SCell1	SCell2, SCell3
PDSCH transmission mode			1		
Uplink downlink configuration			2	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	N/A
Special subframe configuration			4	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	N/A
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			18	23 (shift of 5 ms relative to Pcell)	28 for SCell 2 (shift of 10 ms relative to Pcell) , 33 for SCell 3 (shift of 15ms relative to PCell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.					

Table 9.6.1.4.3.3-2: PUCCH 1-0 static test (TDD-FDD CA with TDD PCell, 4 DL CA)

Test number	Bandwidth combination (MHz)
1	3x20MHz for TDD cell and 20MHz for FDD cell
2	2x20MHz for FDD cell and 2x20MHz for TDD cell
3	20+15MHz for FDD cell and 2x20MHz for TDD cell
4	2x15MHz for FDD cell and 2x20MHz for TDD cell
5	2x20+15MHz for FDD cell and 20MHz for TDD cell
6	2x15+20MHz for FDD cell and 20MHz for TDD cell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2A. The test coverage for different number of component carriers is defined in 9.1.1.3. Note 2: If more than one cell can be configured as PCell, choose one with the smallest bandwidth as PCell. If all the cells which can be configured as PCell have the same bandwidth, randomly choose one as PCell. Randomly associate the other cells to SCell 1, SCell 2 and SCell3.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.4.

9.6.1.4.3.4 Test description

9.6.1.4.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.4.3.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.4.3.4.1-1.

Table 9.6.1.4.3.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (4DL CA)

CA Applicability		Bandwidth combination					
	FDD cell	20	2x20	20+15	2x15	2x20+15	2x15+20
	TDD cell	3x20	2X20	2X20	2X20	20	20
Inter-band CA (two bands) (CA4_A2)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Inter-band CA (three bands) (CA4_A3)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Inter-band CA (four bands) (CA4_A4)		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.							

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders for UE supporting only 2Rx RF bands on all CC. Annex A, Figure A.86 for UE supporting 4Rx RF band on any of the CC.

2. The parameter settings for the cell are set up according to Table 9.6.1.4.3.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.4.3.4.3.

9.6.1.4.3.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.

2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined in Table 9.6.1.4.3.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.4.2.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.4.3.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.4.3.4.3-7.

3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.4.3.5-1 as appropriate.

5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.

6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1}, the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband $CQI_{Scell2}$and respective difference $CQI_{S1\text{-}S3}$ = wideband CQI_{Scell1} – wideband CQI_{Scell3}

7. If more than 1800 values of CQI_{P-S1} are ≥ 2, more than 1800 values of CQI_{S1-S2} are ≥ 2 and more than 1800 values of CQI_{S1-S3} are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.4.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.4.3.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.4.3.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.4.3.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	18	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.4.3.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.4.3.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.4.3.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.4.3.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	23	SCell1	
	28	SCell2	
	33	SCell3	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

Table 9.6.1.4.3.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2	PCell	
	sa2	2 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
specialSubframePatterns	ssp4	PCell	
	ssp4	4 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
}			

9.6.1.4.3.5 Test requirement

Table 9.6.1.4.3.5-1: Parameters for PUCCH 1-0 static test on multiple cells (TDD-FDD CA with TDD PCell, 4DL CA)

Parameter		Unit	PCell	SCell1	SCell2, SCell3
PDSCH transmission mode			1		
Uplink downlink configuration			2	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	N/A
Special subframe configuration			4	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	N/A
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$ for CC on 2Rx supported RF band		dB[mW/15kHz]	-86	-92	-98
$\hat{I}_{or}^{(j)}$ for CC on 4Rx supported RF band		dB[mW/15kHz]	[-89]	-95	-101
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 20		
cqi-pmi-ConfigurationIndex			18	23 (shift of 5 ms relative to Pcell)	28 for SCell 2 (shift of 10 ms relative to Pcell) , 33 for SCell 3 (shift of 15ms relative to PCell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1. Note 2: The power level requirement for CC on 4Rx supported RF band is as specified 9.1.1.4.2					

The pass fail decision is as specified in the test procedure in clause 9.6.1.4.3.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.6.1.4.4 TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (5DL CA)

Editor's notes: This test case is incomplete. The following items are missing or are incomplete:

- Some test parameters in minimum requirements are still in square brackets

- Annex G is still absent.

- The test applicability needs to be added to TS36.521-2

9.6.1.4.4.1 Test purpose

To verify that the UE reports different CQI indices for TDD PCell and SCells if each cell experiences a different SNR.

9.6.1.4.4.2 Test applicability

This test applies to all types of E-UTRA FDD and TDD UE release 12 and forward that support 5DL CA with TDD as PCell (UE categories 8 and onwards).

9.6.1.4.4.3 Minimum conformance requirements

The following requirements for 5DL CA apply to UE Category 8 and ≥11. For TDD-FDD CA with TDD PCell with 5 DL CC, for the parameters specified in Table 9.6.1.4.4.3-1 and Table 9.6.1.4.4.3-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of PCell and SCell1 reported, and the difference between the wideband CQI indices of SCell1 and SCell2, SCell1 and SCell3 and SCell 1 and SCell 4 reported shall be such that

$$\text{wideband CQI}_{\text{PCell}} - \text{wideband CQI}_{\text{SCell1}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell2}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell3}} \geq [2]$$

$$\text{wideband CQI}_{\text{SCell1}} - \text{wideband CQI}_{\text{SCell4}} \geq [2]$$

for more than 90% of the time.

Table 9.6.1.4.4.3-1: PUCCH 1-0 static test on multiple cells (TDD-FDD CA with TDD PCell, 5 DL CA)

Parameter		Unit	PCell	SCell1	SCell2, SCell3, SCell4
PDSCH transmission mode			1		
Uplink downlink configuration			N/A	2 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	2
Special subframe configuration			N/A	4 if Scell1 is TDD Cell N/A if Scell1 is FDD Cell	4
Downlink power allocation	ρ_A	dB	0		
	ρ_B	dB	0		
Propagation condition and antenna configuration			AWGN (1 x 2)		
SNR		dB	12	6	0
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-86	-92	-98
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
Physical channel for CQI reporting			PUCCH Format 2		
PUCCH Report Type			4		
Reporting periodicity		ms	N_{pd} = 40		
cqi-pmi-ConfigurationIndex			39	54 (shift of 5 ms relative to Pcell)	59 for SCell 2 (shift of 10 ms relative to Pcell), 64 for SCell 3 (shift of 15 ms relative to Pcell), 69 for SCell 4 (shift of 20 ms relative to Pcell)
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD and OP.1 TDD as described in Annex A.5.1.1 and A.5.2.1.					

Table 9.6.1.4.4.3-2: PUCCH 1-0 static test (TDD-FDD CA with TDD PCell, 5 DL CA)

Test number	Bandwidth combination (MHz)
1	15MHz+2×20MHz for FDD cell and 2x20MHz for TDD cell
2	2×15MHz+20MHz for FDD cell and 2x20MHz for TDD cell
Note 1: The applicability of requirements for different CA configurations and bandwidth combination sets is defined in 9.1.1.2A. The test coverage for different number of component carriers is defined in 9.1.1.3.	
Note 2: If more than one cell can be configured as PCell, choose one of the cells with the smallest bandwidth as PCell. Mapping of PCell and Scells to the CCs shall be constant for all the iterations during the test. Each execution of the test shall use the same mapping.	

The normative reference for this requirement is TS 36.101 [2] clause 9.6.1.4.

9.6.1.4.4.4 Test description

9.6.1.4.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Maximum Wgap for Intra-band non-contiguous CA, otherwise Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: Select one according to Table 9.6.1.4.4.4.1-1.

CA Capability to be tested: Select one according to Table 9.6.1.4.4.4.1-1.

Table 9.6.1.4.4.4.1-1: Test point selection for CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (5DL CA)

CA Applicability		Bandwidth combination	
	FDD cell	2x20+15	2x15+20
	TDD cell	2x20	2x20
Inter-band CA (two bands) (CA5_A2)		Test 1	Test 2
Inter-band CA (three bands) (CA5_A3)		Test 1	Test 2
Inter-band CA (four bands) (CA5_A4)		Test 1	Test 2
Inter-band CA (five bands) (CA5_A5)		Test 1	Test 2
Note 1: Only one test point is tested. Select the largest aggregated CA bandwidth combination supported by the UE among the UE supported CA capabilities.			

1. Connect the SS and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.59 without faders.
2. The parameter settings for the cell are set up according to Table 9.6.1.4.4.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.6.1.4.4.4.3.

9.6.1.4.4.4.2 Test procedure

1. Configure SCCs according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels.
2. The SS shall configure SCCs as per TS 36.508 [7] clause 5.2A.4. Message contents for *RadioResourceConfigDedicatedSCell-r10-DEFAULT* are defined in Table 9.6.1.4.4.4.3-4, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 9.6.1.4.2.4.3-5, *CQI-ReportConfigSCell-r10-DEFAULT* is defined in Table 9.6.1.4.4.4.3-6, *CQI-ReportPeriodic-r10-DEFAULT* is defined in Table 9.6.1.4.4.4.3-7.
3. SS activates SCCs by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. Set the parameters of bandwidth, reference channel, propagation condition, antenna configuration and the SNR according to Table 9.6.1.4.4.3-1 as appropriate.
5. The SS shall start gathering CQI reports. No PDSCH for user data is scheduled for the UE.
6. Continue gathering CQI reports until 2000 wideband CQI reports have been gathered for each P-Cell and S-Cells. For each CSI report calculate the respective difference $CQI_{P\text{-}S1}$ = wideband CQI_{Pcell} – wideband CQI_{Scell1}, the respective difference $CQI_{S1\text{-}S2}$ = wideband CQI_{Scell1} – wideband CQI_{Scell2} and the respective difference $CQI_{S1\text{-}S3}$ = wideband CQI_{Scell1} – wideband CQI_{Scell3} and the respective difference $CQI_{S1\text{-}S4}$ = wideband CQI_{Scell1} – wideband CQI_{Scell4}.
7. If more than 1800 values of $CQI_{P\text{-}S1}$ are ≥ 2, more than 1800 values of $CQI_{S1\text{-}S2}$ are ≥ 2, more than 1800 values of $CQI_{S1\text{-}S3}$ are ≥ 2 and more than 1800 values of $CQI_{S1\text{-}S4}$ are ≥ 2, pass the UE. Otherwise fail the UE.

9.6.1.4.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.6.1.4.4.4.3-1: *RadioResourceConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	*PhysicalConfigDedicated - DEFAULT*		RBC
}			

Table 9.6.1.4.4.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
}			

Table 9.6.1.4.4.4.3-3: *CQI-ReportPeriodic-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	39	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.6.1.4.4.4.3-4: *RadioResourceConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {			
physicalConfigDedicatedSCell-r10	*PhysicalConfigDedicated SCell-r10-DEFAULT*		
}			

Table 9.6.1.4.4.4.3-5: *PhysicalConfigDedicatedSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicatedSCell-r10-DEFAULT ::= SEQUENCE {			
ul-Configuration-r10			
ul-Configuration-r10 SEQUENCE {			
cqi-ReportConfigSCell-r10	*CQI-ReportConfigSCell-r10-DEFAULT*		
}			
}			

Table 9.6.1.4.4.4.3-6: *CQI-ReportConfigSCell-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfigSCell-r10 ::= SEQUENCE {			
cqi-ReportModeAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset-r10	0		
cqi-ReportPeriodicSCell-r10			
	CQI-ReportPeriodic-r10-DEFAULT		CQI_PERIODIC
pmi-RI-Report-r10	Not present		
}			

Table 9.6.1.4.4.4.3-7: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	54	SCell1	
	59	SCell2	
	64	SCell3	
	69	SCell4	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			
}			

Table 9.6.1.4.4.4.3-8: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2	PCell	
	sa2	2 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
specialSubframePatterns	ssp4	PCell	
	ssp4	4 if SCell1 is TDD Cell N/A if SCell1 is FDD Cell	TDD
}			

9.6.1.4.4.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.6.1.4.4.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.7 CSI reporting for UE DL category 0

The number of receiver antennas N_{RX} assumed for the minimum performance requirement in this clause is 1.

9.7.1 CQI reporting definition under AWGN conditions

9.7.1.1 FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category 0

9.7.1.1.1 Test purpose

To verify the variance of the wideband CQI reports is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.7.1.1.2 Test applicability

This test applies to E-UTRA FDD UE release 12 and forward of UE category 0.

9.7.1.1.3 Minimum conformance requirements

The following requirements apply to DL UE Category 0. For the parameters specified in Table 9.7.1.1.3-1 and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to TBD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

Table 9.7.1.1.3-1: PUCCH 1-0 static test (FDD and half-duplex FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			1			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 1)			
SNR (Note 2)		dB	0	1	6	7
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-97	-92	-91
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUCCH Format 2			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 40			
cqi-pmi-ConfigurationIndex			41			
Note 1: Reference measurement channel RC.16 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.						
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.						

The normative reference for this requirement is TS 36.101 [2] clause 9.7.1.1.

9.7.1.1.4 Test description

9.7.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.7.1.1.3-1 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Table 9.7.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.7.1.1.4.3.

9.7.1.1.4.2 Test procedure

Same test procedure as in clause 9.2.1.1.4.2 with the following exceptions:

- Instead of Table 9.2.1.1.3-1 → use Table 9.7.1.1.3-1.

9.7.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.7.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.7.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.7.1.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.7.1.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.7.1.2 TDD CQI reporting definition under AWGN conditions for UE category 0

9.7.1.2.1 Test purpose

To verify the variance of the wideband CQI reports is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.7.1.2.2 Test applicability

This test applies to E-UTRA TDD UE release 12 and forward of UE category 0.

9.7.1.2.3 Minimum conformance requirements

The following requirements apply to DL UE Category 0. For the parameters specified in Table 9.7.1.2.3-1 and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.16 TDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the

median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

Table 9.7.1.2.3-1: PUCCH 1-0 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			1			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 1)			
SNR (Note 2)		dB	0	1	6	7
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-97	-92	-91
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUSCH (Note 3)			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			3			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.16 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

The normative reference for this requirement is TS 36.101 [2] clause 9.7.1.2.

9.7.1.2.4 Test description

9.7.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.7.1.2.3-1 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Table 9.7.1.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.7.1.2.4.3.

9.7.1.2.4.2 Test procedure

Same test procedure as in clause 9.2.1.2.4.2 with the following exceptions:

- Instead of Table 9.2.1.2.3-1 → use Table 9.7.1.2.3-1.

9.7.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.7.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.7.1.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.7.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

9.7.1.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.7.1.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.7.2 CQI reporting under fading conditions

9.7.2.1 FDD and Half duplex FDD CQI reporting definition under fading conditions for UE category 0

9.7.2.1.1 Test purpose

To verify that preferred sub-bands can be used for frequency-selective scheduling.

9.7.2.1.2 Test applicability

This test applies to E-UTRA FDD UE release 12 and forward of UE category 0.

9.7.2.1.3 Minimum conformance requirements

For the parameters specified in Table 9.7.2.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.7.2.1.3-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD and in each available downlink transmission instance for half-duplex FDD.

Table 9.7.2.1.3-1: Sub-band test for single antenna transmission (FDD and half-duplex FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
SNR (Note 3)		dB	8	9	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-90	-89	-85	-84
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 5$ Hz			
Antenna configuration			1 x 1			
Reporting interval		ms	8			
CQI delay		ms	8			
Reporting mode			PUSCH 3-0			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.16 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Table 9.7.2.1.3-2: Minimum requirement (FDD and half-duplex FDD)

	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.1	1.1
UE DL Category	0	0

The normative reference for this requirement is TS 36.101 [2] clause 9.7.2.1.

9.7.2.1.4 Test description

9.7.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.7.2.1.3-1 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9(using only main UE Tx/Rx antenna).

2. The parameter settings for the cell are set up according to Table 9.7.2.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.7.2.1.4.3.

9.7.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.7.2.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and full-size subband CQI reports for each full-size subband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 8 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. In this process the SS collects wideband CQI reports every 8 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and full-size subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. Check if "2000*α%/100 $\leq$ number of CQI reports with index 0 for each full-size subband $\leq$ 2000*β%/100". (2000= No of full-size subband reports, 100 because of %) If yes, continue with step5, otherwise goto step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value in an each TTI randomly selected full-size subband regardless of UE wideband and full-size subband CQI report. Note that each full-size subband is selected in equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 8 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the highest UE reported full-size subband CQI value in one full-size subband selected among the subbands in which UE reports the highest full-size subband CQI. Subband differential CQI offset level is selected from {0, 1, 2, -1}. Note that the SS shall send PDSCH in the same full-size subband until next UE report is available. In case when same full-size subbands are reported subsequently as subbands with highest full-size subband CQI, the SS shall select for transmission a different subband with respect to the last selection. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 8 ms to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the average throughput and (NACK /(ACK + NACK)) according to Annex G.5.3. Declare the throughput as $t_{subband}$. If the ratio ($t_{subband}$ / t_{median}) $\geq \gamma$ and (NACK /(ACK + NACK))$\geq$ 0.05 , pass the UE for this test and go to step 8. Otherwise, go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.7.2.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.7.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.7.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.7.2.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.7.2.1.5 Test requirement

Table 9.7.2.1.5-1: Test requirement (FDD and half-duplex FDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.09	1.09
BLER	0.05	0.05

To pass the test, α and β and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.7.2.2 TDD CQI reporting definition under fading conditions for UE category 0

9.7.2.2.1 Test purpose

To verify that preferred sub-bands can be used for frequency-selective scheduling.

9.7.2.2.2 Test applicability

This test applies to E-UTRA TDD UE release 12 and forward of UE category 0.

9.7.2.2.3 Minimum conformance requirements

For the parameters specified in Table 9.7.2.2.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.7.2.2.3-2 and by the following:

a) a sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% for each sub-band;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each available downlink transmission instance for TDD.

Table 9.7.2.2.3-1: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10 MHz			
Transmission mode			1 (port 0)			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
SNR (Note 3)		dB	8	9	13	14
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-90	-89	-85	-84
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, *a* = 1, $f_D = 5$ Hz			
Antenna configuration			1 x 1			
Reporting interval		ms	5			
CQI delay		ms	10 or 11			
Reporting mode			PUSCH 3-0			
Sub-band size		RB	6 (full size)			
Max number of HARQ transmissions			1			
ACK/NACK feedback mode			Multiplexing			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.16 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Table 9.7.2.2.3-2: Minimum requirement (TDD)

	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.1	1.1
UE DL Category	0	0

The normative reference for this requirement is TS 36.101 [2] clause 9.7.2.2.

9.7.2.2.4 Test description

9.7.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.7.2.2.3-1 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9(using only main UE Tx/Rx antenna).
2. The parameter settings for the cell are set up according to Table 9.7.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.7.2.2.4.3.

9.7.2.2.4.2 Test procedure

Same test procedure as in clause 9.3.1.1.2.4.2 with the following exceptions:

- Instead of Table 9.3.1.1.2.3-1 → use Table 9.7.2.2.3-1.

9.7.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.7.2.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.7.2.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.7.2.2.5 Test requirement

Table 9.7.2.2.5-1: Test requirement (TDD)

Parameter	Test 1	Test 2
α [%]	2	2
β [%]	55	55
γ	1.09	1.09
BLER	0.05	0.05

To pass the test, α and β and γ and BLER must be fulfilled.

To pass the test, Test 1 and Test 2 must be passed.

To pass the test, one **or** the other SNR point within one test must be fulfilled.

9.8 CSI reporting for UE DL category M1

The number of receiver antennas N_{RX} assumed for the minimum performance requirement in this clause is 1.

9.8.1 CQI reporting definition under AWGN conditions

9.8.1.1 FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category M1

9.8.1.1.1 Test purpose

To verify the variance of the wideband CQI reports is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.8.1.1.2 Test applicability

This test applies to E-UTRA FDD UE release 13 and forward of UE category M1.

9.8.1.1.3 Minimum conformance requirements

The following requirements apply to DL UE Category M1. For the parameters specified in Table 9.8.1.1.3-1 and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.23 FDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

Table 9.8.1.1.3-1: PUCCH 1-0 static test (FDD and half-duplex FDD)

Parameter		Unit	Test 1	
Bandwidth		MHz	10	
PDSCH transmission mode			1	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	σ	dB	0	
	δ	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 1)	
SNR (Note 2)		dB	5	6
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-93	-92
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Max number of HARQ transmissions			1	
Physical channel for CQI reporting			PUSCH (Note 4)	
PUCCH Report Type			4	
Reporting periodicity		ms	N_{pd} = 10	
CQI delay		ms	10	
cqi-pmi-ConfigurationIndex			12	
Frequency hopping			Disabled	
Frequency hopping interval (interval-FDD)			N/A	
Starting OFDM symbol (startSymbolBR)			3	
PDSCH repetition level			1	
M-PDCCH repetition level			1	
Beamforming Precoder for MPDCCH			No precoding	
Precoder update granularity for MPDCCH			N/A	
BL/CE DL subframe configuration (fdd-DownlinkOrTddSubframeBitmapBR)			1111111111	

Note 1: Reference measurement channel RC.23 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD and two sided dynamic OCNG pattern OP.2 FDD as described in Annex A.5.1.1 and A.5.1.2.
Note 2: The minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 3: DC subcarrier puncturing shall be considered.
Note 4: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. MPDCCH DCI format 6-0A shall be transmitted in downlink SF#1 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5.

The normative reference for this requirement is TS 36.101 [2] clause 9.8.1.1.

9.8.1.1.4 Test description

9.8.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.8.1.1.3-1 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.18 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Table 9.8.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 9.8.1.1.4.3.

9.8.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.8.1.1.3-1.
2. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via MPDCCH DCI format 6-0A with narrowband index nRB = 0 and CQI request bit set to 0 to schedule UL RMC in subframe #1. Continue transmission of the PDSCH until 2000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 10 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband CQI reports.
3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.
4. If Median CQI is not equal to 1 or 10 and 1800 or more of the wideband CQI values are in the range (Median CQI - 1) ≤ Median CQI ≤ (Median CQI + 1) then continue with step 5, otherwise go to step 8.
5. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to the wideband median-CQI value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via MPDCCH DCI format 6-0A with narrowband index nRB = 0 and CQI request bit set to 0 to schedule UL RMC in subframe #1. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.
6. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to the wideband median-CQI+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via MPDCCH DCI format 6-0A with narrowband index nRB = 0 and CQI request bit set to 0 to

schedule UL RMC in subframe #1. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

If the ratio (NACK /ACK + NACK) > 0.1

then pass the UE for this test, otherwise go to step 8.

7. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A with narrowband index n_{RB} = 0 for C_RNTI to transmit the DL RMC according to the wideband median-CQI-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via MPDCCH DCI format 6-0A with narrowband index nRB = 0 and CQI request bit set to 0 to schedule UL RMC in subframe #1. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) $\leq$ 0.1

   then pass the UE for this test, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

9.8.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the condition CEModeA and the following exceptions:

Table 9.8.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.8.1.1.4.3-2: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	12	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.8.1.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.8.1.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.8.1.2 TDD CQI reporting definition under AWGN conditions for UE category M1

9.8.1.2.1 Test purpose

To verify the variance of the wideband CQI reports is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.8.1.2.2 Test applicability

This test applies to E-UTRA TDD UE release 13 and forward of UE category M1.

9.8.1.2.3 Minimum conformance requirements

The following requirements apply to DL UE Category M1. For the parameters specified in Table 9.8.1.2.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.23 TDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

Table 9.8.1.2.3-1: PUCCH 1-0 static test (TDD)

Parameter		Unit	Test 1	
Bandwidth		MHz	10	
PDSCH transmission mode			1	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	σ	dB	0	
	δ	dB	0	
Propagation condition and antenna configuration			AWGN (1 x 1)	
SNR (Note 2)		dB	4	5
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Max number of HARQ transmissions			1	
Physical channel for CQI reporting			PUSCH (Note 3)	
PUCCH Report Type			4	
Reporting periodicity		ms	N_{pd} = 5	
cqi-pmi-ConfigurationIndex			3	
Frequency hopping			Disabled	
Frequency hopping interval (interval-TDD)			N/A	
Starting OFDM symbol (startSymbolLC)			3	
PDSCH repetition level			1	
ACK/NACK feedback mode			Multiplexing	
MPDCCH repetition level			1	
Beamforming Precoder for MPDCCH			No precoding	
Precoder update granularity for MPDCCH			N/A	
BL/CE DL subframe configuration (fdd-DownlinkOrTddSubframeBitmapBR)			1011110111	

Note 1: Reference measurement channel RC.23 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD and two sided dynamic OCNG pattern OP.2 TDD as described in Annex A.5.2.1 and A.5.2.2.

Note 2: The minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. MPDCCH DCI format 6-0A shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 4: DC subcarrier puncturing shall be considered.

The normative reference for this requirement is TS 36.101 [2] clause 9.8.1.2.

9.8.1.2.4 Test description

9.8.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.8.1.2.3-1 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.18 using only main UE Tx/Rx antenna.

2. The parameter settings for the cell are set up according to Table 9.8.1.2.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 9.8.1.2.4.3.

9.8.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.8.1.2.3-1.

2. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via MPDCCH DCI format 6-0A with narrowband index nRB = 0 and CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2a). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. If Median CQI is not equal to 1 or 10 and 1800 or more of the wideband CQI values are in the range (Median CQI - 1) ≤ Median CQI ≤ (Median CQI + 1) then continue with step 5, otherwise go to step 8.

5. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via MPDCCH DCI format 6-0A with narrowband index nRB = 0 and CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2a). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via MPDCCH DCI format 6-0A with narrowband index nRB = 0 and CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2a). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK.*

   If the ratio (NACK /ACK + NACK) > 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

7. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via MPDCCH DCI

format 6-0A with narrowband index nRB = 0 and CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2a). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

If the ratio (NACK /ACK + NACK) $\leq$ 0.1

then pass the UE for this test, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

9.8.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the condition CEModeA and the following exceptions:

Table 9.8.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.8.1.2.4.3-2: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1C in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.8.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

Table 9.8.1.2.4.3-4: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
mpdcch-NumRepetition-r13	r1		

9.8.1.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.8.1.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.8.2 UE-selected subband CQI

9.8.2.1 FDD and half-duplex FDD UE-selected subband CQI for UE category M1

9.8.2.1.1 Test purpose

To verify the increased relative throughput when transmitting on the UE-selected narrowband with the corresponding transport format compared to the case for which a fixed format is transmitted on any narrowband within the set of narrowbands in which MPDCCH is monitored of TS 36.213 [6].

9.8.2.1.2 Test applicability

This test applies to E-UTRA FDD and half-duplex FDD UE release 13 and forward of UE category M1.

9.8.2.1.3 Minimum conformance requirements

The following requirements apply to DL UE Category M1. For the parameters specified in Table 9.8.2.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.8.2.1.3-2 and by the following:

The ratio of the throughput obtained when transmitting on the best narrowband reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected narrowband within the set of narrowbands in which MPDCCH is monitored shall be $\geq \gamma$;

The requirements only apply for narrowbands and the random scheduling across the narrowbands is done by selecting a new narrowband in each TTI for FDD and half-duplex FDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the entry in Table 7.1.7.2.1-1 of TS 36.213 [6] that corresponds to the narrowband size.

Table 9.8.2.1.3-1: Sub-band test for single antenna transmission (FDD and half-duplex FDD)

Parameter		Unit	Test 1	
Bandwidth		MHz	10 MHz	
Transmission mode			1 (port 0)	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	σ	dB	0	
	δ	dB	0	
SNR (Note 3)		dB	5	6
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-93	-92
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, *a* = 1, $f_D = 1$ Hz	
Reporting interval		ms	10	
CQI delays for each narrowband		ms	11, 12, 13, 14	
Reporting mode			PUSCH 2-0	
Max number of HARQ transmissions			1	
Number of preferred subbands (*M*)			1	
Number of narrowbands			4	
Frequency hopping			Enabled	
Frequency hopping offset			1	
Starting OFDM symbol (startSymbolBR)			3	
Maximum number of MPDCCH repetition s (mpdcch-NumRepetition)			4	
MPDCCH repetition level (Note 6)			1	
PDSCH repetition level			1	
MPDCCH narrowband (mpdcch-Narrowband)			7 (Note 5)	
MPDCCH hopping interval (interval-FDD)			1	
Start subframe configuration for MPDCCH (mpdcch-startSF-UESS)			2.5	
Beamforming Precoder for MPDCCH			No precoding	
Precoder update granularity for MPDCCH			N/A	

BL/CE DL subframe configuration (fdd-DownlinkOrTddSubframeBitmapBR)		1111111111
R^{CSI} (csi-NumRepetitionCE)	Subframe	4

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported narrowband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)
Note 2: Reference measurement channel RC.25 FDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.
Note 3: The minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level
Note 4: DC subcarrier puncturing shall be considered
Note 5: For RRC parameter setting, mpdcch-narrowband is set to 8.
Note 6: DCI format 6-1A is scheduled in the subframe k3 according to TS36.213 subclause 9.1.5.

Table 9.8.2.1.3-2: Minimum requirement (FDD and half-duplex FDD)

	Test 1
γ	1.3
UE DL Category	M1, ≥0

The normative reference for this requirement is TS 36.101 [2] clause 9.8.2.1.

9.8.2.1.4 Test description

9.8.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.8.2.1.3-1 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Table 9.8.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 9.8.2.1.4.3.

9.8.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.8.2.1.3-1 as appropriate.
2. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue

transmission of the PDSCH until 2000 wideband CQI reports and subband CQI reports for each narrowband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 10 ms to carry the PUSCH CQI feedback via PDCCH DCI format 6-0A with CQI request bit set to 1. In this process the SS collects wideband CQI reports every 10 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and narrowband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC on a randomly selected narrowband using the transport format according to the wideband median-CQI value regardless of UE wideband or subband CQI report. Note that each narrowband shall be selected in the equal probability The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 10 ms to carry the PUSCH CQI feedback via MPDCCH DCI format 6-0A with CQI request bit set to 1. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

5. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC in one narrowband reported by the UE and with the corresponding TBS. Differential CQI offset level is selected from {1, 2, 3, 4}. Note that the SS shall send PDSCH in the same narrowband until next UE report is available. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission every 10 ms to carry the PUSCH CQI feedback via MPDCCH DCI format 6-0A with CQI request bit set to 1. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval.
   If $t_{subband} / t_{median} \geq \gamma$, then pass the UE for this test, otherwise go to step 6.

6. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 5) for the other SNR point as appropriate. Otherwise fail the UE.

9.8.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the condition CEModeA and the following exceptions:

Table 9.8.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.8.2.1.4.3-2: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm20		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	Not present		
}			
}			

Table 9.8.2.1.4.3-3: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
EPDCCH-Config-r11 ::= SEQUENCE{			
config-r11{			
setup SEQUENCE {			
setConfigToAddModList-r11 SEQUENCE {	1 entry		
resourceBlockAssignment-r11[1] SEQUENCE{			
resourceBlockAssignment-r11	1110		
}			
mpdcch-config-r13 CHOICE[1] {			
setup SEQUENCE {			
csi-NumRepetitionCE-r13	sf4		
mpdcch-pdsch-HoppingConfig-r13	on		
mpdcch-StartSF-UESS-r13 CHOICE {			
fdd-r13	v2dot5		
mpdcch-NumRepetition-r13	r4		
mpdcch-Narrowband-r13	8		
}			
}			

9.8.2.1.5 Test requirement

Table 9.8.2.1.5-1: Test requirement (FDD and half-duplex FDD)

	Test 1
γ	1.29
UE DL Category	M1, ≥0

9.8.2.2 TDD UE-selected subband CQI for UE category M1

9.8.2.2.1 Test purpose

To verify the increased relative throughput when transmitting on the UE-selected subbands with the corresponding transport format compared to the case for which a fixed format is transmitted on any subband within the set of narrowbands in which MPDCCH is monitored of TS 36.213 [6].

9.8.2.2.2 Test applicability

This test applies to E-UTRA TDD UE release 13 and forward of UE category M1.

9.8.2.2.3 Minimum conformance requirements

The following requirements apply to DL UE Category M1. For the parameters specified in Table 9.8.2.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.8.2.2-2 and by the following:

The ratio of the throughput obtained when transmitting on the best narrowband reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected narrowband within the set of narrowbands in which MPDCCH is monitored shall be $\geq \gamma$;

The requirements only apply for narrowbands and the random scheduling across the narrowbands is done by selecting a new narrowband in each available downlink transmission instance for TDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [6] that corresponds to the narrowband size.

Table 9.8.2.2.3-1: Sub-band test for single antenna transmission (TDD)

Parameter		Unit	Test 1	
Bandwidth		MHz	10 MHz	
Transmission mode			1 (port 0)	
Downlink power allocation	ρ_A	dB	0	
	ρ_B	dB	0	
	σ	dB	0	
	δ	dB	0	
Uplink downlink configuration			2	
Special subframe configuration			4	
SNR (Note 3)		dB	5	6
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-93	-92
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Propagation channel			Clause B.2.4 with $\tau_d = 0.45\,\mu$s, a = 1, $f_D = 1$ Hz	
Reporting interval		ms	20	
CQI delay		ms	23, 24, 25, 28	
Reporting mode			PUSCH 2-0	
Max number of HARQ transmissions			1	
Number of preferred subbands (*M*)			1	
ACK/NACK feedback mode			Multiplexing	
Number of narrowbands			4	
Frequency hopping			Enabled	
Frequency hopping offset			1	
Starting OFDM symbol (startSymbolBR)			3	
Maximum number of MPDCCH repetitions (mpdcch-NumRepetition)			4	
PDSCH repetition level			1	
MPDCCH narrowband (mpdcch-Narrowband)			7 (Note 5)	
MPDCCH hopping interval (interval-TDD)			1	
Start subframe configuration for MPDCCH (mpdcch-startSF-UESS)			5	
Beamforming Precoder for MPDCCH			No precoding	
Precoder update granularity for MPDCCH			N/A	
BL/CE DL subframe configuration (fdd-DownlinkOrTddSubframeBitmapBR)			1011110111	
RCSI (csi-NumRepetitionCE)		Subframe	4	

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2:	Reference measurement channel RC.25 TDD according to Table A.4-1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.
Note 3:	The minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4:	DC subcarrier puncturing shall be considered
Note 5:	For RRC parameter setting, mpdcch-narrowband is set to 8.
Note 6:	DCI format 6-1A is scheduled in the subframe k3 according to TS36.213 subclause 9.1.5.
Note 7:	In the case CQI reports and HARQ-ACK collide, CQI reports and HARQ-ACK will be multiplexed.

Table 9.8.2.2.3-2: Minimum requirement (TDD)

	Test 1
γ	1.3
UE DL Category	M1, ≥0

The normative reference for this requirement is TS 36.101 [2] clause 9.8.2.2.

9.8.2.2.4 Test description

9.8.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and MPDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz for tests defined in 9.8.2.2.3-1 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.9 using only main UE Tx/Rx antenna.
2. The parameter settings for the cell are set up according to Table 9.8.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF-CE according to TS 36.508 [7] clause 5.2A.2AA. Message contents are defined in clause 9.8.2.2.4.3.

9.8.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.8.2.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband and subband CQI value sent by the UE. Continue transmission of the PDSCH until 2000 wideband CQI reports and subband CQI reports for each narrowband have been gathered. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in 12^{th} subframe every 20 ms to carry the PUSCH CQI feedback via PDCCH DCI format 6-0A with CQI request bit set to 1. In this process the SS collects wideband CQI reports every 20 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI and subband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC on a randomly selected narrowband using the transport format according to the wideband median-CQI value regardless of UE wideband or subband CQI report. Note that each narrowband shall be selected in the equal probability. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in 12th subframe every 20 ms to carry the PUSCH CQI feedback via MPDCCH DCI format 6-0A with CQI request bit set to 1. Measure the average throughput according to Annex G.5.3. Declare the throughput as t_{median}.

5. The SS shall transmit PDSCH via MPDCCH DCI format 6-1A for C_RNTI to transmit the DL RMC in one narrowband reported by the UE and with the corresponding TBS. Differential CQI offset level is selected from {1, 2, 3, 4}. Note that the SS shall send PDSCH in the same narrowband until next UE report is available. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission in 12th subframe every 20 ms to carry the PUSCH CQI feedback via MPDCCH DCI format 6-0A with CQI request bit set to 1. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{subband}$. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval.
   If $t_{subband} / t_{median} \geq \gamma$, then pass the UE for this test, otherwise go to step 6.

6. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 5) for the other SNR point as appropriate. Otherwise fail the UE.

9.8.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the condition CEModeA and the following exceptions:

Table 9.8.2.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.8.2.2.4.3-2: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm20		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	Not present		
}			
}			

Table 9.8.2.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

Table 9.8.2.2.4.3-4: EPDCCH-Config-r11-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
EPDCCH-Config-r11 ::= SEQUENCE{			
config-r11{			
setup SEQUENCE {			
setConfigToAddModList-r11 SEQUENCE {	1 entry		
resourceBlockAssignment-r11[1] SEQUENCE{			
resourceBlockAssignment-r11	1110		
}			
mpdcch-config-r13 CHOICE[1] {			
setup SEQUENCE {			
csi-NumRepetitionCE-r13	sf4		
mpdcch-pdsch-HoppingConfig-r13	on		
mpdcch-StartSF-UESS-r13 CHOICE {			
fdd-r13	v5		
mpdcch-NumRepetition-r13	r4		
mpdcch-Narrowband-r13	8		
}			
}			

9.8.2.2.5 Test requirement

Table 9.8.2.2.5-1: Test requirement (TDD)

	Test 1
γ	1.29
UE DL Category	M1, ≥0

9.9 CSI reporting for 4Rx UE

9.9.1 CQI Reporting under AWGN conditions

The reporting accuracy of the channel quality indicator (CQI) under frequency non-selective conditions is determined by the reporting variance and the BLER performance using the transport format indicated by the reported CQI median. The purpose is to verify that the reported CQI values are in accordance with the CQI definition given in TS 36.213 [10]. To account for sensitivity of the input SNR the reporting definition is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.9.1.1 CQI reporting under AWGN conditions - PUCCH 1-0 with Rank 1 (Cell-Specific Reference Symbols)

9.9.1.1.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 with Rank 1 1x4

9.9.1.1.1.1 Test purpose

To verify the variance of the wideband CQI reports is within the limits defined and a PDSCH BLER of 10% falls between the transport format based median CQI-1 and median CQI or the transport format based median CQI and median CQI +1.

9.9.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 10 and forward UEs that support 4 Rx antenna ports in any FDD RF band.

9.9.1.1.1.3 Minimum conformance requirements

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.9.1.1.1.3-1, using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.1 FDD / RC.4 FDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

Table 9.9.1.1.1.3-1: PUCCH 1-0 static test (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			1			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 4)			
SNR (Note 2)		dB	-2	-1	4	5
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-100	-99	-94	-93
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUCCH Format 2			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			6			

Note 1: Reference measurement channel RC.1 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, except for category 1 UE use RC.4 FDD with two sided dynamic OCNG Pattern OP.2 FDD as described in Annex A.5.1.2.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

The normative reference for this requirement is TS 36.101 [2] clause 9.9.1.1.1.

9.9.1.1.1.4 Test description

9.9.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.75.

2. The parameter settings for the cell are set up according to Table 9.9.1.1.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.1.1.1.4.3.

9.9.1.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.9.1.1.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. Continue transmission of the PDSCH until 2000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the wideband CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI values are in the range (Median CQI - 1) ≤ Median CQI ≤ (Median CQI + 1) then continue with step 5, otherwise go to step 8.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) > 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered.

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

9. If both tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the table 9.9.1.1.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.9.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.1.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.9.1.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.9.1.1.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.9.1.1.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.9.1.1.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 with Rank 1 1x4

9.9.1.1.2.1 Test purpose

To verify the variance of the wideband CQI reports is within the limits defined and a PDSCH BLER of 10% falls between the transport format based on wideband median CQI-1 and wideband median CQI or the transport format based on wideband median CQI and wideband median CQI +1.

9.9.1.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 10 and forward UEs that support 4 Rx antenna ports in any TDD RF band.

9.9.1.1.2.3 Minimum conformance requirements

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.9.1.1.2.3-1, using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.1/RC.4 TDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

Table 9.9.1.1.2.3-1: PUCCH 1-0 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			1			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			AWGN (1 x 4)			
SNR (Note 2)		dB	-2	-1	4	5
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-100	-99	-94	-93
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI reporting			PUSCH (Note 3)			
PUCCH Report Type			4			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			3			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.1 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1, except for category 1 UE use RC.4 TDD with two sided dynamic OCNG Pattern OP.2 TDD as described in Annex A.5.2.2.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

The normative reference for this requirement is TS 36.101 [2] clause 9.9.1.1.2.

9.9.1.1.2.4 Test description

9.9.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.75.
2. The parameter settings for the cell are set up according to Table 9.9.1.1.2.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.1.1.2.4.3.

9.9.1.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.9.1.1.2.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to CQI value 8 and keep it regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband CQI reports have been gathered. In this process the SS collects wideband CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband CQI reports.

3. Set up a relative frequency distribution for the reported wideband CQI-values, Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side). This CQI-value is declared as wideband Median CQI value.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI values are in the range (Median CQI - 1) ≤ Median CQI ≤ (Median CQI + 1) then continue with step 5, otherwise go to step 8.

5. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses reaches 1000.

   For the filtered ACK and NACK responses if the ratio (NACK / ACK + NACK) ≤ 0.1 then go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI+1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) > 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

7. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband median-CQI-1 value and shall not react to the UE's wideband CQI reports. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH, transmitted by the SS, record and filter the ACK, NACK and statDTX responses as in step 5 until 1000 filtered ACK+NACK responses are gathered. *In case statDTX cannot be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK*

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then pass the UE for this test and go to step 9, otherwise go to step 8.

8. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 7) for the other SNR point as appropriate. Otherwise fail the UE.

9. If both tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the table 9.9.1.1.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.9.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.1.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.9.1.1.2.4.3-2: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.2.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

9.9.1.1.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.9.1.1.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.9.1.2 CQI reporting under AWGN conditions - PUCCH 1-1 with Rank 2 (CSI Reference Symbols)

9.9.1.2.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with Rank 2 4x4

9.9.1.2.1.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 – 1$ and median $CQI_1 – 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.9.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 10 and forward UEs of Category 2 and onwards that support 4 Rx antenna ports in any FDD RF band. Applicability requires support for FGI bit 103.

9.9.1.2.1.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.9.1.2.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 – \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 – 1$ and median $CQI_1 – 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.9.1.2.1.3-1: PUCCH 1-1 static test (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-3			
	σ	dB	-3			
Cell-specific reference signals			Antenna ports 0, 1			
CSI reference signals			Antenna ports 15,…,18			
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1			
CSI reference signal configuration			0			
Propagation condition and antenna configuration			Clause B.1 (4 x 4)			
Beamforming Model			As specified in Section B.4.3			
CodeBookSubsetRestriction bitmap			0x0000 0000 0100 0000			
SNR (Note 2)		dB	5	6	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-93	-92	-87	-86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note3)			
PUCCH Report Type for CQI/PMI			2			
Physical channel for RI reporting			PUCCH Format 2			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	8			
cqi-pmi-ConfigurationIndex			2			
ri-ConfigIndex			1			

Note 1: Reference measurement channel RC.7 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

The normative reference for this requirement is TS 36.101 [2] clause 9.9.1.2.1.

9.9.1.2.1.4 Test description

9.9.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.74.

2. The parameter settings for the cell are set up according to Table 9.9.1.2.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.1.2.1.4.3.

9.9.1.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.9.1.2.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.9.1.2.1.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≤ 0.1 for both codeword #0 and codeword #1

   then and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≥ 0.1 for both codeword #0 and codeword #1

then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.9.1.2.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.9.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.1.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.9.1.2.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.9.1.2.1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0100 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.9.1.2.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.9.1.2.1.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.1.2.1.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.9.1.2.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.9.1.2.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.9.1.2.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with Rank 2 8x4

9.9.1.2.2.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.9.1.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 10 and forward UEs of Category 2 and onwards that support 4 Rx antenna ports in any TDD RF band. Applicability requires support for FGI bit 104.

9.9.1.2.2.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.9.1.2.2.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI_1 = wideband CQI_0 – Codeword 1 offset level

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI_0 – 1 and median CQI_1 – 1 shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI_0 + 1 and median CQI_1 + 1 shall be greater than or equal to 0.1.

Table 9.9.1.2.2.3-1: PUCCH 1-1 submode 1 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			9			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-6			
	σ	dB	-3			
CRS reference signals			Antenna ports 0, 1			
CSI reference signals			Antenna ports 15,…,22			
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$			5/ 3			
CSI reference signal configuration			0			
Propagation condition and antenna configuration			Clause B.1 (8 x 4)			
Beamforming Model			As specified in Section B.4.3			
CodeBookSubsetRestriction bitmap			0x0000 0000 0020 0000 0000 0001 0000			
SNR (Note 2)		dB	2	3	8	9
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-96	-95	-90	-89
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note 3)			
PUCCH Report Type for CQI/second PMI			2b			
Physical channel for RI reporting			PUSCH			
PUCCH Report Type for RI/ first PMI			5			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	10 or 11			
cqi-pmi-ConfigurationIndex			3			
ri-ConfigIndex			805 (Note 4)			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.7 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7 and #2.

Note 4: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.

The normative reference for this requirement is TS 36.101 [2] clause 9.9.1.2.2.

9.9.1.2.2.4 Test description

9.9.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.77.
2. The parameter settings for the cell are set up according to Table 9.9.1.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.1.2.2.4.3.

9.9.1.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.9.1.2.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband and wideband spatial differential CQI reports respectively.
3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.9.1.2.2.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.
4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.
5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX

responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

If the ratio (NACK /ACK + NACK) $\leq$ 0.1

then, and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK.* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) $\geq$ 0.1

   then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.9.1.2.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.9.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.1.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.9.1.2.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.9.1.2.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 0020 0000 0000 0001 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.9.1.2.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.9.1.2.2.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	submode1		
}			
ri-ConfigIndex	805	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.1.2.2.4.3-6: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

Table 9.9.1.2.2.4.3-7: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.9.1.2.2.4.3-8: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an8	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-6	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.9.1.2.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.9.1.2.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.9.1.3 CQI Reporting under AWGN conditions - PUCCH 1-1 (Cell-Specific Reference Symbols)

9.9.1.3.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 4 4x4

9.9.1.3.1.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.9.1.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 10 and forward UEs of Category 5 and onwards that support 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 4 in any FDD RF band.

9.9.1.3.1.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

The following requirements apply to UE Category ≥5. For the parameters specified in table 9.9.1.3.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.9.1.3.1.3-1: PUCCH 1-1 static test (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Downlink power allocation	ρ_A	dB	-6			
	ρ_B	dB	-6			
	σ	dB	0			
Propagation condition and antenna configuration			Clause B.1 (4 x 4)			
CodeBookSubsetRestriction bitmap			0x0002 0000 0000 0000			
SNR (Note 2)		dB	5	6	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-93	-92	-87	-86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUCCH Format 2			
PUCCH Report Type for CQI/PMI			2			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			6			
ri-ConfigIndex			1 (Note 3)			

Note 1: Reference measurement channel RC.21 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 3: It is intended to have UL collisions between RI reports and HARQ-ACK, since the RI reports shall not be used by the eNB in this test.

The normative reference for this requirement is TS 36.101 [2] clause 9.9.1.3.1.

9.9.1.3.1.4 Test description

9.9.1.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Table 9.9.1.3.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.1.3.1.4.3.

9.9.1.3.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.9.1.3.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.9.1.3.1.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≤ 0.1 for both codeword #0 and codeword #1

   then and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≥ 0.1 for both codeword #0 and codeword #1

   then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.9.1.3.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.9.1.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.1.3.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	0x0002 0000 0000 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.9.1.3.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 9.9.1.3.1.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.9.1.3.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.9.1.3.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.9.1.3.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 4 4x4

9.9.1.3.2.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective wideband median $CQI_0 - 1$ and wideband median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective wideband median $CQI_0 + 1$ and wideband median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.9.1.3.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 10 and forward UEs of Category 5 and onwards that support 4 Rx antenna ports and 4-layer spatial multiplexing for PDSCH transmission mode 4 in any TDD RF band.

9.9.1.3.2.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

The following requirements apply to UE Category ≥5. For the parameters specified in table 9.9.1.3.2.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.9.1.3.2.3-1: PUCCH 1-1 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	-6			
	ρ_B	dB	-6			
	σ	dB	0			
Propagation condition and antenna configuration			Clause B.1 (4x4)			
CodeBookSubsetRestriction bitmap			0x0002 0000 0000 0000			
SNR (Note 2)		dB	5	6	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-93	-92	-87	-86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note 3)			
PUCCH Report Type			2			
Reporting periodicity		ms	N_{pd} = 5			
cqi-pmi-ConfigurationIndex			3			
ri-ConfigIndex			805 (Note 4)			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.21 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 4: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.

The normative reference for this requirement is TS 36.101 [2] clause 9.9.1.3.2.

9.9.1.3.2.4 Test description

9.9.1.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.74.

2. The parameter settings for the cell are set up according to Table 9.9.1.3.2.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.1.3.2.4.3.

9.9.1.3.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.9.1.3.2.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.9.1.3.2.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≤ 0.1

   then, and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

If the ratio (NACK /ACK + NACK) ≥ 0.1

then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.9.1.3.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.9.1.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.1.3.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	0x0002 0000 0000 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.9.1.3.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 9.9.1.3.2.4.3-3: CQI-ReportConfig-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	805		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.1.3.2.4.3-4: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa2		
specialSubframePatterns	Ssp4		
}			

9.9.1.3.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.9.1.3.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.9.1.4 CQI reporting under AWGN conditions - PUCCH 1-1 with Rank 3 (CSI Reference Symbols)

9.9.1.4.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with Rank 3 4x4

9.9.1.4.1.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.9.1.4.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 10 and forward UEs of Category 5 and onwards that support 4 Rx antenna ports in any FDD RF band. Applicability requires support for FGI bit 103.

9.9.1.4.1.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

The following requirements apply to UE Category ≥5. For the parameters specified in table 9.9.1.4.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

$$\text{wideband } CQI_1 = \text{wideband } CQI_0 - \text{Codeword 1 offset level}$$

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Table 9.9.1.4.1.3-1: PUCCH 1-1 static test (FDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-3			
	σ	dB	-3			
Cell-specific reference signals			Antenna ports 0, 1			
CSI reference signals			Antenna ports 15,…,18			
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/1			
CSI reference signal configuration			0			
Propagation condition and antenna configuration			Clause B.1 (4 x 4)			
Beamforming Model			As specified in Section B.4.3			
CodeBookSubsetRestriction bitmap			0x0000 0020 0000 0000			
SNR (Note 2)		dB	5	6	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-93	-92	-87	-86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note3)			
PUCCH Report Type for CQI/PMI			2			
Physical channel for RI reporting			PUCCH Format 2			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	8			
cqi-pmi-ConfigurationIndex			2			
ri-ConfigIndex			1			

Note 1: Reference measurement channel RC.22 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

The normative reference for this requirement is TS 36.101 [2] clause 9.9.1.4.1.

9.9.1.4.1.4 Test description

9.9.1.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.74.

2. The parameter settings for the cell are set up according to Table 9.9.1.4.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.1.4.1.4.3.

9.9.1.4.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.9.1.4.1.3-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are also counted as wideband and wideband spatial differential CQI reports respectively.

3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.9.1.4.1.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.

4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.

5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) ≤ 0.1 for both codeword #0 and codeword #1

   then and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

If the ratio (NACK /ACK + NACK) ≥ 0.1 for both codeword #0 and codeword #1

then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.9.1.4.1.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.9.1.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.1.4.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.9.1.4.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.9.1.4.1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0020 0000 0000		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.9.1.4.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.9.1.4.1.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.1.4.1.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.9.1.4.1.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.9.1.4.1.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.9.1.4.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with Rank 3 4x4

9.9.1.4.2.1 Test purpose

To verify the variance of the wideband spatial differential CQI between codeword #0 and codeword #1 are within the limits defined and for both codeword #0 and codeword #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1 and the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

9.9.1.4.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 10 and forward UEs of Category 5 and onwards that support 4 Rx antenna ports in any TDD RF band. Applicability requires support for FGI bit 103.

9.9.1.4.2.3 Minimum conformance requirements

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

The following requirements apply to UE Category ≥5. For the parameters specified in table 9.9.1.4.2.3-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI_1 = wideband CQI_0 – Codeword 1 offset level

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI_0 – 1 and median CQI_1 – 1 shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI_0 + 1 and median CQI_1 + 1 shall be greater than or equal to 0.1.

Table 9.9.1.4.2.3-1: PUCCH 1-1 submode 1 static test (TDD)

Parameter		Unit	Test 1		Test 2	
Bandwidth		MHz	10			
PDSCH transmission mode			9			
Uplink downlink configuration			2			
Special subframe configuration			4			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	P_C	dB	-3			
	σ	dB	-3			
CRS reference signals			Antenna ports 0, 1			
CSI reference signals			Antenna ports 15,…,18			
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$			5/ 3			
CSI reference signal configuration			0			
Propagation condition and antenna configuration			Clause B.1 (4 x 4)			
Beamforming Model			As specified in Section B.4.3			
CodeBookSubsetRestriction bitmap			0x0000 0020 0000 0000			
SNR (Note 2)		dB	5	6	11	12
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-93	-92	-87	-86
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98	
Max number of HARQ transmissions			1			
Physical channel for CQI/PMI reporting			PUSCH (Note 3)			
PUCCH Report Type for CQI/second PMI			2b			
Physical channel for RI reporting			PUSCH			
PUCCH Report Type for RI/ first PMI			5			
Reporting periodicity		ms	N_{pd} = 5			
CQI delay		ms	10 or 11			
cqi-pmi-ConfigurationIndex			3			
ri-ConfigIndex			805 (Note 4)			
ACK/NACK feedback mode			Multiplexing			

Note 1: Reference measurement channel RC.22 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7 and #2.

Note 4: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.

The normative reference for this requirement is TS 36.101 [2] clause 9.9.1.4.2.

9.9.1.4.2.4 Test description

9.9.1.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.74.
2. The parameter settings for the cell are set up according to Table 9.9.1.4.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.1.4.2.4.3.

9.9.1.4.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 9.9.1.4.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing both according to CQI value 8 and keep them regardless of the wideband CQI value sent by the UE. The SS sends downlink MAC padding bits on the DL RMC. The SS shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Continue transmission of the PDSCH until 2000 wideband and wideband spatial differential CQI reports have been gathered. In this process the SS collects wideband and wideband spatial differential CQI reports every 5 ms and also cases where UE transmits nothing in its CQI timing are counted as wideband and wideband spatial differential CQI reports respectively.
3. From each wideband CQI report, wideband CQI_0 is defined as Wideband CQI of codeword #0 and wideband CQI_1 is calculated according to clause 9.9.1.4.2.3. Codeword 1 offset level is selected from {0,1,2,3,-4,-3,-2,-1}. Set up a relative frequency distribution for the wideband CQI-values, reported. Calculate the median value (wideband Median CQI is the CQI that is at or crosses 50% distribution from the lower wideband CQI side) for each codewords. Wideband Median CQI_0 is based on the wideband CQI_0 and wideband median CQI_1 is based on the wideband CQI_1.
4. If Median CQI is not equal to 1 or 15 and 1800 or more of the wideband CQI_1 values are in the range (Median CQI_1 - 1) ≤ Median CQI ≤ (Median CQI_1 + 1) then continue with step 5, otherwise go to step 7.
5. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median- CQI_0– 1 and the transport format of codeword #1 is according to the wideband median CQI_1– 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX

responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

If the ratio (NACK /ACK + NACK) $\leq$ 0.1

then, and go to step 6, otherwise go to step 7.

6. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC including two codewords with spatial multiplexing where the transport format of codeword #0 is according to the wideband median-CQI_0 + 1 and the transport format of codeword #1 is according to the wideband median-CQI_1 + 1. The SS sends downlink MAC padding bits on the DL RMC. The SS shall not react to the any wideband CQI reports from UE and shall use a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. For any PDSCH transmitted by the SS, record the associated ACK, NACK and statDTX responses for each codewords respectively. *In case statDTX can not be differentiated from NACK due to multiplexing effect, evaluate the feedback as a NACK.* The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses. Continue to gather data until the number of filtered ACK+NACK responses for each codewords reaches 1000.

   If the ratio (NACK /ACK + NACK) $\geq$ 0.1

   then pass the UE for this test and go to step 8, otherwise go to step 7.

7. If both SNR points of the test have not been tested, then repeat the same procedure (steps 1 to 6) for the other SNR point as appropriate. Otherwise fail the UE.

8. If both tests have not been done, then repeat the same procedure (steps 1 to 7) with test conditions according to the table 9.9.1.4.2.3-1 for the other Test as appropriate. Otherwise pass the UE.

9.9.1.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.1.4.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.9.1.4.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.9.1.4.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	TBD		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.9.1.4.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.9.1.4.2.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
}			
ri-ConfigIndex	805	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.1.4.2.4.3-6: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

Table 9.9.1.4.2.4.3-7: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.9.1.4.2.4.3-8: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-3	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.9.1.4.2.5 Test requirement

The pass fail decision is as specified in the test procedure in clause 9.9.1.4.2.4.2.

There are no parameters in the test setup or measurement process whose variation impacts the results so there are no applicable test tolerances for this test.

9.9.2 CQI Reporting under fading conditions

9.9.2.1 CQI Reporting under fading conditions - PUCCH 1-0 (Cell-Specific Reference Symbols) for Enhanced Performance Requirement Type A

9.9.2.1.1 FDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A 1x4

9.9.2.1.1.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.9.2.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that support enhanced receiver Type A and 4Rx antenna ports in any FDD RF band.

9.9.2.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.9.2.1.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.9.2.1.1.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;

b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

Table 9.9.2.1.1.3-1: Fading test for single antenna (FDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		1 (port 0)	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-4	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (1 x 4)	(1 x 4)
DIP (Note 4)	dB	N/A	-0.41
Reference measurement channel		Note 2	R.2 FDD
Reporting mode		PUCCH 1-0	N/A
Reporting periodicity	ms	N_{pd} = 2	N/A
CQI delay	ms	8	N/A
Physical channel for CQI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type		4	N/A
cqi-pmi-ConfigurationIndex		1	N/A
Max number of HARQ transmissions		1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 FDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and RC.4 FDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Table 9.9.2.1.1.3-2: Minimum requirement (FDD)

γ	1.8
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.9.2.1.1.

9.9.2.1.1.4 Test description

9.9.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.78.
2. The parameter settings for the cell 1 are set up according to Table 9.9.2.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.2.1.1.4.3.

9.9.2.1.1.4.2 Test procedure

1. Set the cell 1 and 2 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.9.2.1.1.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1,#3,#5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_interference}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
3. Deactivate i.e., stop transmitting anything from the cell 2 and set the cell 1 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.9.2.1.1.3-1 as appropriate.
4. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #1,#3,#5 and subframe #7 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_gaussian_noise}}$.
5. If the ratio ($t_{\text{wideband_interference}} / t_{\text{wideband_gaussian_noise}}$) $\geq \gamma$ and ratio (NACK /(ACK + NACK)) calculated in step 2 is greater or equal to 0.02, then pass the UE for this test. Otherwise fail the UE.

9.9.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.2.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.9.2.1.1.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	1	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

9.9.2.1.1.5 Test requirement

Table 9.9.2.1.1.5-1: Test Parameters for Fading test with single antenna (FDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		1 (port 0)	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-3.97	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (1 x 4)	(1 x 4)
DIP (Note 4)	dB	N/A	-0.38
Reference measurement channel		Note 2	R.2 FDD
Reporting mode		PUCCH 1-0	N/A
Reporting periodicity	ms	N_{pd} = 2	N/A
CQI delay	ms	8	N/A
Physical channel for CQI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type		4	N/A
cqi-pmi-ConfigurationIndex		1	N/A
Max number of HARQ transmissions		1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 FDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and RC.4 FDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Table 9.9.2.1.1.5-2: Test requirement (FDD)

γ	1.79
UE Category	≥1

9.9.2.1.2 TDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A 1x4

9.9.2.1.2.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.9.2.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward that support enhanced receiver Type A and 4Rx antenna ports in any TDD RF band.

9.9.2.1.2.3 Minimum conformance requirements

For the parameters specified in Table 9.9.2.1.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.9.2.1.2.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;

b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

Table 9.9.2.1.2.3-1: Fading test for single antenna (TDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		1 (port 0)	
Uplink downlink configuration		2	
Special subframe configuration		4	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-4	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (1 x 4)	(1 x 4)
DIP (Note 4)	dB	N/A	-0.41
Reference measurement channel		Note 2	R.2A TDD
Reporting mode		PUCCH 1-0	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	10 or 11	N/A
Physical channel for CQI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type		4	N/A
cqi-pmi-ConfigurationIndex		3	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback mode		Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 TDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1 and RC.4 TDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Table 9.9.2.1.2.3-2: Minimum requirement (TDD)

γ	1.8
UE Category	≥1

The normative reference for this requirement is TS 36.101 [2] clause 9.9.2.1.2.

9.9.2.1.2.4 Test description

9.9.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.78.
2. The parameter settings for the cell 1 are set up according to Table 9.9.2.1.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.2.1.2.4.3.

9.9.2.1.2.4.2 Test procedure

1. Set the cell 1 and 2 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.9.2.1.2.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_interference}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
3. Deactivate i.e., stop transmitting anything from the cell 2 and set the cell 1 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.9.2.1.2.3-1 as appropriate.
4. The SS shall transmit PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_gaussian_noise}}$.
5. If the ratio ($t_{\text{wideband_interference}} / t_{\text{wideband_gaussian_noise}}$) $\geq \gamma$ and ratio (NACK /(ACK + NACK)) calculated in step 2 is greater or equal to 0.02, then pass the UE for this test. Otherwise fail the UE.

9.9.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.2.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
}			

Table 9.9.2.1.2.4.3-2: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	3	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	NULL	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.2.1.2.4.3-3: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

9.9.2.1.2.5 Test requirement

Table 9.9.2.1.2.5-1: Test Parameters for Fading test with single antenna (TDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		1 (port 0)	
Uplink downlink configuration		2	
Special subframe configuration		4	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-3.97	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (1 x 4)	(1 x 4)
DIP (Note 4)	dB	N/A	-0.38
Reference measurement channel		Note 2	R.2A TDD
Reporting mode		PUCCH 1-0	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	10 or 11	N/A
Physical channel for CQI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type		4	N/A
cqi-pmi-ConfigurationIndex		3	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback mode		Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.1 TDD according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1 and RC.4 TDD according to Table A.4-1 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.

Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.

Table 9.9.2.1.2.5-2: Test requirement (TDD)

γ	1.79
UE Category	≥1

9.9.2.2 CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) for Enhanced Performance Requirement Type A

9.9.2.2.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A 2x4

9.9.2.2.1.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.9.2.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward with category 2 or higher that support enhanced receiver Type A and 4Rx antenna ports in any FDD RF band. Applicability requires support for FGI bit 103.

9.9.2.2.1.3 Minimum conformance requirements

For the parameters specified in Table 9.9.2.2.1.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.9.2.2.1.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;

b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

Table 9.9.2.2.1.3-1: Fading test for single antenna (FDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		9	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-4	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 4)	(1 x 4)
Beamforming Model		As specified in Section B.4.3 (Note 9, 10)	N/A
DIP (Note 4)	dB	N/A	-0.41
Cell-specific reference signals		Antenna ports 0,1	Antenna port 0
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/1	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	N/A	1 / 0010000000000000
CodeBookSubsetRestriction bitmap		001111	N/A
Reference measurement channel		Note 2	R.2 FDD
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	8	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
PUCCH channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-ConfigurationIndex		2	N/A
ri-ConfigIndex		1	N/A
Max number of HARQ transmissions		1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.

Note 4: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Interfering cell is fully loaded.

Note 6:	Both cells are time-synchronous.
Note 7:	Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.
Note 8:	SINR corresponds to $\hat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.
Note 9:	The precoder in clause B.4.3 follows UE recommended PMI.
Note 10:	If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 9.9.2.2.1.3-2: Minimum requirement (FDD)

γ	1.8
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.9.2.2.1.

9.9.2.2.1.4 Test description

9.9.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.79.
2. The parameter settings for the cell 1 are set up according to Table 9.9.2.2.1.5-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.2.2.1.4.3.

9.9.2.2.1.4.2 Test procedure

1. Set the cell 1 and 2 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.9.2.2.1.5-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_interference}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.
3. Deactivate i.e., stop transmitting anything from the cell 2 and set the cell 1 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.9.2.2.1.5-1 as appropriate.

4. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and subframe #5 (Table A.4.1-1). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_gaussian_noise}}$.

5. If the ratio ($t_{\text{wideband_interference}} / t_{\text{wideband_gaussian_noise}}$) $\geq \gamma$ in Table 9.9.2.2.1.5-2 and ratio (NACK /(ACK + NACK)) calculated in step 2 is greater or equal to 0.02, then pass the UE for this test. Otherwise fail the UE.

9.9.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.2.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.9.2.2.1.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	001111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.9.2.2.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.9.2.2.1.4.3-4: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	2		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.2.2.1.4.3-5: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 9.9.2.2.1.4.3-6: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

9.9.2.2.1.5 Test requirement

Table 9.9.2.2.1.5-1: Test Parameters for fading test for single antenna (FDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		9	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-3.97	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 4)	(1 x 4)
Beamforming Model		As specified in Section B.4.3 (Note 9, 10)	N/A
DIP (Note 4)	dB	N/A	-0.38
Cell-specific reference signals		Antenna ports 0,1	Antenna port 0
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/1	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	N/A	1 / 0010000000000000
CodeBookSubsetRestriction bitmap		001111	N/A
Reference measurement channel		Note 2	R.2 FDD
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	8	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
PUCCH channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-ConfigurationIndex		2	N/A
ri-ConfigIndex		1	N/A
Max number of HARQ transmissions		1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.

Note 4: The respective received power spectral density of each interfering cell relative to $N_{oc}{}'$ is defined by its associated DIP value as

	specified in clause B.5.1.
Note 5:	Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Interfering cell is fully loaded.
Note 6:	Both cells are time-synchronous.
Note 7:	Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.
Note 8:	SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.
Note 9:	The precoder in clause B.4.3 follows UE recommended PMI.
Note 10:	If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 9.9.2.2.1.5-2: Test requirement (FDD)

γ	1.79
UE Category	≥2

9.9.2.2.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A 2x4

9.9.2.2.2.1 Test purpose

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.9.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 11 and forward with category 2 or higher that support enhanced receiver Type A and 4Rx antenna ports in any TDD RF band. Applicability requires support for FGI bit 103.

9.9.2.2.2.3 Minimum conformance requirements

For the parameters specified in Table 9.9.2.2.2.3-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in 9.9.2.2.2.3-2 and by the following

a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;

b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

Table 9.9.2.2.2.3-1: Fading test for single antenna (TDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		9	
Uplink downlink configuration		2	
Special subframe configuration		4	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-4	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 4)	(1 x 4)
Beamforming Model		As specified in Section B.4.3 (Note 10, 11)	N/A
DIP (Note 4)	dB	N/A	-0.41
Cell-specific reference signals		Antenna ports 0,1	Antenna port 0
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/3	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	N/A	3 / 0010000000000000
CodeBookSubsetRestriction bitmap		001111	N/A
Reference measurement channel		Note 2	R.2A TDD
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	10	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
Physical channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-ConfigurationIndex		3	N/A
ri-ConfigIndex		805 (Note 9)	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback mode		Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in

uplink subframe SF#2 and #7.
Note 4: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.
Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Interfering cell is fully loaded.
Note 6: Both cells are time-synchronous.
Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.
Note 8: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.
Note 9: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.
Note 10: The precoder in clause B.4.3 follows UE recommended PMI.
Note 11: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 9.9.2.2.2.3-2: Minimum requirement (TDD)

γ	1.8
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.9.2.2.2.

9.9.2.2.2.4 Test description

9.9.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS and faders to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.79.
2. The parameter settings for the cell 1 are set up according to Table 9.9.2.2.2.5-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.2.2.2.4.3.

9.9.2.2.2.4.2 Test procedure

1. Set the cell 1 and 2 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.9.2.2.2.5-1 as appropriate.

2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_interference}}$. The responses are then filtered as follows: for the sequence of responses for each HARQ process, discard all the statDTX responses.

3. Deactivate i.e., stop transmitting anything from the cell 2 and set the cell 1 parameters of bandwidth, the propagation condition, antenna configuration and measurement channel according to Table 9.9.2.2.2.5-1 as appropriate.

4. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the wideband CQI value reported from UE. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #2 and subframe #7 (Table A.4.1-2). The UE will send ACK/NACK and periodic CQI report using PUSCH. Measure the average throughput according to Annex G.5.3. Declare the throughput as $t_{\text{wideband_gaussian_noise}}$.

5. If the ratio ($t_{\text{wideband_interference}} / t_{\text{wideband_gaussian_noise}}$) $\geq \gamma$ in Table 9.9.2.2.2.5-2 and ratio (NACK /(ACK + NACK)) calculated in step 2 is greater or equal to 0.02, then pass the UE for this test. Otherwise fail the UE.

9.9.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.2.2.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	Not present		RBC
antennaInfo	Not present		RBC
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Condition	Explanation
RBC	Used at configuration of a radio bearer combination during SRB2+DRB establishment

Table 9.9.2.2.2.4.3-2 *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.9.2.2.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	001111		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.9.2.2.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.9.2.2.2.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	3		
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	805		
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.2.2.2.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	2	Parameter: CSI reference signal configuration	
subframeConfig-r10	3	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

Table 9.9.2.2.2.4.3-7: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa2		
specialSubframePatterns	ssp4		
}			

9.9.2.2.2.5 Test requirement

Table 9.9.2.2.2.5-1: Test parameters for fading test for single antenna (TDD)

Parameter	Unit	Cell 1	Cell 2
Bandwidth	MHz	10 MHz	
Transmission mode		9	
Uplink downlink configuration		2	
Special subframe configuration		4	
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-3.97	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 4)	(1 x 4)
Beamforming Model		As specified in Section B.4.3 (Note 9, 10)	N/A
DIP (Note 4)	dB	N/A	-0.38
Cell-specific reference signals		Antenna ports 0,1	Antenna port 0
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/3	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap	Subframes / bitmap	N/A	3 / 0010000000000000
CodeBookSubsetRestriction bitmap		001111	N/A
Reference measurement channel		Note 2	R.2A TDD
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	N_{pd} = 5	N/A
CQI delay	ms	10	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
Physical channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-ConfigurationIndex		3	N/A
ri-ConfigIndex		805 (Note 9)	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback mode		Multiplexing	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)

Note 2: Reference measurement channel RC.11 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH

DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#2 and #7.

Note 4: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Interfering cell is fully loaded.

Note 6: Both cells are time-synchronous.

Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.

Note 8: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.

Note 9: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.

Note 10: The precoder in clause B.4.3 follows UE recommended PMI.

Note 11: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Table 9.9.2.2.2.5-2: Test requirement (TDD)

γ	1.79
UE Category	≥2

9.9.3 Reporting of Precoding Matrix Indicator (PMI) for 4Rx UE

9.9.3.1 PMI Reporting – PUSCH 3-1 (Single PMI) (Cell-Specific Reference Symbols)

9.9.3.1.1 TDD PMI Reporting – PUSCH 3-1 (Single PMI) 8x4

9.9.3.1.1.1 Test purpose

To test the accuracy of the Precoding Matrix Indicator (PMI) reporting such that the system throughput is maximized based on the precoders configured according to the UE reports.

9.9.3.1.1.2 Test applicability

This test applies to all types of E-UTRA TDD release 10 and forward UEs of Category 2 and onwards that support 4 Rx antenna ports in any TDD RF band. Applicability requires support for FGI bit 104.

9.9.3.1.1.3 Minimum conformance requirements

For the parameters specified in Table 9.9.3.1.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.9.3.1.1.3-2.

Table 9.9.3.1.1.3-1: PMI test for single-layer (TDD)

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Uplink downlink configuration			1
Special subframe configuration			4
Propagation channel			EVA5
Precoding granularity		PRB	50
Antenna configuration			8 x 4
Correlation modelling			High, Cross polarized
Cell-specific reference signals			Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,22
Beamforming model			Annex B.4.3
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/ 4
CSI-RS reference signal configuration			0
CodeBookSubsetRestriction bitmap			0x0000 0000 001F FFE0 0000 0000 FFFF
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0
	Pc	dB	-6
	σ	dB	-3
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 3-1
Reporting interval		ms	5
PMI delay (Note 2)		ms	10
Measurement channel			R.45-2
OCNG Pattern			OP.1 TDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,0,1,2}
ACK/NACK feedback mode			Multiplexing

Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity).

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).

Note 3: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#4 and #9 to allow aperiodic CQI/PMI/RI to be transmitted on uplink SF#3 and #8.

Note 4: Randomization of the principle beam direction shall be used as specified in B.2.3A.4

Table 9.9.3.1.1.3-2: Minimum requirement (TDD)

Parameter	Test 1
γ	2.5
UE Category	≥2

The normative reference for this requirement is TS 36.101 [2] clause 9.9.3.1.1.

9.9.3.1.1.4 Test description

9.9.3.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.77.
2. The parameter settings for the cell are set up according to Table 9.9.3.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.3.1.1.4.3.

9.9.3.1.1.4.2 Test procedure

1. Set the bandwidth, propagation condition, antenna configuration and measurement channel parameters according to Table 9.9.3.1.1.3-1 as appropriate.
2. The SS shall transmit PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC with randomly selected precoding matrix from codebook (Table 7.2.4-1 in TS 36.213 [10]) every subframe regardless of PMI reports from the UE. Note that each precoding matrix shall be selected in equal probabilities. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Establish t_{rnd} and SNR_{rnd} according to annex G.5.2.
3. Set SNR to SNR_{rnd}. The SS shall transmit PDSCH with precoding matrix according to PMI report from the UE. The SS sends downlink MAC padding bits on the DL RMC. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure t_{ue} according to Annex G.5.3.
4. Calculate $\gamma = \frac{t_{ue}}{t_{rnd}}$ If the ratio (throughput / t_{rnd}) ≥ γ which is specified in table 9.9.3.1.1.5-1, then the test is pass. Otherwise, the test is fail.

9.9.3.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.3.1.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig-r10	*CQI-ReportConfig-r10-DEFAULT*		
antennaInfo	Not present		
antennaInfo-r10 CHOICE {			
explicitValue-r10	AntennaInfoDedicated-r10		
}			
csi-RS-Config-r10	CSI-RS-Config-r10		
}			

Table 9.9.3.1.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.9.3.1.1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	0x0000 0000 001F FFE0 0000 0000 FFFF		
ue-TransmitAntennaSelection CHOICE{			
release	NULL		
}			
}			

Table 9.9.3.1.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	setup		
}			

Table 9.9.3.1.1.4.3-5: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Multiplexing	Multiplexing is selected as default to align with RAN4's assumptions in RF tests.	TDD
}			

Table 9.9.3.1.1.4.3-6: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.9.3.1.1.4.3-7: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an8	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	-6	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.9.3.1.1.5 Test requirement

Table 9.9.3.1.1.5-1: Test requirement (TDD)

Parameter	Test 1
γ	2.49
UE Category	≥2

9.9.4 Reporting of Rank Indicator (RI)

The purpose of this test for 4Rx UEs is to verify that the reported rank indicator accurately represents the channel rank. The accuracy of RI (CQI) reporting is determined by the relative increase of the throughput obtained when transmitting based on the reported rank compared to the case for which a fixed rank is used for transmission. Transmission mode 4 is used with the specified CodebookSubSetRestriction in section 9.9.4.1, transmission mode 9 is used with the specified CodebookSubSetRestriction in section 9.9.4.2.

For the fixed rank 1 transmission with 2 Tx ports the RI and PMI reporting is restricted to two single-layer precoders, For fixed rank 2 transmission with 2 Tx ports the RI and PMI reporting is restricted to one two-layer precoder. For the follow RI transmission for rank 1 and 2 and 2 Tx ports the RI and PMI reporting is restricted to select the union of these precoders.

For the fixed rank 2 transmission with 4 Tx ports the RI and PMI reporting is restricted to any 2 Layer precoder, for the follow RI transmission the RI and PMI reporting is not restricted at all.

Channels with low and high correlation are used to ensure that RI reporting reflects the channel condition.

9.9.4.1 RI Reporting– PUCCH 1-1 4x4

9.9.4.1.1 FDD RI Reporting– PUCCH 1-1 4x4

9.9.4.1.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank.

9.9.4.1.1.2 Test applicability

This test applies to E-UTRA FDD release 10 and forward UEs of Category 2 and onwards that support 4 Rx antenna ports in any FDD bands.

9.9.4.1.1.3 Minimum conformance requirements

The minimum performance requirement in Table 9.9.4.1.1.3-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

For the parameters specified in Table 9.9.4.1.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.9.4.1.1.3-2.

Table 9.9.4.1.1.3-1: RI Test (FDD)

Parameter		Unit	Test 1	Test 2	Test 3	Test 4
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Downlink power allocation	ρ_A	dB	-3			
	ρ_B	dB	-3			
	σ	dB	0			
Propagation condition and antenna configuration			2 x 4 EPA5			4 x 4 EPA5
Cell-specific reference signals			Antenna ports 0, 1			Antenna ports 0-3
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI			Note 6
Antenna correlation			Low	Low	High	Low
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI	Fixed RI=2 and follow RI
SNR		dB	-4	16	16	25
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-102	-82	-82	-73
Maximum number of HARQ transmissions			1			
Reporting mode			PUCCH 1-1 (Note 4)			
Physical channel for CQI/PMI reporting			PUCCH Format 2			
PUCCH Report Type for CQI/PMI			2			
Physical channel for RI reporting			PUSCH (Note 3)			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	N_{pd}= 5			
PMI and CQI delay		ms	8			
cqi-pmi-ConfigurationIndex			6			
ri-ConfigurationInd			1 (Note 5)			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.2 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between RI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic RI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.

Note 4: The bit field for precoding information in DCI format 2 shall be mapped as:
- For reported RI = 1 and PMI = 0 >> precoding information bit field index = 1
- For reported RI = 1 and PMI = 1 >> precoding information bit field index = 2
- For reported RI = 2 and PMI = 0 >> precoding information bit field index = 0

Note 5: To avoid the ambiguity of TE behaviour when applying CQI and PMI during rank switching, RI reports are to be applied at the TE with one subframe delay in addition to Note 1 to align with CQI and PMI reports.

Note 6: The following precoders are allowed in Test 4:
"0x0000 0000 FFFF 0000" for RI=2
"0xFFFF FFFF FFFF FFFF" for UE reported RI

Table 9.9.4.1.1.3-2: Minimum requirement (FDD)

	Test 1	Test 2	Test 3	Test 4
γ_1	N/A	1.05	0.9	N/A
γ_2	1	N/A	N/A	1.1
UE Category	≥2	≥2	≥2	≥5

The normative reference for this requirement is TS 36.101 [2] clause 9.9.4.1.1.

9.9.4.1.1.4 Test description

9.9.4.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76 for test 1-3 and Figure A.74 for test 4 ..
2. The parameter settings for the cell are set up according to Table 9.9.4.1.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.4.1.1.4.3.

9.9.4.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.9.4.1.1.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-1). Measure the t_{fix} according to annex G.5.3.
3. Propagation conditions are set according to Annex B.1.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe (Table A.4.1-1).
5. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.9.4.1.1.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. Propagation conditions are set according to Table 9.9.4.1.1.3-1.
8. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-1). Measure $t_{reported}$ according to Annex G.5.3 If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.9.4.1.1.5-1, then pass the UE for this test and go to step 9. Otherwise, fail the UE.
9. If all tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the Table 9.9.4.1.1.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.9.4.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.4.1.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
physicalConfigDedicated	PhysicalConfigDedicated - DEFAULT using condition RBC		
}			

Table 9.9.4.1.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		RBC
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
N4TxAntenna-tm4	According to each test		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.9.4.1.1.4.3-3: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.9.4.1.1.4.3-4: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex	0		
cqi-pmi-ConfigIndex	6	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic CHOICE {			
widebandCQI	NULL		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.4.1.1.4.3-5: *RRCConnectionReconfiguration*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {	Not present		
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			

9.9.4.1.1.5 Test requirement

Table 9.9.4.1.1.5-1: Test requirement (FDD)

	Test 1	**Test 2**	**Test 3**	**Test 4**
γ_1	N/A	1.04	0.89	N/A
γ_2	0.99	N/A	N/A	1.09
UE Category	≥2	≥2	≥2	≥5

9.9.4.1.2 TDD RI Reporting– PUSCH 3-1 4x4

9.9.4.1.2.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank.

9.9.4.1.2.2 Test applicability

This test applies to E-UTRA TDD release 10 and forward UEs of Category 2 and onwards that support 4 Rx antenna ports in any TDD bands.

9.9.4.1.2.3 Minimum conformance requirements

The minimum performance requirement in Table 9.9.4.1.1.3-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

For the parameters specified in Table 9.9.4.1.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.9.4.1.2-2.

Table 9.9.4.1.2.3-1: RI Test (TDD)

Parameter		Unit	Test 1	Test 2	Test 3	Test 4
Bandwidth		MHz	10			
PDSCH transmission mode			4			
Downlink power allocation	ρ_A	dB	-3			
	ρ_B	dB	-3			
	σ	dB	0			
Uplink downlink configuration			2			
Special subframe configuration			4			
Propagation condition and antenna configuration			2 x 4 EPA5			4 x 4 EPA5
Cell-specific reference signals			Antenna ports 0, 1			Antenna ports 0-3
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI			Note 4
Antenna correlation			Low	Low	High	Low
RI configuration			Fixed RI=2 and follow RI	Fixed RI= 1 and follow RI	Fixed RI=1 and follow RI	Fixed RI=2 and follow RI
SNR		dB	-4	16	16	25
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-102	-82	-82	-73
Maximum number of HARQ transmissions			1			
Reporting mode			PUSCH 3-1 (Note 3)			
Reporting interval		ms	5			
PMI and CQI delay		ms	10 or 11			
ACK/NACK feedback mode			Bundling			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 2: Reference measurement channel RC.2 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 3: Reported wideband CQI and PMI are used and sub-band CQI is discarded.
Note 4: The following precoders are allowed in Test 4:
"0x0000 0000 FFFF 0000" for RI=2
"0xFFFF FFFF FFFF FFFF" for UE reported RI

Table 9.9.4.1.2.3-2: Minimum requirement (TDD)

	Test 1	Test 2	Test 3	Test 4
γ_1	N/A	1.05	0.9	N/A
γ_2	1	N/A	N/A	1.1
UE Category	≥2	≥2	≥2	≥5

The normative reference for this requirement is TS 36.101 [2] clause 9.9.4.1.2.

9.9.4.1.2.4 Test description

9.9.4.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76 for test 1-3 and Figure A.74 for test 4 .
2. The parameter settings for the cell are set up according to Table 9.9.4.1.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.4.1.2.4.3.

9.9.4.1.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.9.4.1.2.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure the t_{fix} according to annex G.5.3
3. Propagation conditions are set according to Annex B.1.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in subframe#2 and #7 (Table A.4.1-2).
5. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.9.4.1.2.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. Propagation conditions are set according to Table 9.9.4.1.2.3-1.
8. The SS shall send PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4. Measure $t_{reported}$ according to Annex G.5.3
   If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.9.4.1.2.5-1, then pass the UE for this test and go to step 9. Otherwise, fail the UE.
9. If all tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the Table 9.9.4.1.2.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.9.4.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.4.1.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 5.5.1.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
cqi-ReportConfig	*CQI-ReportConfig-DEFAULT*		
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
}			
codebookSubsetRestriction CHOICE {			
N4TxAntenna-tm4	According to each test		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			

Table 9.9.4.1.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

Table 9.9.4.1.2.4.3-3: *CQI-ReportConfig-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic CHOICE {	Not Present		
}			
}			

Table 9.9.4.1.2.4.3-4: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Bundling	Multiplexing is selected as default to align with RAN4's assumptions in RF tests	TDD
}			

Table 9.9.4.1.2.4.3-5: *RRCConnectionReconfiguration*

Derivation Path: 36.331 clause 6.2.2			
Information Element	**Value/remark**	**Comment**	**Condition**
rrcConnectionReconfiguration-r8 SEQUENCE {			
nonCriticalExtension SEQUENCE {			
lateNonCriticalExtension SEQUENCE {	Not present		
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {			
maxLayersMIMO-r10	fourLayers		
}			
}			
}			
}			

9.9.4.1.2.5 Test requirement

Table 9.9.4.1.2.5-1: Test requirement (TDD)

	Test 1	**Test 2**	**Test 3**	**Test 4**
γ_1	N/A	1.04	0.89	N/A
γ_2	0.99	N/A	N/A	1.09
UE Category	≥2	≥2	≥2	≥5

9.9.4.2 RI Reporting- PUCCH 1-1 for eDL-MIMO 4x4

9.9.4.2.1 FDD RI Reporting- PUCCH 1-1 for eDL-MIMO 4x4

9.9.4.2.1.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank.

9.9.4.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD release 10 and forward UEs of Category 2 and onwards that support 4 Rx antenna ports in any FDD bands. Applicability requires support for FGI bit 103.

9.9.4.2.1.3 Minimum conformance requirements

The minimum performance requirement in Table 9.9.4.2.1.3-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

For the parameters specified in Table 9.9.4.2.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.9.4.2.1.3-2.

Table 9.9.4.2.1.3-1: RI Test (FDD)

Parameter		Unit	Test 1	Test 2	Test 3	Test 4
Bandwidth		MHz	10			
PDSCH transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	Pc	dB	0			
	σ	dB	0			
Propagation condition and antenna configuration			2 x 4 EPA5			4 x 4 EPA5
Cell-specific reference signals			Antenna ports 0			
Beamforming Model			As specified in Section B.4.3			
CSI reference signals			Antenna ports 15, 16			Antenna ports 15-18
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$			5/1			
CSI reference signal configuration			6			
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI			Note 5
Antenna correlation			Low	Low	High	Low
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI	Fixed RI=2 and follow RI
SNR		dB	-4	16	16	25
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-102	-82	-82	-73
Maximum number of HARQ transmissions			1			
Reporting mode			PUCCH 1-1			
Physical channel for CQI/PMI reporting			PUSCH (Note 3)			
PUCCH Report Type for CQI/PMI			2			
Physical channel for RI reporting			PUCCH Format 2			
PUCCH Report Type for RI			3			
Reporting periodicity		ms	N_{pd} = 5			
PMI and CQI delay		ms	8			
cqi-pmi-ConfigurationIndex			2			
ri-ConfigurationInd			1 (Note 4)			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.9 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.

Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

Note 4: To avoid the ambiguity of TE behaviour when applying CQI and PMI during rank switching, RI reports are to be applied at the TE with one subframe delay in addition to Note 1 to align with CQI and PMI reports.

Note 5: The following precoders are allowed in Test 4:
"0x0000 0000 FFFF 0000" for RI=2
"0xFFFF FFFF FFFF FFFF" for UE reported RI

Table 9.9.4.2.1.3-2: Minimum requirement (FDD)

	Test 1	Test 2	Test 3	Test 4
γ_1	N/A	1.05	0.9	N/A
γ_2	1	N/A	N/A	1.1
UE Category	≥2	≥2	≥2	≥5

The normative reference for this requirement is TS 36.101 [2] clause 9.9.4.2.1.

9.9.4.2.1.4 Test description

9.9.4.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76 for test 1-3 and Figure A.74 for test 4 .
2. The parameter settings for the cell are set up according to Table 9.9.4.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.4.2.1.4.3.

9.9.4.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.9.4.2.1.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1). Measure the t_{fix} according to annex G.5.3.
3. Propagation conditions are set according to Annex B.1.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 to schedule UL RMC in every subframe (Table A.4.1-1).
5. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.9.4.2.1.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. Propagation conditions are set according to Table 9.9.4.2.1.3-1.
8. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI, PMI and RI. In case of CQI reports for two codewords (codeword #0 and #1), the CQI offset level for codeword #1 is selected from {0,1,2,3,-4,-3,-2,-1}. The SS sends downlink MAC padding bits on the

DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #0 and #5 (Table A.4.1-1). Measure $t_{reported}$ according to Annex G.5.3

If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.9.4.2.1.5-1, then pass the UE for this test and go to step 9. Otherwise, fail the UE.

9. If all tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the Table 9.9.4.2.1.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.9.4.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.4.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Table 9.9.4.2.1.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.9.4.2.1.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	According to each test		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.9.4.2.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.9.4.2.1.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	2	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.4.2.1.4.3-6: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	6	Parameter: CSI reference signal configuration	
subframeConfig-r10	1	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.9.4.2.1.5 Test requirement

Table 9.9.4.2.1.5-1: Test requirement (FDD) for eDL-MIMO

	Test 1	Test 2	Test 3	Test 4
γ_1	N/A	1.04	0.89	N/A
γ_2	0.99	N/A	N/A	1.09
UE Category	≥2	≥2	≥2	≥5

9.9.4.2.2 TDD RI Reporting- PUCCH 1-1 for eDL-MIMO 4x4

9.9.4.2.2.1 Test purpose

To verify that the reported rank indicator accurately represents the channel rank.

9.9.4.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD release 10 and forward UEs of Category 2 and onwards that support 4 Rx antenna ports in any TDD bands. Applicability requires support for FGI bit 103.

9.9.4.2.2.3 Minimum conformance requirements

The minimum performance requirement in Table 9.9.4.2.2.3-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

For the parameters specified in Table 9.9.4.2.2.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.9.4.2.2.3-2.

Table 9.9.4.2.2.3-1: RI Test (TDD)

Parameter		Unit	Test 1	Test 2	Test 3	Test 4
Bandwidth		MHz	10			
PDSCH transmission mode			9			
Downlink power allocation	ρ_A	dB	0			
	ρ_B	dB	0			
	Pc	dB	0			
	σ	dB	0			
Uplink downlink configuration			1			
Special subframe configuration			4			
Propagation condition and antenna configuration			2 x 4 EPA5			4 x 4 EPA5
Cell-specific reference signals			Antenna ports 0			
CSI reference signals			Antenna ports 15, 16			Antenna ports 15-18
Beamforming Model			As specified in Section B.4.3			
CSI reference signal configuration			4			
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}			5/4			
CodeBookSubsetRestriction bitmap			000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI			Note 4
Antenna correlation			Low	Low	High	Low
RI configuration			Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI	Fixed RI=2 and follow RI
SNR		dB	-4	16	16	25
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-102	-82	-82	-73
Maximum number of HARQ transmissions			1			
Reporting mode			PUCCH 1-1			
Physical channel for CQI/ PMI reporting			PUSCH (Note 3)			
PUCCH report type for CQI/ PMI			2			
Physical channel for RI reporting			PUCCH Format 2			
Reporting periodicity		ms	N_{pd} = 5			
PMI and CQI delay		ms	10			
ACK/NACK feedback mode			Bundling			
cqi-pmi-ConfigurationIndex			4			
ri-ConfigurationInd			1			

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 2: Reference measurement channel RC.9 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.

Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#3 and #8.

Note 4: The following precoders are allowed in Test 4:
"0x0000 0000 FFFF 0000" for RI=2
"0xFFFF FFFF FFFF FFFF" for UE reported RI

Table 9.9.4.2.2.3-2: Minimum requirement (TDD)

	Test 1	Test 2	Test 3	Test 4
γ_1	N/A	1.05	0.9	N/A
γ_2	1	N/A	N/A	1.1
UE Category	≥2	≥2	≥2	≥5

The normative reference for this requirement is TS 36.101 [2] clause 9.9.4.2.2.

9.9.4.2.2.4 Test description

9.9.4.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.76 for test 1-3 and Figure A.74 for test 4 .
2. The parameter settings for the cell are set up according to Table 9.9.4.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 9.9.4.2.2.4.3.

9.9.4.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration, antenna correlation, CodeBookSubsetRestriction for fixed Rank and the SNR according to Table 9.9.4.2.2.3-1 as appropriate.
2. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL RMC in subframe #3 and #8 (Table A.4.1-2). Measure the t_{fix} according to annex G.5.3
3. Propagation conditions are set according to Annex B.1.
4. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit to 0 to schedule UL RMC in subframe#3 and #8 (Table A.4.1-2).
5. The SS shall transmit an RRC Connection Reconfiguration message to set codebookSubsetRestriction as for UE reported RI according to Table 9.9.4.2.2.3-1.
6. The UE shall transmit RRC Connection Reconfiguration Complete message.
7. Propagation conditions are set according to Table 9.9.4.2.2.3-1.
8. The SS shall send PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to the UE reported CQI (wideband CQI), PMI and RI. The SS sends downlink MAC padding bits on the DL RMC. The SS sends uplink scheduling information via PDCCH DCI format 0 with CQI request bit set to 0 to schedule UL

RMC in subframe #3 and subframe #8 (Table A.4.1-2). Measure $t_{reported}$ according to Annex G.5.3

If the ratio ($t_{reported}$ / t_{fix}) satisfies the requirement in Table 9.9.4.2.2.5-1, then pass the UE for this test and go to step 9. Otherwise, fail the UE.

9. If all tests have not been done, then repeat the same procedure (steps 1 to 8) with test conditions according to the Table 9.9.4.2.2.3-2 for the other Tests as appropriate. Otherwise pass the UE.

9.9.4.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 9.9.4.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT::= SEQUENCE {			
antennaInfo	Not present		
antennaInfo-r10 CHOICE{			RBC
explicitValue-r10	AntennaInfoDedicated-r10		
}			
cqi-ReportConfig-r10	CQI-ReportConfig-r10-DEFAULT		RBC
csi-RS-Config-r10	CSI-RS-Config-r10		RBC
}			

Table 9.9.4.2.2.4.3-2: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.508 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 9.9.4.2.2.4.3-3: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	According to each test		
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			

Table 9.9.4.2.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not Present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	CQI-ReportPeriodic-r10-DEFAULT		
pmi-RI-Report-r9	setup		
}			

Table 9.9.4.2.2.4.3-5: *CQI-ReportPeriodic-r10-DEFAULT*

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	4	(see Table 7.2.2-1A in TS 36.213)	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
ri-ConfigIndex	1	(see Table 7.2.2-1B in TS 36.213)	
simultaneousAckNackAndCQI	FALSE		
}			
}			
}			

Table 9.9.4.2.2.4.3-6: PUCCH-ConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
ackNackRepetition CHOICE {			
release	NULL		
}			
tddAckNackFeedbackMode	Bundling	Multiplexing is selected as default to align with RAN4's assumptions in RF tests	TDD
}			

Table 9.9.4.2.2.4.3-7: TDD-Config-DEFAULT

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa1		
specialSubframePatterns	ssp4		
}			

Table 9.9.4.2.2.4.3-8: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	4	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI-RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI-RS}}$	
p-C-r10	0	Parameter: P_C which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
}			
}			

9.9.4.2.2.5 Test requirement

Table 9.9.4.2.2.5-1: Test requirement (TDD) for eDL-MIMO

	Test 1	**Test 2**	**Test 3**	**Test 4**
γ_1	N/A	1.04	0.89	N/A
γ_2	0.99	N/A	N/A	1.09
UE Category	≥2	≥2	≥2	≥5

10 MBMS Performance

10.1 FDD MBMS performance (Fixed Reference Channel)

10.1.1 Test purpose

This test verifies the performance of FDD MBMS with a given SNR for which the average BLER remains below a given reference value.

10.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE supporting MBMS release 9 and forward.

10.1.3 Minimum conformance requirements

The parameters specified in Table 10.1.3-1 are valid for all FDD tests unless otherwise stated. For the requirements defined in this section, the difference between CRS EPRE and the MBSFN RS EPRE should be set to 0 dB as the UE demodulation performance might be different when this condition is not met (e.g. in scenarios where power offsets are present, such as scenarios when reserved cells are present).

Table 10.1.3-1: Common Test Parameters (FDD)

Parameter	Unit	Value
Number of HARQ processes	Processes	None
Subcarrier spacing	kHz	15 kHz
Allocated subframes per Radio Frame (Note 1)		6 subframes
Number of OFDM symbols for PDCCH		2
Cyclic Prefix		Extended
Note 1: For FDD mode, up to 6 subframes (#1/2/3/6/7/8) are available for MBMS, in line with TS 36.331.		

The receive characteristic of MBMS is determined by the BLER. The requirement is valid for all RRC states for which the UE has capabilities for MBMS.

For the parameters specified in Table 10.1.3-1 and Table 10.1.3-2 and Annex A.3.8.1, the average downlink SNR shall be below the specified value for the BLER shown in Table 10.1.3-3.

Table 10.1.3-2: Test Parameters for Testing

Parameter		Unit	Test 1-4
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Note 1: $P_B = 0$			

Table 10.1.3-3: Minimum performance

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation condition	Correlation Matrix and antenna	Reference value		MBMS UE Category
						BLER (%)	SNR(dB)	
1	10 MHz	R.37 FDD	OP.4 FDD	MBSFN channel model (Table B.2.6-1)	1x2 low	1	4.1	≥1
2	10 MHz	R.38 FDD	OP.4 FDD				11.0	≥1
3	10 MHz	R.39 FDD	OP.4 FDD				20.1	≥2
	5 MHz	R.39-1 FDD	OP.4 FDD				20.5	1

The normative reference for this requirement is TS 36.101 [2] clause 10.1.

10.1.4 Test description

10.1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: As specified per test number in Table 10.1.3-3 as defined in TS 36.508 [7] clause 4.3.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Table 10.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents are defined in clause 10.1.4.3.
6. SS transmits *MBSFNAreaConfiguration* message. Message content is defined in clause 10.1.4.3.
7. Wait for a period equal to the MCCH modification period to make sure the UE has received the *MBSFNAreaConfiguration* message.
8. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode C is activated. Message contents are defined in clause 10.1.4.3.
9. SS is configured to include 10 MBMS packets in one TB.

10.1.4.2 Test procedure

1. Initialise the variables M_{tot} and M_{ok} as 0. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 10.1.5-1 as appropriate.
2. SS shall send MBMS Packets on the MTCH radio bearer for the test time specified in Table G.6.4-1. SS stores the number of the transmitted MBMS Packets on the MTCH in the current test iteration in the variable M_{tot}.
3. SS shall send a “UE TEST LOOP MODE C MBMS PACKET COUNTER REQUEST” message and wait for the UE to respond with a “UE TEST LOOP MODE C MBMS PACKET COUNTER RESPONSE” reporting the received MBMS Packet counter value. Message contents are defined in clause 10.1.4.3. SS calculates the variable M_{ok} as (current counter value - counter value at last test iteration).
4. SS shall compute the BLER as the following:

   The BLER = $(M_{tot} – M_{ok}) / M_{tot}$
5. Repeat steps from 1 to 4 for each subtest in Table 10.1.5-1 as appropriate.

10.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 4.4, 4.6 and 4.7A with following exceptions:

Table 10.1.4.3-1: SystemInformationBlockType2: Additional FDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508 table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType2 ::= SEQUENCE {			
mbsfn-SubframeConfigList SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'111111' B		
}			
}			
}			

Table 10.1.4.3-2: MBSFNAreaConfiguration message: Additional FDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508, Table 4.6.1-4A			
Information Element	**Value/remark**	**Comment**	**Condition**
MBSFNAreaConfiguration-r9 ::= SEQUENCE {			
commonSF-Alloc-r9 SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE {			
oneFrame	'111111' B		
}			
}			
commonSF-AllocPeriod-r9	rf8		
pmch-InfoList-r9 SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF SEQUENCE {			
pmch-Config-r9 SEQUENCE {			
sf-AllocEnd-r9	47	48 active subframes in 8 Radio-frames	
dataMCS-r9	4	Test number 1	R.37 FDD
	12	Test number 2	R.38 FDD
	20	Test number 3	R.39 FDD R.39-1 FDD
mch-SchedulingPeriod-r9	rf8		
}			
…			
}			

Table 10.1.4.3-3: ACTIVATE TEST MODE: Additional FDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE C

Table 10.1.4.3-4: CLOSE UE TEST LOOP: Additional FDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE C

Table 10.1.4.3-5: SystemInformationBlockType13: Additional FDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508 table 4.4.3.3-13			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType13 ::= SEQUENCE {			
mbsfn-AreaInfoList-r9 SEQUENCE (SIZE(1..maxMBSFN-Area)) OF SEQUENCE {			
mcch-Config-r9 SEQUENCE {			
mcch-RepetitionPeriod-r9	rf32		
mcch-Offset-r9	0		
mcch-ModificationPeriod-r9	rf512		
sf-AllocInfo-r9	'100000' B		
signallingMCS-r9	n7	Test number 1	QPSK
	n13	Test number 2	16QAM
	n19	Test number 3	64QAM
}			
}			
notificationConfig-r9 SEQUENCE {			
notificationRepetitionCoeff-r9	n4		
notificationOffset-r9	0		
notificationSF-Index-r9	1	Subframe #1	
}			
}			

10.1.5 Test requirement

For the parameters specified in Table 10.1.3-1, Table 10.1.3-2, Annex A.3.8.1, and SNR in Table 10.1.5-1, the value for the BLER in step 4 shall be below the test limit in Annex G.6.3 for all subtests shown in Table 10.1.5-1.

Table 10.1.5-1: Test requirement

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation condition	Correlation Matrix and antenna	Reference value		MBMS UE Category
						BLER (%)	SNR(dB)	
1	10 MHz	R.37 FDD	OP.4 FDD	MBSFN channel model (Table B.2.6-1)	1x2 low	1	5	≥1
2	10 MHz	R.38 FDD	OP.4 FDD				11.9	≥1
3	10 MHz	R.39 FDD	OP.4 FDD				21.0	≥2
	5 MHz	R.39-1 FDD	OP.4 FDD				21.4	1

10.1_1 FDD MBMS performance (Fixed Reference Channel) (Release 13 and forward)

10.1_1.1 Test purpose

Same test purpose as in clause 10.1.1.

10.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE supporting MBMS release 13 and forward.

10.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 10.1.3 with the following exceptions:

- Instead of Table 10.1.3-3 → use Table 10.1_1.3-1.

Table 10.1._1.3-1: Minimum performance

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation condition	Correlation Matrix and antenna	Reference value		MBMS UE Category
						BLER (%)	SNR(dB)	
4	1.4 MHz	R.40 FDD	OP.4 FDD	MBSFN channel model (Table B.2.6-1)	1x2 low	1	6.6	≥1

10.1_1.4 Test description

10.1_1.4.1 Initial conditions

Same initial conditions as in clause 10.1.4.1 with the following exceptions:

- Instead of Table 10.1.3-3 → use Table 10.1_1.3-1.

10.1_1.4.2 Test procedure

Same test procedure as in clause 10.1_1.4.2 with the following exceptions:

- Instead of Table 10.1.5-1 → use Table 10.1_1.5-1.

10.1_1.4.3 Message contents

Same message contents as in clause 10.1.4.3 for Test number 1.

10.1_1.5 Test requirement

Same test requirements as in clause 10.1.5 with the following exceptions:

- Instead of Table 10.1.5-1 → use Table 10.1_1.5-1.

Table 10.1_1.5-1: Test requirement

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation condition	Correlation Matrix and antenna	Reference value		MBMS UE Category
						BLER (%)	SNR(dB)	
4	1.4 MHz	R.40 FDD	OP.4 FDD	MBSFN channel model (Table B.2.6-1)	1x2 low	1	7.5	≥1

10.2 TDD MBMS performance (Fixed Reference Channel)

10.2.1 Test purpose

This test verifies the performance of TDD MBMS with a given SNR for which the average BLER remains below a given reference value.

10.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE supporting MBMS release 9 and forward.

10.2.3 Minimum conformance requirements

The parameters specified in Table 10.2.3-1 are valid for all TDD tests unless otherwise stated. For the requirements defined in this section, the difference between CRS EPRE and the MBSFN RS EPRE should be set to 0 dB as the UE demodulation performance might be different when this condition is not met (e.g. in scenarios where power offsets are present, such as scenarios when reserved cells are present).

Table 10.2.3-1: Common Test Parameters (TDD)

Parameter	Unit	Value
Number of HARQ processes	Processes	None
Subcarrier spacing	kHz	15 kHz
Allocated subframes per Radio Frame (Note 1)		5 subframes
Number of OFDM symbols for PDCCH		2
Cyclic Prefix		Extended
Note 1: For TDD mode, in line with TS 36.331, Uplink-Downlink Configuration 5 is proposed, up to 5 subframes (#3/4/7/8/9) are available for MBMS.		

The receive characteristic of MBMS is determined by the BLER. The requirement is valid for all RRC states for which the UE has capabilities for MBMS.

For the parameters specified in Table 10.2.3-1 and Table 10.2.3-2 and Annex A.3.8.2, the average downlink SNR shall be below the specified value for the BLER shown in Table 10.2.3-3.

Table 10.2.3-2: Test Parameters for Testing

Parameter		Unit	Test 1-4
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Note 1: $P_B = 0$.			

Table 10.2.3-3: Minimum performance

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation condition	Correlation Matrix and antenna	Reference value		MBMS UE Category
						BLER (%)	SNR(dB)	
1	10 MHz	R.37 TDD	OP.4 TDD	MBSFN channel model (Table B.2.6-1)	1x2 low	1	3.4	≥1
2	10 MHz	R.38 TDD	OP.4 TDD				11.1	≥1
3	10 MHz	R.39 TDD	OP.4 TDD				20.1	≥2
	5MHz	R.39-1 TDD	OP.4 TDD				20.5	1

The normative reference for this requirement is TS 36.101 [2] clause 10.2.

10.2.4 Test description

10.2.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: As specified per test number in Table 10.2.3-3 as defined in TS 36.508 [7] clause 4.3.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Table 10.2.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents are defined in clause 10.2.4.3.
6. SS transmits *MBSFNAreaConfiguration* message. Message content is defined in clause 10.2.4.3.
7. Wait for a period equal to the MCCH modification period to make sure the UE has received the *MBSFNAreaConfiguration* message.
8. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode C is activated. Message contents are defined in clause 10.2.4.3.
9. SS is configured to include 10 MBMS packets in one TB.

10.2.4.2 Test procedure

1. Initialise the variables M_{tot} and M_{ok} as 0. Set the parameters of bandwidth, reference channel, the propagation condition, antenna configuration and the SNR according to Table 10.2.5-1 as appropriate.
2. SS shall send MBMS Packets on the MTCH radio bearer for the test time specified in Table G.6.4-1. SS stores the number of the transmitted MBMS Packets on the MTCH in the current test iteration in the variable M_{tot}.
3. SS shall send a “UE TEST LOOP MODE C MBMS PACKET COUNTER REQUEST” message and wait for the UE to respond with a “UE TEST LOOP MODE C MBMS PACKET COUNTER RESPONSE” reporting the received MBMS Packet counter value. Message contents are defined in clause 10.2.4.3. SS calculates the variable M_{ok} as (current counter value - counter value at last test iteration).
4. SS shall compute the BLER as the following:

   The BLER = $(M_{tot} – M_{ok}) / M_{tot}$
5. Repeat steps from 1 to 4 for each subtest in Table 10.2.5-1 as appropriate.

10.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clauses 4.4, 4.6 and 4.7A with following exceptions:

Table 10.2.4.3-1: SystemInformationBlockType2: Additional TDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508 table 4.4.3.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType2 ::= SEQUENCE {			
mbsfn-SubframeConfigList SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE{			
oneFrame	'111110' B	The last bit is not used	
}			
}			
}			

Table 10.2.4.3-2: MBSFNAreaConfiguration message: Additional TDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508, Table 4.6.1-4A			
Information Element	**Value/remark**	**Comment**	**Condition**
MBSFNAreaConfiguration-r9 ::= SEQUENCE {			
commonSF-Alloc-r9 SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF SEQUENCE {			
radioframeAllocationPeriod	n1		
radioframeAllocationOffset	0		
subframeAllocation CHOICE {			
oneFrame	'111110' B	The last bit is not used	
}			
}			
commonSF-AllocPeriod-r9	rf8		
pmch-InfoList-r9 SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF SEQUENCE {			
pmch-Config-r9 SEQUENCE {			
sf-AllocEnd-r9	39	40 active subframes in 8 Radio-frames	
dataMCS-r9	4	Test number 1	R.37 TDD
	12	Test number 2	R.38 TDD
	20	Test number 3	R.39 TDD R.39-1 TDD
mch-SchedulingPeriod-r9	rf8		
}			
}			

Table 10.2.4.3-3: ACTIVATE TEST MODE: Additional TDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE C

Table 10.2.4.3-4: CLOSE UE TEST LOOP: Additional TDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE C

Table 10.2.4.3-5: SystemInformationBlockType13: Additional TDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508 table 4.4.3.3-13			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType13 ::= SEQUENCE {			
mbsfn-AreaInfoList-r9 SEQUENCE (SIZE(1..maxMBSFN-Area)) OF SEQUENCE {			
mcch-Config-r9 SEQUENCE {			
mcch-RepetitionPeriod-r9	rf32		
mcch-Offset-r9	0		
mcch-ModificationPeriod-r9	rf512		
sf-AllocInfo-r9	'100000' B		
signallingMCS-r9	n7	Test number 1	QPSK
	n13	Test number 2	16QAM
	n19	Test number 3	64QAM
}			
}			
notificationConfig-r9 SEQUENCE {			
notificationRepetitionCoeff-r9	n4		
notificationOffset-r9	0		
notificationSF-Index-r9	1	Subframe #3	
}			
}			

Table 10.2.4.3-6: *TDD-Config-DEFAULT:* Additional TDD MBMS performance (Fixed Reference Channel)

Derivation Path: TS 36.508 Table 5.3.1-1			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Config-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa5		
}			

Table 10.2.4.3-7: *PUCCH-ConfigDedicated-DEFAULT:* Additional TDD MBMS performance (Fixed Reference Channel)

Derivation Path: 36.508 Table 4.6.3-9			
Information Element	**Value/remark**	**Comment**	**Condition**
PUCCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
tddAckNackFeedbackMode	bundling		
}			

10.2.5 Test requirement

For the parameters specified in Table 10.2.3-1, Table 10.2.3-2, Annex A.3.8.2, and SNR in Table 10.2.5-1, the value for the BLER in step 4 shall be below the test limit in Annex G.6.3 for all subtests shown in Table 10.2.5-1.

Table 10.2.5-1: Test requirement

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation condition	Correlation Matrix and antenna	Reference value		MBMS UE Category
						BLER (%)	SNR(dB)	
1	10 MHz	R.37 TDD	OP.4 TDD	MBSFN channel model (Table B.2.6-1)	1x2 low	1	4.3	≥1
2	10 MHz	R.38 TDD	OP.4 TDD				12	≥1
3	10 MHz	R.39 TDD	OP.4 TDD				21.0	≥2
	5MHz	R.39-1 TDD	OP.4 TDD				21.4	1

10.2_1 TDD MBMS performance (Fixed Reference Channel) (Release 13 and forward)

10.2.1 Test purpose

Same test purpose as in clause 10.2.1.

10.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE supporting MBMS release 13 and forward.

10.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 10.2.3 with the following exceptions:

- Instead of Table 10.2.3-3 → use Table 10.2_1.3-1.

Table 10.2_1.3-1: Minimum performance

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation condition	Correlation Matrix and antenna	Reference value		MBMS UE Category
						BLER (%)	SNR(dB)	
4	1.4 MHz	R.40 TDD	OP.4 TDD	MBSFN channel model (Table B.2.6-1)	1x2 low	1	5.8	≥1

The normative reference for this requirement is TS 36.101 [2] clause 10.2.

10.2.4 Test description

10.2.4.1 Initial conditions

Same initial conditions as in clause 10.2.4.1 with the following exceptions:

- Instead of Table 10.2.3-3 → use Table 10.2_1.3-1.

10.2_1.4.2 Test procedure

Same test procedure as in clause 10.2.4.2 with the following exceptions:

- Instead of Table 10.2.5-1 → use Table 10.2_1.5-1.

10.2.4.3 Message contents

Same message contents as in clause 10.2.4.3 for Test number 1.

10.2_1.5 Test requirement

Same test requirements as in clause 10.2.5 with the following exceptions:

- Instead of Table 10.2.5-1 → use Table 10.2_1.5-1.

Table 10.2_1.5-1: Test requirement

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation condition	Correlation Matrix and antenna	Reference value		MBMS UE Category
						BLER (%)	SNR(dB)	
4	1.4 MHz	R.40 TDD	OP.4 TDD	MBSFN channel model (Table B.2.6-1)	1x2 low	1	6.7	≥1

11 Performance Requirement (ProSe Direct Discovery)

This clause contains the performance requirements for the Sidelink physical channels specified for ProSe Direct Discovery.

11.1 General

11.1.1 Applicability of requirements

The requirements in this clause are applicable to UEs that support ProSe Direct Discovery. Some of the tests defined in this clause are applicable only to UEs that additionally support transmission and reception of Sidelink synchronization signal (indicated using *disc-SLSS*). The test case applicability is in according to table 11.1.1-1 depending on UE capability.

Table 11.1.1-1: ProSe Direct Discovery test applicability

	ProSe Direct Discovery without support of SLSS	ProSe Direct Discovery with support of SLSS
FDD	11.2.1, 11.3.1, 11.5.1	11.3.1, 11.4.1, 11.5.1
TDD	11.2.2, 11.3.2, 11.5.2	11.2.2, 11.3.2, 11.5.2

For maximum Sidelink Processes test specified in clause 11.5, the UE is required to only meet the test for the maximum channel bandwidth over the ProSe operating bands supported by the UE.

11.1.2 Reference DRX configuration

Table 11.1.2-1: Reference DRX configuration

Parameter	Value	Comments
onDurationTimer	psf1	
drx-InactivityTimer	psf1	
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	sf2560, 0	
shortDRX	disabled	
NOTE 1: For further information see clause 6.3.2 in TS 36.331.		

11.2 Demodulation of PSDCH (single link performance)

The purpose of the requirements in this subclause is to verify the PSDCH demodulation performance with a single active PSDCH link under different operating scenarios and channel conditions.

The active cell(s), when present, are specified in the test parameters specific to the test.

11.2.1 FDD PSDCH Single Link Performance (ProSe Direct Discovery)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Test time is FFS.
- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- UL and DL RMC for cell1 is TBD

11.2.1.1 Test Purpose

This test verifies the PSDCH demodulation performance with a single PSDCH link with a given SNR for which the average BLER remains below a given reference value under different channel conditions.

11.2.1.2 Test Applicability

This test case applies to all types of E-UTRA FDD UE release 12 and forward which support ProSe Direct Discovery.

11.2.1.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 11.2.1.3-2 with the test parameters specified in Table 11.2.1.3-1. The receiver UE under test is associated with Cell 1.

Table 11.2.1.3-1: Test Parameters

Parameter			Unit	Test 1
Discovery resource pool configuration				As specified in Table A.7.1.1-1 (Configuration #1-FDD)
DRX configuration				As specified in Table 11.1.2-1
N_{oc} at antenna port (NOTE 3)			dBm/15kHz	-98
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern (NOTE 2)			OP.1 FDD
	Propagation channel			AWGN
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-92
Active Sidelink UE(s)				Sidelink UE 1
Sidelink UE 1	Sidelink Transmissions			PSDCH
	PSDCH RB allocation			PRB pairs {2i..2i+1}, where i is chosen randomly uniformly from [0,11] in each discovery period.
	Time offset (NOTE 4)		µs	+1
	Frequency offset (NOTE 5)		Hz	+200
	Propagation Channel			EPA5
	Antenna configuration			1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: Applicable to both DL channel and ProSe Direct Discovery Subframes on UL.
NOTE 4: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 5: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 11.2.1.3-2: Minimum performance

Test num.	Sidelink UE	Band-width	Reference channel	Reference value	
				BLER of PSDCH (%)	SNR (dB)
1	1	5 MHz	D.1 FDD	30	4.6

The normative reference for this requirement is TS 36.101 [2] clause 11.2.1

11.2.1.4 Test Description

11.2.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range for Cell1, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 11.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD.

2. The parameter settings for the cell are set up according to Table 11.2.1.3-1.

3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2, and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 11.2.1.4.3.

6. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

11.2.1.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table TBD. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table TBD. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.

3. Set the parameters of bandwidth, propagation condition, antenna configuration and the SNR for cell1 according to Table 11.2.1.3-1.

4. SS transmits PSDCH to transmit the SL RMC according to Table 11.2.1.3-2. Set the Sidelink signal level, bandwidth, propagation condition, antenna configuration and SNR according to Table 11.2.1.3-1 and Table 11.2.1.3-2.

5. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions are defined in clause 11.2.1.4.3.

6. The UE shall transmit RRCConnectionReconfigurationComplete message.

7. Initialise the variables P_{tot} and P_{ok} as 0.

8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable P_{tot}.

9. SS shall send (on the available PDSCH) a “UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST” message and wait for the UE to respond (on the available PUSCH) with a “UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE” reporting the received Sidelink direct discovery packet counter value.

10. SS calculates the variable P_{ok} as (current counter value - counter value at last test iteration).

11. SS shall compute the BLER as following:

    $BLER = ((P_{tot} - P_{ok}) / P_{tot}) * 100\%$

11.2.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

Table 11.2.1.4.3-1: ACTIVATE TEST MODE: FDD PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: 36.508[7], Table 4.7A-1, condition UE TEST LOOP MODE D

Table 11.2.1.4.3-2: CLOSE UE TEST LOOP: FDD PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: 36.508[7], Table 4.7A-3, condition UE TEST LOOP MODE D

Table 11.2.1.4.3-3: *MAC-MainConfig-RBC*: DRX config for PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n5		
periodicBSR-Timer	sf2560		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	sf2560		
}			

11.2.1.5 Test Requirement

For the parameters specified in Table 11.2.1.3-1 and SNR in Table 11.2.1.5-1, the BLER obtained in step 11 shall be below the test limit in Annex TBD.

Table 11.2.1.5-1: Test Requirements

Test num.	Sidelink UE	Band-width	Reference channel	Reference value	
				BLER of PSDCH (%)	SNR (dB)
1	1	5 MHz	D.1 FDD	30	4.6 + TT

11.2.2 TDD PSDCH Single Link Performance (ProSe Direct Discovery)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Test time is FFS.
- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- UL and DL RMC for cell1 is TBD

11.2.2.1 Test Purpose

This test verifies the PSDCH demodulation performance with a single PSDCH link with a given SNR for which the average BLER remains below a given reference value under different channel conditions.

11.2.2.2 Test Applicability

This test case applies to all types of E-UTRA TDD UE release 12 and forward which support ProSe Direct Discovery.

11.2.2.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 11.2.2.3-2 with the test parameters specified in Table 11.2.2.3-1. The receiver UE under test is associated with Cell 1.

Table 11.2.2.3-1: Test Parameters

Parameter			Unit	Test 1
Discovery resource pool configuration				As specified in Table A.7.1.2-1 (Configuration #1-TDD)
DRX configuration				As specified in Table 11.1.2-1
N_{oc} at antenna port (NOTE 5)			dBm/15kHz	-98
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Uplink downlink configuration (NOTE 3)			0
	Special subframe configuration (NOTE 4)			4
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern NOTE 2			OP.1 TDD
	Propagation channel			AWGN
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-92
Active Sidelink UE(s)				Sidelink UE 1
Sidelink UE 1	Sidelink Transmissions			PSDCH
	RB allocation			PRB pairs {2i..2i+1}, where i is chosen randomly uniformly from [0,11] in each discovery period.
	Time offset (NOTE 6)		µs	+1
	Frequency offset (NOTE 7)		Hz	+200
	Propagation Channel			EPA5
	Antenna configuration			1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: As specified in Table 4.2-2 in TS 36.211 [8].
NOTE 4: As specified in Table 4.2-1 in TS 36.211 [8].
NOTE 5: Applicable to both DL subframes and UL subframes configured for ProSe Direct Discovery.
NOTE 6: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 7: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 11.2.2.3-2: Minimum performance

Test num.	Sidelink UE	Band-width	Reference channel	Reference value	
				BLER of PSDCH (%)	SNR (dB)
1	1	5 MHz	D.1 TDD	30	4.6

The normative reference for this requirement is TS 36.101 [2] clause 11.2.2.

11.2.2.4 Test Description

11.2.2.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range for Cell1, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 11.2.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD.
2. The parameter settings for the cell are set up according to Table 11.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 11.2.2.4.3.
6. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

11.2.2.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table TBD. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table TBD. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.
3. Set the parameters of bandwidth, propagation condition, antenna configuration and the SNR for cell1 according to Table 11.2.2.3-1.
4. SS transmits PSDCH to transmit the SL RMC according to Table 11.2.2.3-2. Set the Sidelink signal level, bandwidth, propagation condition, antenna configuration and SNR according to Table 11.2.2.3-1 and Table 11.2.2.3-2.
5. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions are defined in clause 11.2.2.4.3.
6. The UE shall transmit RRCConnectionReconfigurationComplete message.
7. Initialise the variables P_{tot} and P_{ok} as 0.
8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for the test time [FFS]. SS stores the number of the transmitted Discovery Packets in the current test iteration in the variable P_{tot}.
9. SS shall send (on the available PDSCH) a “UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST” message and wait for the UE to respond (on the available PUSCH) with a “UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE” reporting the received Sidelink direct discovery packet counter value.
10. SS calculates the variable P_{ok} as (current counter value - counter value at last test iteration).
11. SS shall compute the BLER as following:

    $BLER = ((P_{tot} - P_{ok})/ P_{tot})* 100\%$

11.2.2.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

Table 11.2.2.4.3-1: ACTIVATE TEST MODE: TDD PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 11.2.2.4.3-2: CLOSE UE TEST LOOP: TDD PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 11.2.2.4.3-3: *MAC-MainConfig-RBC*: DRX config for PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n5		
periodicBSR-Timer	sf2560		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	sf2560		
}			

11.2.2.5 Test Requirement

For the parameters specified in Table 11.2.2.3-1 and SNR in Table 11.2.2.5-1, the BLER obtained in step 11 shall be below the test limit in Annex TBD.

Table 11.2.2.5-1: Test Requirements

Test num.	Sidelink UE	Band-width	Reference channel	Reference value	
				BLER of PSDCH (%)	SNR (dB)
1	1	5 MHz	D.1 TDD	30	4.6 + TT

11.3 Power imbalance performance with two links

The purpose of the requirements in this subclause is to check the demodulation performance when receiving PSDCH transmissions from two Sidelink UEs with power imbalance in one subframe.

11.3.1 FDD Power imbalance performance with two links

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test system uncertainties and test tolerances is TBD

- Connection Diagram is FFS
- Test procedure is TBD
- Message contents are TBD

11.3.1.1 Test Purpose

This test verifies the PSDCH demodulation performance in the presence of two links which exhibit power imbalance in one subframe.

11.3.1.2 Test Applicability

This test case applies to all types of E-UTRA FDD UE release 12 and forward which support ProSe Direct Discovery.

11.3.1.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 11.3.1.3-2 with the test parameters specified in Table 11.3.1.3-1. The receiver UE under test is associated with Cell 1. The Sidelink UE 1 and 2 are synchronized to Cell 1 and transmit PSDCH on adjacent RBs.

Table 11.3.1.3-1: Test Parameters

Parameter			Unit	Test 1
Discovery resource pool configuration				As specified in Table A.7.1.1-1 (Configuration #1-FDD)
DRX configuration				As specified in Table 11.1.2-1
N_{oc} at antenna port (NOTE 3)			dBm/15kHz	-98
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern (NOTE 2)			OP.1 FDD
	Propagation channel			AWGN
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-92
Active Sidelink UE(s)				Sidelink UE 1, Sidelink UE 2
Sidelink UE 1	Sidelink Transmissions			PSDCH
	PSDCH RB allocation			PRB pairs {4..5}
	Time offset (NOTE 3)		μs	0
	Frequency offset (NOTE 4)		Hz	0
	Propagation Channel			AWGN
	Antenna configuration			1x2 Low
Sidelink UE 2	Sidelink Transmissions			PSDCH
	PSDCH RB allocation			PRB pairs {6..7}
	Time offset (w.r.t. Cell 1 DL)		μs	0
	Frequency offset (w.r.t. Cell 1 UL)		Hz	0
	Propagation Channel			AWGN
	Antenna configuration			1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: Applicable to both DL channel and ProSe Direct Discovery Subframes on UL.
NOTE 4: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 5: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 11.3.1.3-2: Minimum performance

Test num.	Band-width	Sidelink UE	Reference channel	Reference value	
				BLER of PSDCH (%)	SNR (dB)
1	5 MHz	1	D.1 FDD	(NOTE 1)	24.3
		2	D.1 FDD	30	6.9
NOTE 1: There is no BLER requirement for Sidelink UE 1.					

The normative reference for this requirement is TS 36.101 [2] clause 11.3.1

11.3.1.4 Test Description

TBD

11.3.1.5 Test Requirement

For the parameters specified in Table 11.3.1.3-1 and SNR in Table 11.3.1.5-1, the BLER obtained in step 11 shall be below the test limit in Annex TBD.

Table 11.3.1.5-1: Test Requirements

Test num.	Band-width	Sidelink UE	Reference channel	Reference value	
				BLER of PSDCH (%)	SNR (dB)
1	5 MHz	1	D.1 FDD	(NOTE 1)	24.3+TT
		2	D.1 FDD	30	6.9+TT
NOTE 1: There is no BLER requirement for Sidelink UE 1.					

11.3.2 TDD Power imbalance performance with two links

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- Test procedure is TBD

11.3.2.1 Test Purpose

This test verifies the PSDCH demodulation performance in the presence of two links which exhibit power imbalance in one subframe.

11.3.2.2 Test Applicability

This test case applies to all types of E-UTRA TDD UE release 12 and forward which support ProSe Direct Discovery.

11.3.2.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 11.3.2.3-2 with the test parameters specified in Table 11.3.2.3-1. The receiver UE under test is associated with Cell 1. The Sidelink UE 1 and 2 are synchronized to Cell 1 and transmit PSDCH on adjacent RBs.

Table 11.3.2.3-1: Test Parameters

Parameter			Unit	Test 1
Discovery resource pool configuration				As specified in Table A.7.1.2-1 (Configuration #1-TDD)
DRX configuration				As specified in Table 11.1.2-1
N_{oc} at antenna port (NOTE 5)			dBm/15kHz	-98
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Uplink downlink configuration (NOTE 3)			0
	Special subframe configuration (NOTE 4)			4
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern NOTE 2			OP.1 TDD
	Propagation channel			AWGN
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-92
Active Sidelink UE(s)				Sidelink UE 1, Sidelink UE 2
Sidelink UE 1	Sidelink Transmissions			PSDCH
	PSDCH RB allocation			PRB pairs {4..5}
	Time offset (NOTE 6)		µs	0
	Frequency offset (NOTE 7)		Hz	0
	Propagation Channel			AWGN
	Antenna configuration			1x2 Low
Sidelink UE 2	Sidelink Transmissions			PSDCH
	RB allocation			PRB pairs {6..7}
	Time offset (NOTE 6)		µs	0
	Frequency offset (NOTE 7)		Hz	0
	Propagation Channel			AWGN
	Antenna configuration			1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: As specified in Table 4.2-2 in TS 36.211 [4].
NOTE 4: As specified in Table 4.2-1 in TS 36.211 [4].
NOTE 5: Applicable to both DL subframes and UL subframes configured for ProSe Direct Discovery.
NOTE 6: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 7: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 11.3.2.3-2: Minimum performance

Test num.	Band-width	Sidelink UE	Reference channel	Reference value	
				BLER of PSDCH (%)	SNR (dB)
1	5 MHz	1	D.1 TDD	(NOTE 1)	24.3
		2	D.1 TDD	30	6.9
NOTE 1: There is no BLER requirement for Sidelink UE 1.					

The normative reference for this requirement is TS 36.101 [2] clause 11.3.2

11.3.2.4 Test Description

TBD

11.3.2.5 Test Requirement

For the parameters specified in Table 11.3.2.3-1 and SNR in Table 11.3.2.5-1, the BLER obtained in step 11 shall be below the test limit in Annex TBD.

Table 11.3.2.5-1: Test Requirements

Test num.	Band-width	Sidelink UE	Reference channel	Reference value	
				BLER of PSDCH (%)	SNR (dB)
1	5 MHz	1	D.1 FDD	(NOTE 1)	24.3+TT
		2	D.1 FDD	30	6.9+TT
NOTE 1: There is no BLER requirement for Sidelink UE 1.					

11.4 Multiple timing reference test

The purpose of this test is to check the demodulation performance when receiving from two Sidelink UEs that follow different timing references and transmitting on different resources (non-overlapping in time).

11.4.1 FDD Multiple timing reference test

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test time is FFS.
- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- Test procedure is TBD
- Message contents are TBD

11.4.1.1 Test Purpose

This test verifies the demodulation performance when receiving from two Sidelink UEs that follow different timing references and transmitting on different resources (non-overlapping in time) with a given SNR for which the average BLER remains below a given reference value.

11.4.1.2 Test Applicability

This test case applies to all types of E-UTRA FDD UE release 12 and forward which support ProSe Direct Discovery.

11.4.1.3 Minimum Conformance Requirements

The test parameters are specified in Table 11.4.1-1. Sidelink UE 2 and the receiver UE under test are associated with Cell 1. Sidelink UE 1 and 3 are associated with another cell and use a different timing, and UE 1 acts as a synchronization reference. The minimum requirements are specified in Table 11.4.1-2.

Table 11.4.1-1: Test Parameters

Parameter			Unit	Test 1
Discovery resource pool configuration				As specified in Table A.7.1.1-2 (Configuration #2-FDD)
DRX configuration				As specified in Table 11.1.2-1
N_{oc} at antenna port (NOTE 3)			dBm/15kHz	-98
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern NOTE 2			OP.1 FDD
	Propagation channel			AWGN
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-92
Active Sidelink UE(s)				Sidelink UEs 1, 2, 3
Sidelink UE 1	Sidelink Transmissions			SLSS
	networkControlledSyncTx			ON
	slssid			30
	Time offset (NOTE 4)		µs	3511
	Frequency offset (NOTE 5)		Hz	-100
	Propagation channel			EPA5
	Antenna configuration			1x2 Low
	$\widehat{E}_s$ of SLSS at antenna port		dBm/15kHz	-82
Sidelink UE 2	Sidelink Transmissions			PSDCH
	Resource pool used for transmissions			*discRxPool(0)*
	RB allocation			PRB pairs {2i..2i+1}, where i is chosen randomly uniformly from [0,11] in each discovery period.
	Time offset (NOTE 4)		µs	+1
	Frequency offset (NOTE 5)		Hz	+200
	Propagation Channel			EPA5
	Antenna configuration			1x2 Low
Sidelink UE 3	Sidelink Transmissions			PSDCH
	Resource pool used for transmissions			*discRxPool(1)*
	RB allocation			PRB pairs {2i..2i+1}, where i is chosen randomly uniformly from [0,11] in each discovery period.
	Time offset (NOTE 4)		µs	3511
	Frequency offset (NOTE 5)		Hz	+300
	Propagation Channel			EPA5
	Antenna configuration			1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: Applicable to both DL channel and ProSe Direct Discovery Subframes on UL.
NOTE 4: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 5: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 11.4.1-2: Minimum performance

Test num.	Band-width	Sidelink UE	Reference channel	Reference value	
				BLER of PSDCH (%)[NOTE 1]	SNR (dB)
1	5 MHz	2	D.1 FDD	30	4.6
		3	D.1 FDD	30	4.6
NOTE 1: The BLER is measured after 5 D2D Discovery periods (1600 frames) of lead time during which the test UE detects and synchronizes to Sidelink UE 1 SLSS.					

The normative reference for this requirement is TS 36.101 [2] clause 11.4.1.

11.4.1.4 Test Description

11.4.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range for Cell1, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 11.4.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD.
2. The parameter settings for the cell are set up according to Table 11.4.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 11.4.1.4.3.
6. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

11.4.1.4.2 Test Procedure

TBD

11.4.1.4.3 Message Contents

TBD

11.4.1.5 Test Requirement

For the parameters specified in Table 11.4.1.3-1 and SNR in Table 11.4.1.5-1, the BLER obtained in step TBD shall be below the test limit in Annex TBD.

Table 11.4.1-2: Minimum performance

Test num.	Band-width	Sidelink UE	Reference channel	Reference value	
				BLER of PSDCH (%)[NOTE 1]	SNR (dB)
1	5 MHz	2	D.1 FDD	30	4.6+TT
		3	D.1 FDD	30	4.6+TT
NOTE 1: The BLER is measured after 5 D2D Discovery periods (1600 frames) of lead time during which the test UE detects and synchronizes to Sidelink UE 1 SLSS.					

11.5 Maximum Sidelink processes test

The purpose of this test is to verify the maximum number of Sidelink processes supported by the UE as reported using UE capability signalling (discSupportedProc).

The UE is required to meet only the test for the maximum channel bandwidth over the ProSe operating bands supported by the UE.

11.5.1 FDD maximum Sidelink processes test (ProSe Direct Discovery)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Test time is FFS.
- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- UL and DL RMC for cell1 is TBD

11.5.1.1 Test Purpose

This test verifies the UE's ability to support maximum number of Sidelink processes by verifying the percentage of the information bit throughput for a specified PSDCH Reference Measurement Channel (RMC) not falling below a specified value.

11.5.1.2 Test Applicability

This test case applies to all types of E-UTRA FDD UE release 12 and forward which support ProSe Direct Discovery.

11.5.1.3 Minimum Conformance Requirements

The test parameters are specified in Table 11.5.1.3-1. Multiple discovery resource pools are interleaved. Each Sidelink UE transmits in one of the resource pools with 3 retransmissions. The minimum requirements are specified in Table 11.5.1.3-2.

Table 11.5.1.3-1: Test Parameters

Parameter			Unit	Test 1-7
Discovery resource pool configuration				As specified in Table A.7.1.1-3 (Configuration #3-FDD) with parameters $BW_{Channel}$, NPools = Number of configured resource pools (as specified in Table 11.5.1.3-2), and N = discSupportedProc
DRX configuration				As specified in Table 11.1.2-1
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern NOTE 2			OP.1 FDD
	Propagation channel			Static propagation condition No external noise sources are applied
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-85
Active Sidelink UE(s)				Sidelink UE i, i = 0, …, discSupportedProc-1
Sidelink UE i	Sidelink Transmissions			PSDCH (D.1 FDD)
	Resource pool index (NOTE 3)			$\left\lfloor \frac{i}{N_{MAX_SF}} \right\rfloor$
	PSDCH RB allocation (NOTE 3)			PRB pairs {2*(i % N_{MAX_SF}), 2*(i % N_{MAX_SF})+1}
	Time offset (NOTE 4)		µs	0
	Frequency offset (NOTE 4)		Hz	0
	Propagation Channel			Static propagation condition No external noise sources are applied
	Antenna configuration			1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: N_{MAX_SF} represents the maximum number of Sidelink UEs transmitting in one subframe. N_{MAX_SF} = 12 (5 MHz), 25 (10MHz), 37 (15MHz), 50 (10MHz).
NOTE 4: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 5: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 11.5.1.3-2: Minimum performance

Test num.	Bandwidth	discSupportedProc	Number of configured resource pools	$\hat{E}_s$ at antenna port (dBm/15kHz)	Reference value for Sidelink UE i=0…discSupportedProc-1
					Fraction of maximum throughput (%)
1	5 MHz	50	5	-85	95
2	10 MHz	50	2	-85	95
3	15 MHz	50	2	-85	95
4	20 MHz	50	1	-85	95
5	10 MHz	400	16	-85	95
6	15 MHz	400	11	-85	95
7	20 MHz	400	8	-85	95

The normative reference for this requirement is TS 36.101 [2] clause 11.5.1.

11.5.1.4 Test Description

11.5.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range for Cell1, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: Select the test numbers in Table 11.5.1.3-2 corresponding to the max channel bandwidth among the UE supported ProSe operating bands as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD without faders or AWGN source.
2. The parameter settings for the cell are set up according to Table 11.5.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 11.5.1.4.3.
6. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

11.5.1.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table TBD. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table TBD. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.
3. Set the parameters of bandwidth, propagation condition, antenna configuration and the SNR for cell1 according to Table 11.5.1.3-1.
4. SS transmits PSDCH on each active Sidelink UE as per with SL RMC according to Table 11.5.1.3-1. Set the Sidelink signal level, configured resource pools, bandwidth, antenna configuration according to Table 11.5.1.3-1 and Table 11.5.1.3-2.
5. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions are defined in clause 11.5.1.4.3.
6. The UE shall transmit RRCConnectionReconfigurationComplete message.
7. Initialise the variables P_{tot} and P_{ok} as 0.
8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for each of the active sidelink for the test time [FFS]. SS stores the number of the transmitted Discovery Packets per sidelink UE in the current test iteration in the variable P_{tot}.
9. SS shall send (on the available PDSCH) a “UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST” message and wait for the UE to respond (on the available PUSCH) with a “UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE” reporting the received Sidelink direct discovery packet counter value.
10. SS calculates the variable P_{ok} as (current counter value - counter value at last test iteration).

11. SS shall compute the fraction of maximum throughput as 100%*(P_{ok} / P_{tot}).

12. Repeat steps 1 to 11 for each subtest as applicable.

11.5.1.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

Table 11.5.1.4.3-1: ACTIVATE TEST MODE: FDD PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 11.5.1.4.3-2: CLOSE UE TEST LOOP: FDD PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 11.5.1.4.3-3: *MAC-MainConfig-RBC*: DRX config for PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n5		
periodicBSR-Timer	Sf2560		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	Sf500		
}			

11.5.1.5 Test Requirement

The fraction of the maximum throughput obtained per active sidelink UE shall meet or exceed the specified value in Table 11.5.1.5-1 for each test number as applicable.

Table 11.5.1.5-1: Test Requirements

Test num.	Bandwidth	discSupportedProc	Number of configured resource pools	$\hat{E}_s$ at antenna port (dBm/15kHz)	Reference value for Sidelink UE i=0…discSupportedProc-1
					Fraction of maximum throughput (%)
1	5 MHz	50	5	-85	[95+TT]
2	10 MHz	50	2	-85	[95+TT]
3	15 MHz	50	2	-85	[95+TT]
4	20 MHz	50	1	-85	[95+TT]
5	10 MHz	400	16	-85	[95+TT]
6	15 MHz	400	11	-85	[95+TT]
7	20 MHz	400	8	-85	[95+TT]

11.5.2 TDD maximum Sidelink processes test (ProSe Direct Discovery)

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Test time is FFS.
- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- UL and DL RMC for cell1 is TBD

11.5.2.1 Test Purpose

This test verifies the UE's ability to support maximum number of Sidelink processes by verifying the percentage of the information bit throughput for a specified PSDCH Reference Measurement Channel (RMC) not falling below a specified value.

11.5.2.2 Test Applicability

This test case applies to all types of E-UTRA TDD UE release 12 and forward which support ProSe Direct Discovery.

11.5.2.3 Minimum Conformance Requirements

The test parameters are specified in Table 11.5.2.3-1. Multiple discovery resource pools are interleaved. Each Sidelink UE transmits in one of the resource pools with 3 retransmissions. The minimum requirements are specified in Table 11.5.1.3-2.

Table 11.5.2.3-1: Test Parameters

Parameter			Unit	Test 1-7
Discovery resource pool configuration				As specified in Table A.7.1.2-2 (Configuration #2-TDD) with parameters $BW_{Channel}$, NPools = Number of configured resource pools (as specified in Table 11.5.2-2), and N = discSupportedProc
DRX configuration				As specified in Table 11.1.2-1
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Uplink downlink configuration (NOTE 3)			0
	Special subframe configuration (NOTE 4)			4
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern NOTE 2			OP.1 TDD
	Propagation channel			Static propagation condition No external noise sources are applied
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-85
Active Sidelink UE(s)				Sidelink UE i, i = 0, …, discSupportedProc-1
Sidelink UE i	Sidelink Transmissions			PSDCH (D.1 TDD)
	PSDCH Resource pool (NOTE 5)			$\left\lfloor \frac{i}{N_{MAX_SF}} \right\rfloor$
	PSDCH RB allocation (NOTE 5)			PRB pairs {2*(i % N_{MAX_SF}),2*(i % N_{MAX_SF})+1}
	Time offset (NOTE 6)		µs	0
	Frequency offset (NOTE 7)		Hz	0
	Propagation Channel			Static propagation condition No external noise sources are applied
	Antenna configuration			1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: As specified in Table 4.2-2 in TS 36.211 [8].
NOTE 4: As specified in Table 4.2-1 in TS 36.211 [8].
NOTE 5: N_{MAX_SF} represents the maximum number of Sidelink UEs transmitting in one subframe. N_{MAX_SF} = 12 (5 MHz), 25 (10MHz), 37 (15MHz), 50 (10MHz).
NOTE 6: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 7: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 11.5.2.3-2: Minimum performance

Test num.	Bandwidth	discSupportedProc	Number of configured resource pools	$\hat{E}_s$ at antenna port (dBm/15kHz	Reference value
					Fraction of maximum throughput (%) for Sidelink UE i=0…discSupportedProc-1
1	5 MHz	50	5	-85	95
2	10 MHz	50	2	-85	95
3	15 MHz	50	2	-85	95
4	20 MHz	50	1	-85	95
5	10 MHz	400	16	-85	95
6	15 MHz	400	11	-85	95
7	20 MHz	400	8	-85	95

11.5.2.4 Test Description

11.5.2.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range for Cell1, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: Select the test numbers in Table 11.5.1.3-2 corresponding to the max channel bandwidth among the UE supported ProSe operating bands as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD without faders or AWGN source.
2. The parameter settings for the cell are set up according to Table 11.5.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 2A-RF according to TS 36.508 [7] clause 5.2A.1A. Message contents exceptions are defined in clause 11.5.1.4.3.
6. SS continues with the generic procedures described in TS 36.508 [7] clause 4.5.3A.3 and 4.5.4.3 and ensures the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and the UE test loop Mode D is activated.

11.5.2.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Table TBD. The SS sends downlink MAC padding bits on the DL RMC.
2. SS sends uplink scheduling information via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table TBD. When the UE has no payload data to send, it transmits uplink MAC padding bits on the UL RMC.
3. Set the parameters of bandwidth, propagation condition, antenna configuration and the SNR for cell1 according to Table 11.5.1.3-1.
4. SS transmits PSDCH on each active Sidelink UE as per with SL RMC according to Table 11.5.1.3-1. Set the Sidelink signal level, configured resource pools, bandwidth, antenna configuration according to Table 11.5.1.3-1 and Table 11.5.1.3-2.

5. SS shall transmit an RRCConnectionReconfiguration message to configure DRX. Message contents exceptions are defined in clause 11.5.1.4.3.
6. The UE shall transmit RRCConnectionReconfigurationComplete message.
7. Initialise the variables P_{tot} and P_{ok} as 0.
8. SS shall send SL Discovery Packets (MAC padding bits) on the SL RMC for each of the active sidelink for the test time [FFS]. SS stores the number of the transmitted Discovery Packets per sidelink UE in the current test iteration in the variable P_{tot}.
9. SS shall send (on the available PDSCH) a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER REQUEST" message and wait for the UE to respond (on the available PUSCH) with a "UE TEST LOOP PROSE MODE D SIDELINK DIRECT DISCOVERY PACKET COUNTER RESPONSE" reporting the received Sidelink direct discovery packet counter value.
10. SS calculates the variable P_{ok} as (current counter value - counter value at last test iteration).
11. SS shall compute the fraction of maximum throughput as $100\%*(P_{ok} / P_{tot})$.
12. Repeat steps 1 to 11 for each subtest as applicable.

11.5.2.4.3 Message Contents

Message contents are according to TS 36.508 [7] clauses TBD with following exceptions:

Table 11.5.2.4.3-1: ACTIVATE TEST MODE: TDD PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-1, condition UE TEST LOOP MODE D

Table 11.5.2.4.3-2: CLOSE UE TEST LOOP: TDD PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: 36.508, Table 4.7A-3, condition UE TEST LOOP MODE D

Table 11.5.2.4.3-3: *MAC-MainConfig-RBC*: DRX config for PSDCH Single Link Performance for ProSe Direct Discovery

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n5		
periodicBSR-Timer	Sf2560		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
}			
drx-Config CHOICE {			
Setup SEQUENCE {			
onDurationTimer	psf1		
drx-InactivityTimer	psf1		
drx-RetransmissionTimer	psf1		
longDRX-CycleStartOffset CHOICE {			
sf2560	0		
}			
shortDRX	Not present		
}			
}			
timeAlignmentTimerDedicated	Sf500		
}			

11.5.2.5 Test Requirement

The fraction of the maximum throughput obtained per active sidelink UE shall meet or exceed the specified value in Table 11.5.2.5-1 for each test number as applicable.

Table 11.5.2.5-1: Test Requirements

Test num.	Bandwidth	discSupportedProc	Number of configured resource pools	$\hat{E}_s$ at antenna port (dBm/15kHz	Reference value
					Fraction of maximum throughput (%) for Sidelink UE i=0…discSupportedProc-1
1	5 MHz	50	5	-85	[95+TT]
2	10 MHz	50	2	-85	[95+TT]
3	15 MHz	50	2	-85	[95+TT]
4	20 MHz	50	1	-85	[95+TT]
5	10 MHz	400	16	-85	[95+TT]
6	15 MHz	400	11	-85	[95+TT]
7	20 MHz	400	8	-85	[95+TT]

12 Performance requirement (ProSe Direct Communication)

This clause contains test method to measure the performance requirements for the Sidelink physical channels specified for ProSe Direct Communication in TS 36.211 [4].

12.1 General

12.1.1 Applicability of requirements

The requirements in this clause are applicable to UEs that support ProSe Direct Communication. Test cases defined for 5MHz channel bandwidth are applicable to UEs that support ProSe Direct Communication on only Band 31.

12.1.2 Reference DRX configuration

Table 12.1.2-1: Reference DRX configuration

Parameter	Value	Comments
onDurationTimer	psf1	
drx-InactivityTimer	psf1	
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	sf2560, 0	
shortDRX	disabled	
NOTE 1: For further information see clause 6.3.2 in TS 36.331.		

12.2 Demodulation of PSSCH

This clause contains test method to measure the PSSCH demodulation performance with a single active PSSCH link.

12.2.1 FDD PSSCH Single Link Performance for ProSe Direct communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Test time is FFS.
- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- Test procedure is TBD
- Message contents are TBD
- UL and DL RMC for cell1 is TBD

12.2.1.1 Test Purpose

This test verifies the PSSCH demodulation performance with a single active PSSCH link with a given SNR for which the average BLER remains below a given reference value under different channel conditions.

12.2.1.2 Test Applicability

This test case applies to all types of E-UTRA FDD UE release 12 and forward which support ProSe Direct Communication.

12.2.1.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 12.2.1.3-2 with the test parameters specified in Table 12.2.1.3-1. The receiver UE under test is associated with Cell 1.

Table 12.2.1.3-1: Test Parameters

Parameter		Unit	Test 1
Communication resource pool configuration			As specified in Table A.7.2.1-1 (Configuration #1-FDD)
DRX configuration			As specified in Table 12.1.2-1
N_{oc} at antenna port (NOTE 1)		dBm/15 kHz	-98
Active cell(s)			None
Sidelink UE 1	Sidelink Transmissions		SLSS + PSBCH
	networkControlledSyncTx		ON
	slssid		30
	inCoverage (in MIB-SL)		TRUE
	syncOffsetIndicator		Set same as syncOffsetIndicator1 in Configuration #1-FDD
	Propagation channel		EPA5
	Antenna configuration		1x2 Low
	$\widehat{E}_s$ at antenna port	dBm/15 kHz	-85
Sidelink UE 2	Sidelink Transmissions		PSCCH + PSSCH
	PSCCH RMC		5MHz: CC.3 FDD 10 MHz: CC.4 FDD
	PSCCH subframe allocation		As defined by TS 36.213 with n_{PSCCH} chosen randomly (uniformly) in $[0, \lfloor M_{RB}^{PSCCH_RP} / 2 \rfloor L_{PSCCH} - 1]$ every sc-period
	PSCCH RB allocation		
	$\widehat{E}_s$ of PSCCH at antenna port	dBm/15 kHz	-85
	PSSCH RMC		As specified in Table 12.2.1-2
	PSSCH subframe allocation		As per time repetition pattern specified in PSCCH
	PSSCH RB allocation		First transmission: Chosen randomly (uniformly) among the allowed RBs as per TS36.213 HARQ retransmission: As per frequency hopping indicated in PSCCH and specified in TS36.213
	Time offset (NOTE 2)	µs	+1
	Frequency offset (NOTE 3)	Hz	+200
	Propagation Channel		EVA70
	Antenna configuration		1x2 Low

NOTE 1: Applicable to both DL channel and ProSe Direct Communication Subframes on UL.
NOTE 2: Time offset of Sidelink UE 2 receive signal timing with respect to Sidelink UE 1 receive signal timing at the tested UE.
NOTE 3: Frequency offset of Sidelink UE 2 with respect to Sidelink UE 1 transmit frequency.

Table 11.2.1.3-2: Minimum performance

Test num.	Sidelink UE	Band-width	PSSCH Reference channel	Reference value	
				Fraction of maximum throughput (%) (NOTE 1)	SNR (dB) of PSSCH
1	2	10 MHz	CD.1 FDD	70	-3.4
		5 MHz		70	-3.3

NOTE 1: The throughput is measured after 40 radio frames of lead time during which the test UE detects and synchronizes to Sidelink UE 1

The normative reference for this requirement is TS 36.101 [2] clause 12.2.1

12.2.1.4 Test Description

12.2.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range for Cell1, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 12.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD.
2. The parameter settings for the cell are set up according to Table 12.2.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and UE test loop Mode E is activated on a EUTRA cell. Message contents are defined in clause 12.2.1.4.3.

12.2.1.4.2 Test Procedure

TBD

12.2.1.4.3 Message Contents

TBD

12.2.1.5 Test Requirement

For the parameters specified in Table 12.2.1.3-1 and SNR in Table 12.2.1.5-1, the BLER obtained in step TBD shall be below the test limit in Annex TBD.

Table 12.2.1.5-1: Test Requirements

Test num.	Sidelink UE	Band-width	PSSCH Reference channel	Reference value	
				Fraction of maximum throughput (%) (NOTE 1)	SNR (dB) of PSSCH
1	2	10 MHz	CD.1 FDD	70	-3.4+TT
		5 MHz		70	-3.3+TT
NOTE 1: The throughput is measured after 40 radio frames of lead time during which the test UE detects and synchronizes to Sidelink UE 1.					

12.3 Demodulation of PSCCH (single link performance)

FFS

12.4 Demodulation of PSBCH (single link performance)

FFS

12.5 Power imbalance performance with two links

The purpose of this test is to check the demodulation performance when receiving PSSCH transmissions from two Sidelink UEs with power imbalance in one subframe.

12.5.1 FDD Power imbalance performance with two links

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Test time is FFS.
- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- Test procedure is TBD
- Message contents are TBD

12.5.1.1 Test Purpose

This test verifies the PSSCH demodulation performance from two Sidelink UEs with power imbalance in one subframe

12.5.1.2 Test Applicability

This test case applies to all types of E-UTRA FDD UE release 12 and forward which support ProSe Direct Communication.

12.5.1.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 12.5.1.3-2 with the test parameters specified in Table 12.5.1.3-1. The receiver UE under test is associated with Cell 1.

Table 12.5.1.3-1: Test Parameters

Parameter			Unit	Test 1
Communication resource pool configuration				As specified in Table A.7.2.1-2 (Configuration #2-FDD)
DRX configuration				As specified in Table 12.1.2-1
N_{oc} at antenna port (Note 3)			dBm/15kHz	-98
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern (Note 2)			OP.1 FDD
	Propagation channel			AWGN
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-92
Active Sidelink UE(s)				Sidelink UE 1, Sidelink UE 2
Sidelink UE 1	Sidelink Transmissions			PSCCH + PSSCH
	PSCCH RMC			5 MHz: CC.1 FDD 10 MHz: CC.2 FDD
	PSCCH subframe allocation			$n_{PSCCH} = 0$ (as defined in TS 36.213)
	PSCCH RB allocation			
	$\hat{E}_s$ of PSCCH at antenna port		dBm/15kHz	-85
	PSSCH RMC			As specified in Table 12.5.1-2
	PSSCH subframe allocation			As per time repetition pattern specified in PSCCH
	PSSCH RB allocation			PRB pairs {4, 5}
	Time offset (NOTE 4)		μs	0
	Frequency offset (NOTE 5)		Hz	0
	Propagation Channel			AWGN
	Antenna configuration			1x2 Low
Sidelink UE 2	Sidelink Transmissions			PSCCH + PSSCH
	PSCCH RMC			5 MHz: CC.1 FDD 10 MHz: CC.2 FDD
	PSCCH subframe allocation			$n_{PSCCH} = 2$ (as defined in TS 36.213)
	PSCCH RB allocation			
	$\hat{E}_s$ of PSCCH at antenna port		dBm/15kHz	-85
	PSSCH RMC			As specified in Table 12.5.1-2
	PSSCH subframe allocation			As per time repetition pattern specified in PSCCH
	PSSCH RB allocation			PRB pairs {6, 7}
	Time offset (NOTE 4)		μs	0
	Frequency offset (NOTE 5)		Hz	0
	Propagation Channel			AWGN
	Antenna configuration			1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: Applicable to both DL channel and ProSe Direct Communication Subframes on UL.
NOTE 4: The power of PSCCH is set high to ensure reliable reception of PSCCH.
NOTE 4: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 5: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 12.5.1.3-2: Minimum performance

Test num.	Band-width	Sidelink UE	PSSCH Reference channel	Reference value	
				Fraction of maximum throughput (%)	SNR (dB) of PSSCH
1	5 / 10 MHz	1	CD.5 FDD	(NOTE 1)	24.35
		2	CD.5 FDD	70	2.4
NOTE 1: There is no throughput requirement for Sidelink UE 1.					

The normative reference for this requirement is TS 36.101 [2] clause 12.5.1

12.5.1.4 Test Description

12.5.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range for Cell1, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 12.5.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD.
2. The parameter settings for the cell are set up according to Table 12.5.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 12.5.1.4.3.

12.5.1.4.2 Test Procedure

TBD

12.5.1.4.3 Message Contents

TBD

12.5.1.5 Test Requirement

For the parameters specified in Table 12.5.1.3-1 and SNR in Table 12.5.1.5-1, the BLER obtained in step TBD shall be below the test limit in Annex TBD.

Table 12.5.1.5-1: Test Requirements

Test num.	Band-width	Sidelink UE	PSSCH Reference channel	Reference value	
				Fraction of maximum throughput (%)	SNR (dB) of PSSCH
1	5 / 10 MHz	1	CD.5 FDD	(NOTE 1)	24.35+TT
		2	CD.5 FDD	70	2.4+TT
NOTE 1: There is no throughput requirement for Sidelink UE 1.					

12.6 Multiple timing reference test

FFS

12.7 Maximum Sidelink processes test

The purpose of this test is to verify the maximum number of Sidelink processes and the maximum number of bits per TTI supported by the UE.

12.7.1 FDD Maximum Sidelink Processes for ProSe Direct communication

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- ProSe UE authentication is not handled in the test case and is still under investigation.
- Test time is FFS.
- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- Test procedure is TBD
- Message contents are TBD
- UL and DL RMC for cell1 is TBD

12.7.1.1 Test Purpose

This test verifies the PSSCH demodulation performance with a single active PSSCH link with a given SNR for which the average BLER remains below a given reference value under different channel conditions.

12.7.1.2 Test Applicability

This test case applies to all types of E-UTRA FDD UE release 12 and forward which support ProSe Direct Communication.

12.7.1.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 12.7.1.3-2 with the test parameters specified in Table 12.7.1.3-1. The receiver UE under test is associated with Cell 1.

Table 12.7.1.3-1: Test Parameters

Parameter			Unit	Test 1
Communication resource pool configuration				As specified in Table A.7.2.1-4 (Configuration #4-FDD)
DRX configuration				As specified in Table 12.1.2-1
Active cell(s)				Cell 1 (Serving cell)
Cell 1	Cyclic prefix			Normal
	Cell ID			0
	Downlink power allocation	ρ_A	dB	0
		ρ_B	dB	0 (NOTE 1)
		σ	dB	0
	OCNG Pattern (Note 2)			OP.1 FDD
	Propagation channel			Static propagation condition No external noise sources are applied
	Antenna configuration			1x2
	RSRP		dBm/15kHz	-85

Active Sidelink UE(s)			Sidelink UE i, 0 ≤ i ≤ 15
Sidelink UE i, 0 ≤ i ≤ 15	Sidelink Transmissions		PSCCH + PSSCH
	Resource pool		*commRxPool(* $\lfloor \frac{i}{8} \rfloor$ *)*
	PSCCH RMC		5MHz: CC.1 FDD with I_{TRP}=i%8 (NOTE 3) 10 MHz: CC.2 FDD with I_{TRP}= i%8 (NOTE 3)
	PSCCH subframe allocation		As defined by TS 36.213 with n_{PSCCH} = i
	PSCCH RB allocation		
	PSSCH RMC		As specified in Table 12.7.1-2
	PSSCH subframe allocation		As per time repetition pattern specified in PSCCH
	PSSCH RB allocation		Fully allocated
	Time offset (NOTE 4)	µs	0
	Frequency offset (NOTE 5)	Hz	0
	Propagation Channel		Static propagation condition No external noise sources are applied
	Antenna configuration		1x2 Low

NOTE 1: $P_B = 0$.
NOTE 2: OCNG is used to fully allocate the available resource blocks to virtual UEs.
NOTE 3: For N_{TRP} = 8 (FDD) and *trpt-Subset* = 001, I_{TRP} = 0 corresponds to a time repetition pattern of (1,0,0,0,0,0,0,0), I_{TRP} = 1 corresponds to a time repetition pattern of (0,1,0,0,0,0,0,0), etc.
NOTE 4: Time offset of Sidelink UE receive signal with respect to Cell 1 downlink timing at the tested UE.
NOTE 5: Frequency offset of Sidelink UE with respect to Cell 1 uplink frequency.

Table 12.7.1.3-2: Minimum performance

Test num.	Bandwidth	PSCCH Reference channel	$\hat{E}_s$ at antenna port (dBm/15kHz)	Reference value for Sidelink UE i=0…15
				Fraction of maximum throughput (%)
1	10 MHz	CD.7 FDD	-85	95
	5 MHz	CD.6 FDD	-85	95

The normative reference for this requirement is TS 36.101 [2] clause 12.7.1

12.7.1.4 Test Description

12.7.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range for Cell1, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 11.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD.
2. The parameter settings for the cell are set up according to Table 12.7.1.3-1.
3. Downlink signals are initially set up according to Annex C.0, C.1 and C.3.2, and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4 according to TS 36.508 [7] clause 4.5.4 and UE test loop Mode E is activated on a EUTRA cell. Message contents are defined in clause 11.2.1.4.3.

12.7.1.4.2 Test Procedure

TBD

12.7.1.4.3 Message Contents

TBD

12.7.1.5 Test Requirement

For the parameters specified in Table 12.7.1.3-1 and SNR in Table 12.7.1.5-1, the BLER obtained in step TBD shall be below the test limit in Annex TBD.

Table 12.7.1.5-1: Test Requirements

Test num.	Bandwidth	PSCCH Reference channel	$\hat{E}_s$ at antenna port (dBm/15kHz)	Reference value for Sidelink UE i=0…15
				Fraction of maximum throughput (%)
1	10 MHz	CD.7 FDD	-85+TT	95
	5 MHz	CD.6 FDD	-85+TT	95

13 FFS

14 Performance requirement (V2X Sidelink Communication)

This clause contains the performance requirements for the sidelink physical channels specified for V2X Sidelink Communication.

14.1 General

14.1.1 Applicability of requirements

The requirements in this clause are applicable to UEs that support V2X sidelink communication using Band 47.

14.2 Demodulation of PSSCH / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- Test procedure is TBD
- Configuration of GNSS-equivalent is FFS
- Message contents are TBD

14.2.1 Test Purpose

The purpose of the requirements in this subclause is to verify the PSSCH for V2X demodulation performance with a single active PSSCH link.

14.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 14 and forward which support V2X sidelink communication using Band 47.

14.2.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 14.2.3-2 with the test parameters specified in Table 14.2.3-1. In this test scenario, GNSS or GNSS-equivalent synchronization source is used and Sidelink UE 1 transmits PSCCH and PSSCH.

Table 14.2.3-1: Test Parameters

Parameter		Unit	Test 1
Communication resource pool configuration			As specified in Table A.9-1 (Configuration #1-V2X)
N_{oc} at antenna port		dBm/15 kHz	-98
Active cell(s)			None
Sidelink UE 1	Sidelink Transmissions		PSCCH+PSSCH
	Timing offset (Note 1)	Ts	CP/2-12
	Frequency offset (Note 2)	Hz	+600
	Synchronization		GNSS or GNSS-equivalent
	Antenna configuration		1x2
Note 1: Time offset of Sidelink UE receive signal with respect to GNSS reference timing. Note 2: Frequency offset of Sidelink UE with respect to GNSS reference frequency.			

Table 14.2.3-2: Minimum performance

Test num.	Bandwidth	PSSCH Reference channel	Propagation condition	Reference value	
				PSSCH BLER (%)	SNR (dB) of PSSCH
1	20 MHz	CD.8	EVA180	10	14.2
2	10 MHz	CD.9	EVA2700		5.4

The normative reference for this requirement is TS 36.101 [2] clause 14.2

14.2.4 Test Description

TBD

14.2.5 Test Requirement

For the parameters specified in Table 14.2.3-1 and SNR in Table 14.2.5-1, the BLER obtained in step TBD shall be below the reference value defined in Table 14.2.5-1.

Table 14.2.5-1: Test Requirements

Test num.	Bandwidth	PSSCH Reference channel	Propagation condition	Reference value	
				PSSCH BLER (%)	SNR (dB) of PSSCH
1	20 MHz	CD.8	EVA180	10	14.2+TT
2	10 MHz	CD.9	EVA2700		5.4+TT

14.3 Demodulation of PSCCH / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- Test procedure is TBD
- Configuration of GNSS-equivalent is FFS
- Message contents are TBD

14.3.1 Test Purpose

The purpose of the requirements in this subclause is to verify the PSCCH for V2X demodulation performance with a single active PSSCH link.

14.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 14 and forward which support V2X sidelink communication using Band 47.

14.3.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 14.3.3-2 with the test parameters specified in Table 14.3.3-1. In this test scenario, GNSS or GNSS-equivalent synchronization source is used and Sidelink UE 1 transmits PSCCH and PSSCH.

Table 14.3.3-1: Test Parameters

Parameter		Unit	Test 1
Communication resource pool configuration			As specified in Table A.9-1 (Configuration #1-V2X)
N_{oc} at antenna port		dBm/15 kHz	-98
Active cell(s)			None
Sidelink UE 1	Sidelink Transmissions		PSCCH+PSSCH
	Timing offset (Note 1)	Ts	CP/2-12
	Frequency offset (Note 2)	Hz	+600
	Synchronization		GNSS or GNSS-equivalent
	Propagation channel		EVA1500
	Antenna configuration		1x2
	PSSCH RMC		CD.9
Note 1: Time offset of Sidelink UE receive signal with respect to GNSS reference timing. Note 2: Frequency offset of Sidelink UE with respect to GNSS reference frequency. Note 3: Cyclic shift for PSCCH DMRS is randomly selected between {0, 3, 6, 9} for each PSCCH transmission.			

Table 14.3.3-2: Minimum performance

Test number	Bandwidth	PSCCH Reference channel	Reference value	
			Probability of missed PSCCH (%)	SNR (dB) of PSCCH
1	10 MHz	CC.8	1	2.6

The normative reference for this requirement is TS 36.101 [2] clause 14.3.

14.3.4 Test Description

TBD

14.3.5 Test Requirement

For the parameters specified in Table 14.3.3-1 and SNR in Table 14.3.5-1, the average probability of missed PSCCH shall be below the specified value in Table 14.3.5-1.

Table 14.3.5-1: Test Requirements

Test number	Bandwidth	PSCCH Reference channel	Reference value	
			Probability of missed PSCCH (%)	SNR (dB) of PSCCH
1	10 MHz	CC.8	1	2.6+TT

14.4 to 14.7

14.8 PSCCH/PSSCH decoding capability test / Non-concurrent with E-UTRA uplink transmissions

Editor's note: This test case is not complete. Following aspects are either missing or not yet determined:

- Test system uncertainties and test tolerances is TBD
- Connection Diagram is FFS
- Test procedure is TBD

- Configuration of GNSS-equivalent is FFS
- Message contents are TBD

14.8.1 Test Purpose

The purpose of this test is to verify the maximum number of Sidelink processes and the maximum number of bits per TTI supported by the UE.

14.8.2 Test Applicability

This test case applies to all types of E-UTRA UE release 14 and forward which support V2X sidelink communication using Band 47.

14.8.3 Minimum Conformance Requirements

The minimum requirements are specified in Table 14.8.3-3 with the test parameters specified in Table 14.8.3-1 and Table 14.8.3-2 according to UE capability.

Table 14.8.3-1: Test Parameters

Parameter		Unit	Test 1
Communication resource pool configuration			As specified in Table A.9-5 (Configuration #5-V2X)
Active cell(s)			None
Sidelink UE i, 0 ≤ i ≤ 9	Sidelink Transmissions		PSCCH + PSSCH
	Timing offset (Note 1)	μs	0
	Frequency offset (Note 2)	Hz	0
	Synchronization source		GNSS or GNSS-equivalent
	Propagation Channel		Static propagation condition No external noise sources are applied
	Antenna configuration		1x2 Low
	PSSCH RMC		CD.12
Note 1: Time offset of Sidelink UE receive signal with respect to GNSS reference timing. Note 2: Frequency offset of Sidelink UE with respect to GNSS reference frequency. Note 3: Cyclic shift for PSCCH DMRS is randomly selected between {0, 3, 6, 9} for each PSCCH transmission.			

Table 14.8.3-2: Test Parameters

Parameter		Unit	Test 2
Communication resource pool configuration			As specified in Table A.9-5 (Configuration #5-V2X)
Active cell(s)			None
Sidelink UE i, 0 ≤ i ≤ 19	Sidelink Transmissions		PSCCH + PSSCH
	Timing offset (Note 1)	μs	0
	Frequency offset (Note 2)	Hz	0
	Synchronization source		GNSS or GNSS-equivalent
	Propagation Channel		Static propagation condition No external noise sources are applied
	Antenna configuration		1x2 Low
	PSSCH RMC		CD.10
Note 1: Time offset of Sidelink UE receive signal with respect to GNSS reference timing. Note 2: Frequency offset of Sidelink UE with respect to GNSS reference frequency. Note 3: Cyclic shift for PSCCH DMRS is randomly selected between {0, 3, 6, 9} for each PSCCH transmission.			

Table 14.8.3-3: Minimum performance

Test number	Bandwidth	PSCCH Reference channel	$\hat{E}_S$ at antenna port (dBm/15kHz)	Reference value
				Probability of missed PSCCH (%)

1	20 MHz	CC.8	-85	1
2	20 MHz	CC.8	-85	1

The normative reference for this requirement is TS 36.101 [2] clause 14.8

14.8.4 Test Description

TBD

14.8.5 Test Requirement

For the parameters specified in Table 14.8.3-1 and $\hat{E}_S$ in Table 14.8.5-1, the probability of missed PSCCH obtained in step TBD shall be below the reference value defined in Table 14.8.5-1.

Table 14.8.5-1: Test Requirements

Test number	Bandwidth	PSCCH Reference channel	$\hat{E}_S$ at antenna port (dBm/15kHz)	Reference value
				Probability of missed PSCCH (%)
1	20 MHz	CC.8	-85+TT	1
2	20 MHz	CC.8	-85+TT	1

Annex A (normative): Measurement Channels

A.1 General

A schematic overview of the encoding process for the reference measurement channels is provided in Figure A-1.

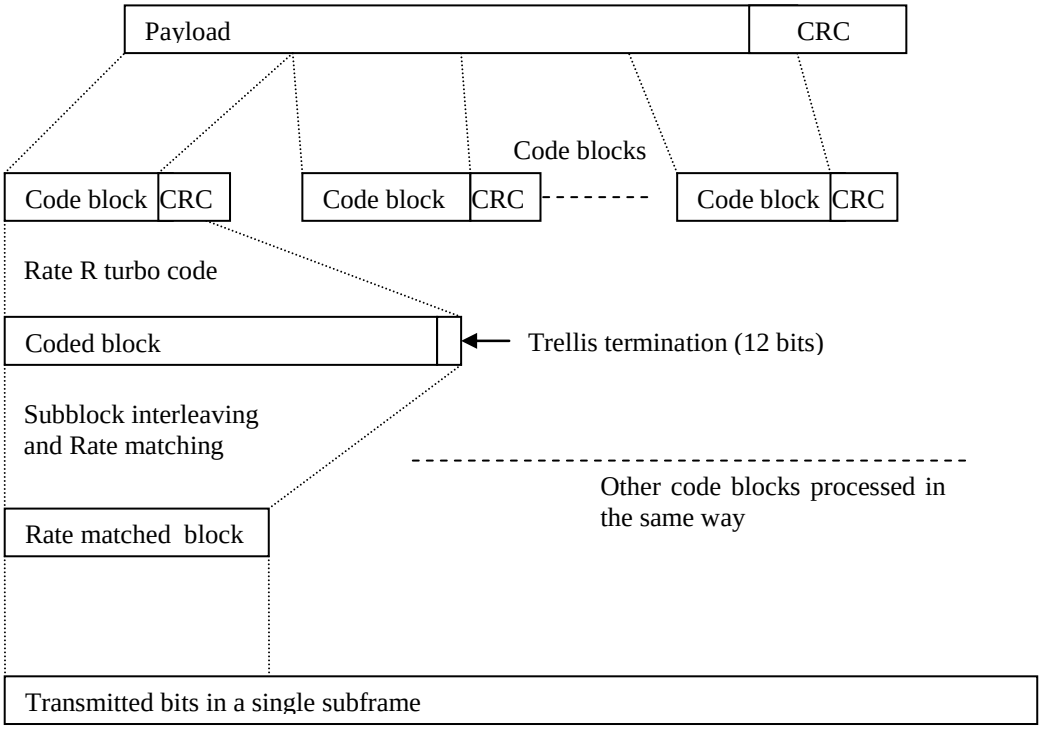


Figure A-1: Schematic overview of the encoding process

The throughput values defined in the measurement channels specified in Annex A, are calculated and are valid per data stream (codeword). For multi-stream (more than one codeword) transmissions, the throughput referenced in the minimum requirements is the sum of throughputs of all data streams (codewords).

The UE category entry in the definition of the reference measurement channels in Annex A is only informative and reveals the UE categories, which can support the corresponding measurement channel. Whether the measurement channel is used for testing a certain UE category or not is specified in the individual test cases.

Rate matching process in Figure A-1 is dependent on the parameter “Total number of Soft Channel bits” which has been defined for each UE category in TS 36.306 [15] clause 4.1. The SS shall use the Soft Channel bits size according to the UE category.

A.2 UL reference measurement channels

A.2.1 General

A.2.1.1 Applicability and common parameters

The following sections define the UL signal applicable to the Transmitter Characteristics (clause 6) and for the Receiver Characteristics (clause 7) where the UL signal is relevant.

The Reference channels in this section assume transmission of PUSCH and Demodulation Reference signal only. The following conditions apply:

- 1 HARQ transmission
- Cyclic Prefix normal
- PUSCH hopping off
- Link adaptation off
- Demodulation Reference signal as per TS 36.211 [8] clause 5.5.2.1.2.

Where ACK/NACK is transmitted, it is assumed to be multiplexed on PUSCH as per TS 36.212 [9] subclause 5.2.2.6.

- ACK/NACK 1 bit
- ACK/NACK mapping adjacent to Demodulation Reference symbol
- ACK/NACK resources punctured into data
- Max number of resources for ACK/NACK: 4 SC-FDMA symbols per subframe
- No CQI transmitted, no RI transmitted

A.2.1.2 Determination of payload size

The algorithm for determining the payload size A is as follows; given a desired coding rate R and radio block allocation N_{RB}:

1. Calculate the number of channel bits N_{ch} that can be transmitted during the first transmission of a given sub-frame.
2. Find *A* such that the resulting coding rate is as close to *R* as possible, that is,

$$\min\left|R-(A+24*(N_{CB}+1))/N_{ch}\right|, \textit{where } N_{CB}=\begin{cases}0, \textit{if } C=1\\ C, \textit{if } C>1\end{cases},$$

   subject to

   a) A is a valid TB size according to clause 7.1.7 of TS 36.213 [10] assuming an allocation of N_{RB} resource blocks.

   b) *C* is the number of Code Blocks calculated according to section 5.1.2 of TS 36.212 [9].

   c) For RMC-s, which at the nominal target coding rate do not cover all the possible UE categories for the given modulation, reduce the target coding rate gradually (within the same modulation), until the maximal possible number of UE categories is covered.

3. If there is more than one *A* that minimises the equation above, then the larger value is chosen per default and the chosen code rate should not exceed 0.93.

A.2.1.3 Overview of UL reference measurement channels

In Table A.2.1.3-1 are listed the UL reference measurement channels specified in annexes A.2.2 and A.2.3 of this release of TS 36.521-1. This table is informative and serves only to a better overview. The reference for the concrete reference measurement channels and corresponding implementation's parameters as to be used for testing are annexes A.2.2 and A.2.3 as appropriate.

Table A.2.1.3-1: Overview of UL reference measurement channels

Duplex	Table	Name	BW	Mod	TCR	RB	RB Offset	UE Categ	Notes
FDD, Full RB allocation, QPSK									
FDD	Table A.2.2.1.1-1		1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.2.2.1.1-1		3	QPSK	1/3	15		≥ 1	
FDD	Table A.2.2.1.1-1		5	QPSK	1/3	25		≥ 1	
FDD	Table A.2.2.1.1-1		10	QPSK	1/3	50		≥ 1	
FDD	Table A.2.2.1.1-1		15	QPSK	1/5	75		≥ 1	
FDD	Table A.2.2.1.1-1		20	QPSK	1/6	100		≥ 1	
FDD / HD-FDD	Table A.2.2.1.1-1a		1.4	QPSK	1/3	6		0	
FDD / HD-FDD	Table A.2.2.1.1-1b		1.4	QPSK	1/3	6		M1	
FDD / HD-FDD	Table A.2.2.1.1-1b		3	QPSK	1/3	6		M1	
FDD / HD-FDD	Table A.2.2.1.1-1b		5	QPSK	1/3	6		M1	
FDD / HD-FDD	Table A.2.2.1.1-1b		10	QPSK	1/3	6		M1	
FDD / HD-FDD	Table A.2.2.1.1-1b		15	QPSK	1/3	6		M1	
FDD / HD-FDD	Table A.2.2.1.1-1b		20	QPSK	1/3	6		M1	
FDD / HD-FDD	Table A.2.2.1.1-1a		3	QPSK	1/5	15		0	
FDD / HD-FDD	Table A.2.2.1.1-1a		5	QPSK	1/8	25		0	
FDD / HD-FDD	Table A.2.2.1.1-1a		10	QPSK	[1/10]	[36]		0	
FDD / HD-FDD	Table A.2.2.1.1-1a		15	QPSK	[1/10]	[36]		0	
FDD / HD-FDD	Table A.2.2.1.1-1a		20	QPSK	[1/10]	[36]		0	
FDD, Full RB allocation, 16-QAM									
FDD	Table A.2.2.1.2-1		1.4	16QAM	3/4	6		≥ 1	
FDD	Table A.2.2.1.2-1		3	16QAM	1/2	15		≥ 1	
FDD	Table A.2.2.1.2-1		5	16QAM	1/3	25		≥ 1	
FDD	Table A.2.2.1.2-1		10	16QAM	3/4	50		≥ 2	
FDD	Table A.2.2.1.2-1		15	16QAM	1/2	75		≥ 2	
FDD	Table A.2.2.1.2-1		20	16QAM	1/3	100		≥ 2	
FDD / HD-FDD	Table A.2.2.1.2-1a		1.4	16QAM	1/3	5		0	
FDD / HD-FDD	Table A.2.2.1.2-1a		3	16QAM	1/3	5		0	
FDD / HD-FDD	Table A.2.2.1.2-1a		5	16QAM	1/3	5		0	
FDD / HD-FDD	Table A.2.2.1.2-1a		10	16QAM	1/3	5		0	
FDD / HD-FDD	Table A.2.2.1.2-1a		15	16QAM	1/3	5		0	
FDD / HD-FDD	Table A.2.2.1.2-1a		20	16QAM	1/3	5		0	
FDD / HD-FDD	Table A.2.2.1.2-1b		1.4	16QAM	1/3	5		M1	
FDD / HD-FDD	Table A.2.2.1.2-1b		3	16QAM	1/3	5		M1	
FDD / HD-FDD	Table A.2.2.1.2-1b		5	16QAM	1/3	5		M1	
FDD / HD-FDD	Table A.2.2.1.2-1b		10	16QAM	1/3	5		M1	
FDD / HD-FDD	Table A.2.2.1.2-1b		15	16QAM	1/3	5		M1	
FDD / HD-FDD	Table A.2.2.1.2-1b		20	16QAM	1/3	5		M1	

FDD, Full RB allocation, 64-QAM									
FDD	Table A.2.2.1.3-1		1.4	64QAM	3/4	6		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.1.3-1		3	64QAM	3/4	15		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.1.3-1		5	64QAM	3/4	25		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.1.3-1		10	64QAM	3/4	50		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.1.3-1		15	64QAM	3/4	75		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.1.3-1		20	64QAM	3/4	100		5,8	UL category 5, 8, 13, 14
FDD, Partial RB allocation, QPSK									

FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	1		≥ 1	
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	2		≥ 1	
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	3		≥ 1	
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	4		≥ 1	
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	5		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	6		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	8		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	9		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	10		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	12		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	15		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	16		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	18		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	20		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	24		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	25		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	27		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	30		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	32		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	36		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	40		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	45		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	48		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/3	50		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/3	54		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/4	60		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/4	64		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/4	72		≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/5	75		≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/5	80		≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/5	81		≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/6	90		≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/6	96		≥ 1	
FDD / HD-FDD	Table A.2.2.2.1-1a		1.4 - 20	QPSK	1/3	1		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		1.4 - 20	QPSK	1/3	2		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		1.4 - 20	QPSK	1/3	3		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		1.4 - 20	QPSK	1/3	4		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		1.4 - 20	QPSK	1/3	5		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		3-20	QPSK	1/3	6		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		3-20	QPSK	1/3	8		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		3-20	QPSK	1/3	9		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		3-20	QPSK	1/3	10		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		3-20	QPSK	1/4	12		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		5-20	QPSK	1/5	15		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		5-20	QPSK	1/5	16		0	

FDD / HD-FDD	Table A.2.2.2.1-1a		5-20	QPSK	1/6	18		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		5-20	QPSK	1/6	20		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		5-20	QPSK	1/8	24		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		10-20	QPSK	1/8	25		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		10-20	QPSK	1/8	27		0	
FDD / HD-FDD	Table A.2.2.2.1-1a		10-20	QPSK	1/10	30		0	
FDD / HD-FDD	Table A.2.2.2.1-1b		1.4-20	QPSK	1/3	1		M1	
FDD / HD-FDD	Table A.2.2.2.1-1b		1.4-20	QPSK	1/3	2		M1	
FDD / HD-FDD	Table A.2.2.2.1-1b		1.4-20	QPSK	1/3	3		M1	
FDD / HD-FDD	Table A.2.2.2.1-1b		1.4-20	QPSK	1/3	4		M1	
FDD / HD-FDD	Table A.2.2.2.1-1b		1.4-20	QPSK	1/3	5		M1	
FDD / HD-FDD	Table A.2.2.2.1-1b		1.4-20	QPSK	1/3	6		M1	
FDD, Partial RB allocation, 16-QAM									
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	1		≥ 1	
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	2		≥ 1	
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	3		≥ 1	
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	4		≥ 1	
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	5		≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	6		≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	8		≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	9		≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	10		≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	12		≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/2	15		≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/2	16		≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/2	18		≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/3	20		≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/3	24		≥ 1	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	1/3	25		≥ 1	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	1/3	27		≥ 1	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	30		≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	32		≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	36		≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	40		≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	45		≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	48		≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	3/4	50		≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	3/4	54		≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	2/3	60		≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	2/3	64		≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	1/2	72		≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	1/2	75		≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	1/2	80		≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	1/2	81		≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	2/5	90		≥ 2	

FDD	Table A.2.2.2.2-1		20	16QAM	2/5	96		≥ 2	
FDD / HD-FDD	Table A.2.2.2.2-1a		1.4 - 20	16QAM	3/4	1		0	
FDD / HD-FDD	Table A.2.2.2.2-1a		1.4 - 20	16QAM	3/4	2		0	
FDD / HD-FDD	Table A.2.2.2.2-1a		1.4 - 20	16QAM	2/5	4		0	
FDD / HD-FDD	Table A.2.2.2.2-1b		1.4-20	16QAM	1/2	1		M1	
FDD / HD-FDD	Table A.2.2.2.2-1b		1.4-20	16QAM	1/2	2		M1	
FDD / HD-FDD	Table A.2.2.2.2-1b		1.4-20	16QAM	1/2	3		M1	
FDD / HD-FDD	Table A.2.2.2.2-1b		1.4-20	16QAM	2/5	4		M1	
FDD, Partial RB allocation, 64-QAM									
FDD	Table A.2.2.2.3-1		1.4 - 20	64QAM	3/4	1		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		1.4 - 20	64QAM	3/4	2		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		1.4 - 20	64QAM	3/4	3		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		1.4 - 20	64QAM	3/4	4		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		1.4 - 20	64QAM	3/4	5		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		3 - 20	64QAM	3/4	6		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		3 - 20	64QAM	3/4	8		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		3 - 20	64QAM	3/4	9		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		3 - 20	64QAM	3/4	10		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		3 - 20	64QAM	3/4	12		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		5 - 20	64QAM	3/4	15		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		5 - 20	64QAM	3/4	16		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		5 - 20	64QAM	3/4	18		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		5 - 20	64QAM	3/4	20		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		5 - 20	64QAM	3/4	24		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		10 - 20	64QAM	3/4	25		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		10 - 20	64QAM	3/4	27		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		10 - 20	64QAM	3/4	30		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		10 - 20	64QAM	3/4	32		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		10 - 20	64QAM	3/4	36		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		10 - 20	64QAM	3/4	40		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		10 - 20	64QAM	3/4	45		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		10 - 20	64QAM	3/4	48		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		15 - 20	64QAM	3/4	50		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		15 - 20	64QAM	3/4	54		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		15 - 20	64QAM	3/4	60		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		15 - 20	64QAM	3/4	64		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		15 - 20	64QAM	3/4	72		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		20	64QAM	3/4	75		5,8	UL category 5, 8, 13, 14

FDD	Table A.2.2.2.3-1		20	64QAM	3/4	80		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		20	64QAM	3/4	81		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		20	64QAM	2/3	90		5,8	UL category 5, 8, 13, 14
FDD	Table A.2.2.2.3-1		20	64QAM	3/4	96		5,8	UL category 5, 8, 13, 14
FDD, Sustained data rate									
FDD	Table A.2.2.3-1	R.1-1 FDD	10	QPSK	0.31	40		≥ 1	
FDD	Table A.2.2.3-1	R.1-2 FDD	10	QPSK	0.31	40		≥ 1	
FDD	Table A.2.2.3-1	R.1-3 FDD	20	QPSK	0.31	90		≥ 2	
FDD	Table A.2.2.3-1	R.1-3A FDD	10	QPSK	0.31	40		≥ 1	
FDD	Table A.2.2.3-1	R.1-4 FDD	20	QPSK	0.31	40		≥ 2	
FDD	Table A.2.2.3-1	R.1-4B FDD	15	QPSK	0.31	60		≥ 1	
TDD, Full RB allocation, QPSK									
TDD	Table A.2.3.1.1-1		1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.2.3.1.1-1		3	QPSK	1/3	15		≥ 1	
TDD	Table A.2.3.1.1-1		5	QPSK	1/3	25		≥ 1	
TDD	Table A.2.3.1.1-1		10	QPSK	1/3	50		≥ 1	
TDD	Table A.2.3.1.1-1		15	QPSK	1/5	75		≥ 1	
TDD	Table A.2.3.1.1-1		20	QPSK	1/6	100		≥ 1	
TDD	Table A.2.3.1.1-1A		1.4	QPSK	1/3	6		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.1-1A		3	QPSK	1/3	15		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.1-1A		5	QPSK	1/3	25		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.1-1A		10	QPSK	1/3	50		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.1-1A		15	QPSK	1/5	75		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.1-1A		20	QPSK	1/6	100		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.1-1a		1.4	QPSK	1/3	6		0	
TDD	Table A.2.3.1.1-1a		3	QPSK	1/5	15		0	
TDD	Table A.2.3.1.1-1a		5	QPSK	1/8	25		0	
TDD	Table A.2.3.1.1-1a		10	QPSK	[1/10]	[36]		0	
TDD	Table A.2.3.1.1-1a		15	QPSK	[1/10]	[36]		0	
TDD	Table A.2.3.1.1-1a		20	QPSK	[1/10]	[36]		0	
TDD, Full RB allocation, 16-QAM									
TDD	Table A.2.3.1.2-1		1.4	16QAM	3/4	6		≥ 1	
TDD	Table A.2.3.1.2-1		3	16QAM	1/2	15		≥ 1	
TDD	Table A.2.3.1.2-1		5	16QAM	1/3	25		≥ 1	
TDD	Table A.2.3.1.2-1		10	16QAM	3/4	50		≥ 2	
TDD	Table A.2.3.1.2-1		15	16QAM	1/2	75		≥ 2	
TDD	Table A.2.3.1.2-1		20	16QAM	1/3	100		≥ 2	
TDD	Table A.2.3.1.2-1		20	16QAM	1/3	100		≥ 2	
TDD	Table A.2.3.1.2-1A		1.4	16QAM	3/4	6		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.2-1A		3	16QAM	1/2	15		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.2-1A		5	16QAM	1/3	25		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.1.2-1A		10	16QAM	3/4	50		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.1.2-1A		15	16QAM	1/2	75		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.1.2-1A		20	16QAM	1/3	100		≥ 2	UL-DL

									configuration 0
TDD	Table A.2.3.1.2-1a		1.4	16QAM	1/3	5		0	
TDD	Table A.2.3.1.2-1a		3	16QAM	1/3	5		0	
TDD	Table A.2.3.1.2-1a		5	16QAM	1/3	5		0	
TDD	Table A.2.3.1.2-1a		10	16QAM	1/3	5		0	
TDD	Table A.2.3.1.2-1a		15	16QAM	1/3	5		0	
TDD	Table A.2.3.1.2-1a		20	16QAM	1/3	5		0	
TDD, Full RB allocation, 64-QAM									
TDD	Table A.2.3.1.3-1		1.4	64QAM	3/4	6		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.1.3-1		3	64QAM	3/4	15		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.1.3-1		5	64QAM	3/4	25		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.1.3-1		10	64QAM	3/4	50		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.1.3-1		15	64QAM	3/4	75		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.1.3-1		20	64QAM	3/4	100		5,8	UL category 5, 8, 13, 14
TDD, Partial RB allocation, QPSK									

TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	1		≥ 1	
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	2		≥ 1	
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	3		≥ 1	
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	4		≥ 1	
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	5		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	6		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	8		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	9		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	10		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	12		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	15		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	16		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	18		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	20		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	24		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	25		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	27		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	30		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	32		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	36		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	40		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	45		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	48		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/3	50		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/3	54		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/4	60		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/4	64		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/4	72		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/5	75		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/5	80		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/5	81		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/6	90		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/6	96		≥ 1	
TDD	Table A.2.3.2.1-1A		1.4 - 20	QPSK	1/3	1		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		1.4 - 20	QPSK	1/3	2		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		1.4 - 20	QPSK	1/3	3		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		1.4 - 20	QPSK	1/3	4		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		1.4 - 20	QPSK	1/3	5		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		3 - 20	QPSK	1/3	6		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		3 - 20	QPSK	1/3	8		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		3 - 20	QPSK	1/3	9		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		3 - 20	QPSK	1/3	10		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		3 - 20	QPSK	1/3	12		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		5 - 20	QPSK	1/3	15		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		5 - 20	QPSK	1/3	16		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		5 - 20	QPSK	1/3	18		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		5 - 20	QPSK	1/3	20		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		5 - 20	QPSK	1/3	24		≥ 1	UL-DL configuration 0

TDD	Table A.2.3.2.1-1A		10 - 20	QPSK	1/3	25		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		10 - 20	QPSK	1/3	27		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		10 - 20	QPSK	1/3	30		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		10 - 20	QPSK	1/3	32		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		10 - 20	QPSK	1/3	36		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		10 - 20	QPSK	1/3	40		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		10 - 20	QPSK	1/3	45		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		10 - 20	QPSK	1/3	48		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		15 - 20	QPSK	1/3	50		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		15 - 20	QPSK	1/3	54		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		15 - 20	QPSK	1/4	60		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		15 - 20	QPSK	1/4	64		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		15 - 20	QPSK	1/4	72		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		20	QPSK	1/5	75		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		20	QPSK	1/5	80		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		20	QPSK	1/5	81		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		20	QPSK	1/6	90		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1A		20	QPSK	1/6	96		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.1-1a		1.4 - 20	QPSK	1/3	1		0	
TDD	Table A.2.3.2.1-1a		1.4 - 20	QPSK	1/3	2		0	
TDD	Table A.2.3.2.1-1a		1.4 - 20	QPSK	1/3	3		0	
TDD	Table A.2.3.2.1-1a		1.4 - 20	QPSK	1/3	4		0	
TDD	Table A.2.3.2.1-1a		1.4 - 20	QPSK	1/3	5		0	
TDD	Table A.2.3.2.1-1a		3-20	QPSK	1/3	6		0	
TDD	Table A.2.3.2.1-1a		3-20	QPSK	1/3	8		0	
TDD	Table A.2.3.2.1-1a		3-20	QPSK	1/3	9		0	
TDD	Table A.2.3.2.1-1a		3-20	QPSK	1/3	10		0	
TDD	Table A.2.3.2.1-1a		3-20	QPSK	1/4	12		0	
TDD	Table A.2.3.2.1-1a		5-20	QPSK	1/5	15		0	
TDD	Table A.2.3.2.1-1a		5-20	QPSK	1/5	16		0	
TDD	Table A.2.3.2.1-1a		5-20	QPSK	1/6	18		0	
TDD	Table A.2.3.2.1-1a		5-20	QPSK	1/6	20		0	
TDD	Table A.2.3.2.1-1a		5-20	QPSK	1/8	24		0	
TDD	Table A.2.3.2.1-1a		10-20	QPSK	1/8	25		0	
TDD	Table A.2.3.2.1-1a		10-20	QPSK	1/8	27		0	
TDD	Table A.2.3.2.1-1a		10-20	QPSK	1/10	30		0	
TDD	Table A.2.3.2.1-1b		1.4-20	QPSK	1/3	1		M1	
TDD	Table A.2.3.2.1-1b		1.4-20	QPSK	1/3	2		M1	
TDD	Table A.2.3.2.1-1b		1.4-20	QPSK	1/3	3		M1	
TDD	Table A.2.3.2.1-1b		1.4-20	QPSK	1/3	4		M1	
TDD	Table A.2.3.2.1-1b		1.4-20	QPSK	1/3	5		M1	
TDD	Table A.2.3.2.1-1b		3-20	QPSK	1/3	6		M1	
TDD, Partial RB allocation, 16-QAM									

TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	1		≥ 1	
TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	2		≥ 1	
TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	3		≥ 1	
TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	4		≥ 1	
TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	5		≥ 1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	6		≥ 1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	8		≥ 1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	9		≥ 1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	10		≥ 1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	12		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/2	15		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/2	16		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/2	18		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/3	20		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/3	24		≥ 1	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	1/3	25		≥ 1	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	1/3	27		≥ 1	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	30		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	32		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	36		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	40		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	45		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	48		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	3/4	50		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	3/4	54		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	2/3	60		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	2/3	64		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	1/2	72		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	1/2	75		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	1/2	80		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	1/2	81		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	2/5	90		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	2/5	96		≥ 2	
TDD	Table A.2.3.2.2-1A		1.4 - 20	16QAM	3/4	1		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		1.4 - 20	16QAM	3/4	2		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		1.4 - 20	16QAM	3/4	3		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		1.4 - 20	16QAM	3/4	4		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		1.4 - 20	16QAM	3/4	5		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		3 - 20	16QAM	3/4	6		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		3 - 20	16QAM	3/4	8		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		3 - 20	16QAM	3/4	9		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		3 - 20	16QAM	3/4	10		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		3 - 20	16QAM	3/4	12		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		5 - 20	16QAM	1/2	15		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		5 - 20	16QAM	1/2	16		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		5 - 20	16QAM	1/2	18		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		5 - 20	16QAM	1/3	20		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		5 - 20	16QAM	1/3	24		≥ 1	UL-DL configuration 0

TDD	Table A.2.3.2.2-1A		10 - 20	16QAM	1/3	25		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		10 - 20	16QAM	1/3	27		≥ 1	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		10 - 20	16QAM	3/4	30		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		10 - 20	16QAM	3/4	32		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		10 - 20	16QAM	3/4	36		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		10 - 20	16QAM	3/4	40		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		10 - 20	16QAM	3/4	45		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		10 - 20	16QAM	3/4	48		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		15 - 20	16QAM	3/4	50		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		15 - 20	16QAM	3/4	54		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		15 - 20	16QAM	2/3	60		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		15 - 20	16QAM	2/3	64		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		15 - 20	16QAM	1/2	72		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		20	16QAM	1/2	75		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		20	16QAM	1/2	80		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		20	16QAM	1/2	81		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		20	16QAM	2/5	90		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1A		20	16QAM	2/5	96		≥ 2	UL-DL configuration 0
TDD	Table A.2.3.2.2-1a		1.4 - 20	16QAM	3/4	1		0	
TDD	Table A.2.3.2.2-1a		1.4 - 20	16QAM	3/4	2		0	
TDD	Table A.2.3.2.2-1a		1.4 - 20	16QAM	2/5	4		0	
TDD	Table A.2.3.2.2-1b		1.4-20	16QAM	1/2	1		M1	
TDD	Table A.2.3.2.2-1b		1.4-20	16QAM	1/2	2		M1	
TDD	Table A.2.3.2.2-1b		1.4-20	16QAM	1/2	3		M1	
TDD	Table A.2.3.2.2-1b		1.4-20	16QAM	2/5	4		M1	
TDD, Partial RB allocation, 64-QAM									
TDD	Table A.2.3.2.3-1		1.4 - 20	64QAM	3/4	1		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		1.4 - 20	64QAM	3/4	2		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		1.4 - 20	64QAM	3/4	3		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		1.4 - 20	64QAM	3/4	4		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		1.4 - 20	64QAM	3/4	5		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		3 - 20	64QAM	3/4	6		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		3 - 20	64QAM	3/4	8		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		3 - 20	64QAM	3/4	9		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		3 - 20	64QAM	3/4	10		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		3 - 20	64QAM	3/4	12		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		5 - 20	64QAM	3/4	15		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		5 - 20	64QAM	3/4	16		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		5 - 20	64QAM	3/4	18		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		5 - 20	64QAM	3/4	20		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		5 - 20	64QAM	3/4	24		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		10 - 20	64QAM	3/4	25		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		10 - 20	64QAM	3/4	27		5,8	UL category 5, 8, 13, 14

TDD	Table A.2.3.2.3-1		10 - 20	64QAM	3/4	30		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		10 - 20	64QAM	3/4	32		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		10 - 20	64QAM	3/4	36		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		10 - 20	64QAM	3/4	40		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		10 - 20	64QAM	3/4	45		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		10 - 20	64QAM	3/4	48		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		15 - 20	64QAM	3/4	50		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		15 - 20	64QAM	3/4	54		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		15 - 20	64QAM	3/4	60		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		15 - 20	64QAM	3/4	64		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		15 - 20	64QAM	3/4	72		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		20	64QAM	3/4	75		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		20	64QAM	3/4	80		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		20	64QAM	3/4	81		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		20	64QAM	2/3	90		5,8	UL category 5, 8, 13, 14
TDD	Table A.2.3.2.3-1		20	64QAM	3/4	96		5,8	UL category 5, 8, 13, 14
TDD, Sustained data rate									
TDD	Table A.2.3.3-1	R.1-1 TDD	10	QPSK	0.43	40		≥ 1	
TDD	Table A.2.3.3-1	R.1-2 TDD	10	QPSK	0.61	40		≥ 2	
TDD	Table A.2.3.3-1	R.1-3 TDD	20	QPSK	0.49	90		≥ 2	
TDD	Table A.2.3.3-1	R.1-3B TDD	15	QPSK	0.42	60		≥ 2	
TDD	Table A.2.3.3-1	R.1-4 TDD	20	QPSK	0.49	90		≥ 2	

A.2.2 Reference measurement channels for FDD

A.2.2.1 Full RB allocation

A.2.2.1.1 QPSK

Table A.2.2.1.1-1: Reference Channels for QPSK with full RB allocation

Parameter	Unit	Value					
Channel bandwidth	**MHz**	**1.4**	**3**	**5**	**10**	**15**	**20**
Allocated resource blocks		6	15	25	50	75	100
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3	1/3	1/5	1/6
Payload size	Bits	600	1544	2216	5160	4392	4584
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)		1	1	1	1	1	1
Total number of bits per Sub-Frame (Note 1)	Bits	1728	4320	7200	14400	21600	28800
Total symbols per Sub-Frame		864	2160	3600	7200	10800	14400
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)							

Table A.2.2.1.1-1a: Reference Channels for QPSK with full/maximum RB allocation for UE category 0

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	[36]	[36]	[36]
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/5	1/8	[1/10]	[1/10]	[1/10]
Payload size	Bits	600	872	904	[1000]	[1000]	[1000]
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame		1	1	1	1	1	1
Total number of bits per Sub-Frame	Bits	1728	4320	7200	[10368]	[10368]	[10368]
Total symbols per Sub-Frame		864	2160	3600	[5184]	[5184]	[5184]
UE Category		0	0	0	0	0	0
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: For HD-FDD UE, the uplink subframes are scheduled at the 4th, 5th, 6th, 12th, 13th, 14th, 20th, 21st, 22nd, 28th, 29th, 30th, 36th, 37th, and 38th subframes every 40ms. Information bit payload is available if uplink subframe is scheduled.							

Table A.2.2.1.1-1b: Reference Channels for QPSK with full/maximum RB allocation for UE category M1

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	6	6	6	6	6
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Payload size	Bits	600	600	600	600	600	600
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame		1	1	1	1	1	1
Total number of bits per Sub-Frame	Bits	1728	1728	1728	1728	1728	1728
Total symbols per Sub-Frame		864	864	864	864	864	864
UE Category		M1	M1	M1	M1	M1	M1

NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

NOTE 2: For HD-FDD UE, the uplink subframes are scheduled at the 4th, 5th and 6th subframes every 10ms for the channel bandwidth 5MHz/10MHz/15MHz/20MHz. For HD-FDD UE, the uplink subframes are scheduled at the 5th, 6th, and 7th subframes every 10ms for the channel bandwidth 1.4MHz/3MHz. Information bit payload is available if uplink subframe is scheduled. N_{abs}^{PUSCH} is total number of absolute subframes a PUSCH with repetition spans [4].

NOTE 3: For HD-FDD UE with $N_{abs}^{PUSCH} > 1$, MPDCCH are scheduled at 0th DL subframe every N_{abs}^{PUSCH} +5 subframes (starting from the 0th subframe). The associated PUSCH is scheduled at the 4th to (N_{abs}^{PUSCH} +3)-th UL subframes every N_{abs}^{PUSCH} +5 subframes. Information bit payload is available if uplink subframe is scheduled.

A.2.2.1.2 16-QAM

Table A.2.2.1.2-1: Reference Channels for 16-QAM with full RB allocation

Parameter	Unit	Value					
Channel bandwidth	**MHz**	**1.4**	**3**	**5**	**10**	**15**	**20**
Allocated resource blocks		6	15	25	50	75	100
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		3/4	1/2	1/3	3/4	1/2	1/3
Payload size	Bits	2600	4264	4968	21384	21384	19848
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)		1	1	1	4	4	4
Total number of bits per Sub-Frame	Bits	3456	8640	14400	28800	43200	57600
Total symbols per Sub-Frame		864	2160	3600	7200	10800	14400
UE Category		≥ 1	≥ 1	≥ 1	≥ 2	≥ 2	≥ 2

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.2.2.1.2-1a: Reference Channels for 16-QAM with maximum RB allocation for UE category 0

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		5	5	5	5	5	5
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Payload size	Bits	872	872	872	872	872	872
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame		1	1	1	1	1	1
Total number of bits per Sub-Frame	Bits	2880	2880	2880	2880	2880	2880
Total symbols per Sub-Frame		720	720	720	720	720	720
UE Category		0	0	0	0	0	0
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: For HD-FDD UE, the uplink subframes are scheduled at the 4th, 5th, 6th, 12th, 13th, 14th, 20th, 21st, 22nd, 28th, 29th, 30th, 36th, 37th, and 38th subframes every 40ms. Information bit payload is available if uplink subframe is scheduled.							

Table A.2.2.1.2-1b: Reference Channels for 16-QAM with maximum RB allocation for UE category M1

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		5	5	5	5	5	5
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Payload size	Bits	872	872	872	872	872	872
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame		1	1	1	1	1	1
Total number of bits per Sub-Frame	Bits	2880	2880	2880	2880	2880	2880
Total symbols per Sub-Frame		720	720	720	720	720	720
UE Category		M1	M1	M1	M1	M1	M1
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) NOTE 2: For HD-FDD UE, the uplink subframes are scheduled at the 4th, 5th and 6th subframes every 10ms for the channel bandwidth 5MHz/10MHz/15MHz/20MHz. For HD-FDD UE, the uplink subframes are scheduled at the 5th, 6th, and 7th subframes every 10ms for the channel bandwidth 1.4MHz/3MHz. Information bit payload is available if uplink subframe is scheduled.							

A.2.2.1.3 64-QAM

Table A.2.2.1.3-1: Reference Channels for 64-QAM with full RB allocation

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding rate		3/4	3/4	3/4	3/4	3/4	3/4
Payload size	Bits	3752	9528	15840	31704	46888	63776
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)		1	2	3	6	8	11
Total number of bits per Sub-Frame	Bits	5184	12960	21600	43200	64800	86400
Total symbols per Sub-Frame		864	2160	3600	7200	10800	14400
UE Category (Note 2)		5,8	5,8	5,8	5,8	5,8	5,8
UE UL Category (Note 2)		5, 8, 13, 14	5, 8, 13, 14	5, 8, 13, 14	5, 8, 13, 14	5, 8, 13, 14	5, 8, 13, 14

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Note2： If UE does not report UE UL category, then the applicability of reference channel is determined by UE category. If UE reports UE UL category, then the applicability of reference channel is determined by UE UL category.

A.2.2.2 Partial RB allocation

For each channel bandwidth, various partial RB allocations are specified. The number of allocated RBs is chosen according to values specified in the Tx and Rx requirements. The single allocated RB case is included.

The allocated RBs are contiguous and start from one end of the channel bandwidth. A single allocated RB is at one end of the channel bandwidth.

A.2.2.2.1 QPSK

Table A.2.2.2.1-1: Reference Channels for QPSK with partial RB allocation

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category
Unit	MHz					Bits	Bits		Bits		
	1.4 - 20	1	12	QPSK	1/3	72	24	1	288	144	≥ 1
	1.4 - 20	2	12	QPSK	1/3	176	24	1	576	288	≥ 1
	1.4 - 20	3	12	QPSK	1/3	256	24	1	864	432	≥ 1
	1.4 - 20	4	12	QPSK	1/3	392	24	1	1152	576	≥ 1
	1.4 - 20	5	12	QPSK	1/3	424	24	1	1440	720	≥ 1
	3-20	6	12	QPSK	1/3	600	24	1	1728	864	≥ 1
	3-20	8	12	QPSK	1/3	808	24	1	2304	1152	≥ 1
	3-20	9	12	QPSK	1/3	776	24	1	2592	1296	≥ 1
	3-20	10	12	QPSK	1/3	872	24	1	2880	1440	≥ 1
	3-20	12	12	QPSK	1/3	1224	24	1	3456	1728	≥ 1
	5-20	15	12	QPSK	1/3	1320	24	1	4320	2160	≥ 1
	5-20	16	12	QPSK	1/3	1384	24	1	4608	2304	≥ 1
	5-20	18	12	QPSK	1/3	1864	24	1	5184	2592	≥ 1
	5-20	20	12	QPSK	1/3	1736	24	1	5760	2880	≥ 1
	5-20	24	12	QPSK	1/3	2472	24	1	6912	3456	≥ 1
	10-20	25	12	QPSK	1/3	2216	24	1	7200	3600	≥ 1
	10-20	27	12	QPSK	1/3	2792	24	1	7776	3888	≥ 1
	10-20	30	12	QPSK	1/3	2664	24	1	8640	4320	≥ 1
	10-20	32	12	QPSK	1/3	2792	24	1	9216	4608	≥ 1
	10-20	36	12	QPSK	1/3	3752	24	1	10368	5184	≥ 1
	10-20	40	12	QPSK	1/3	4136	24	1	11520	5760	≥ 1
	10-20	45	12	QPSK	1/3	4008	24	1	12960	6480	≥ 1
	10-20	48	12	QPSK	1/3	4264	24	1	13824	6912	≥ 1
	15 - 20	50	12	QPSK	1/3	5160	24	1	14400	7200	≥ 1
	15 - 20	54	12	QPSK	1/3	4776	24	1	15552	7776	≥ 1
	15 - 20	60	12	QPSK	1/4	4264	24	1	17280	8640	≥ 1
	15 - 20	64	12	QPSK	1/4	4584	24	1	18432	9216	≥ 1
	15 - 20	72	12	QPSK	1/4	5160	24	1	20736	10368	≥ 1
	20	75	12	QPSK	1/5	4392	24	1	21600	10800	≥ 1
	20	80	12	QPSK	1/5	4776	24	1	23040	11520	≥ 1
	20	81	12	QPSK	1/5	4776	24	1	23328	11664	≥ 1
	20	90	12	QPSK	1/6	4008	24	1	25920	12960	≥ 1
	20	96	12	QPSK	1/6	4264	24	1	27648	13824	≥ 1
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)											

Table A.2.2.2.1-1a: Reference Channels for QPSK with partial RB allocation for UE category 0

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Trans-port block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category
Unit	MHz					Bits	Bits		Bits		
	1.4 - 20	1	12	QPSK	1/3	72	24	1	288	144	0
	1.4 - 20	2	12	QPSK	1/3	176	24	1	576	288	0
	1.4 - 20	3	12	QPSK	1/3	256	24	1	864	432	0
	1.4 - 20	4	12	QPSK	1/3	392	24	1	1152	576	0
	1.4 - 20	5	12	QPSK	1/3	424	24	1	1440	720	0
	3-20	6	12	QPSK	1/3	600	24	1	1728	864	0
	3-20	8	12	QPSK	1/3	808	24	1	2304	1152	0
	3-20	9	12	QPSK	1/3	776	24	1	2592	1296	0
	3-20	10	12	QPSK	1/3	872	24	1	2880	1440	0
	3-20	12	12	QPSK	1/4	840	24	1	3456	1728	0
	5-20	15	12	QPSK	1/5	872	24	1	4320	2160	0
	5-20	16	12	QPSK	1/5	904	24	1	4608	2304	0
	5-20	18	12	QPSK	1/6	776	24	1	5184	2592	0
	5-20	20	12	QPSK	1/6	872	24	1	5760	2880	0
	5-20	24	12	QPSK	1/8	872	24	1	6912	3456	0
	10-20	25	12	QPSK	1/8	904	24	1	7200	3600	0
	10-20	27	12	QPSK	1/8	968	24	1	7776	3888	0
	10-20	30	12	QPSK	1/10	808	24	1	8640	4320	0

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Note 2: For HD-FDD UE, the uplink subframes are scheduled at the 4th, 5th, 6th, 12th, 13th, 14th, 20th, 21st, 22nd, 28th, 29th, 30th, 36th, 37th, and 38th subframes every 40ms. Information bit payload is available if uplink subframe is scheduled.

Table A.2.2.2.1-1b: Reference Channels for QK with partial RB allocation for UE category M1

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Trans-port block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category
Unit	MHz					Bits	Bits		Bits		
	1.4 - 20	1	12	QPSK	1/3	72	24	1	288	144	M1
	1.4 - 20	2	12	QPSK	1/3	176	24	1	576	288	M1
	1.4 - 20	3	12	QPSK	1/3	256	24	1	864	432	M1
	1.4 - 20	4	12	QPSK	1/3	392	24	1	1152	576	M1
	1.4 - 20	5	12	QPSK	1/3	424	24	1	1440	720	M1
	3-20	6	12	QPSK	1/3	600	24	1	1728	864	M1

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Note 2: For HD-FDD UE, the uplink subframes are scheduled at the 4th, 5th and 6thsubframes every 10ms for the channel bandwidth 5MHz/10MHz/15MHz/20MHz. For HD-FDD UE, the uplink subframes are scheduled at the 5th, 6th, and 7th subframes every 10ms for the channel bandwidth 1.4MHz/3MHz. Information bit payload is available if uplink subframe is scheduled.

A.2.2.2.2 16-QAM

Table A.2.2.2.2-1: Reference Channels for 16-QAM with partial RB allocation

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category
Unit	MHz					Bits	Bits		Bits		
	1.4 - 20	1	12	16QAM	3/4	408	24	1	576	144	≥ 1
	1.4 - 20	2	12	16QAM	3/4	840	24	1	1152	288	≥ 1
	1.4 - 20	3	12	16QAM	3/4	1288	24	1	1728	432	≥ 1
	1.4 - 20	4	12	16QAM	3/4	1736	24	1	2304	576	≥ 1
	1.4 - 20	5	12	16QAM	3/4	2152	24	1	2880	720	≥ 1
	3-20	6	12	16QAM	3/4	2600	24	1	3456	864	≥ 1
	3-20	8	12	16QAM	3/4	3496	24	1	4608	1152	≥ 1
	3-20	9	12	16QAM	3/4	3880	24	1	5184	1296	≥ 1
	3-20	10	12	16QAM	3/4	4264	24	1	5760	1440	≥ 1
	3-20	12	12	16QAM	3/4	5160	24	1	6912	1728	≥ 1
	5-20	15	12	16QAM	1/2	4264	24	1	8640	2160	≥ 1
	5-20	16	12	16QAM	1/2	4584	24	1	9216	2304	≥ 1
	5-20	18	12	16QAM	1/2	5160	24	1	10368	2592	≥ 1
	5-20	20	12	16QAM	1/3	4008	24	1	11520	2880	≥ 1
	5-20	24	12	16QAM	1/3	4776	24	1	13824	3456	≥ 1
	10-20	25	12	16QAM	1/3	4968	24	1	14400	3600	≥ 1
	10-20	27	12	16QAM	1/3	4776	24	1	15552	3888	≥ 1
	10-20	30	12	16QAM	3/4	12960	24	3	17280	4320	≥ 2
	10-20	32	12	16QAM	3/4	13536	24	3	18432	4608	≥ 2
	10-20	36	12	16QAM	3/4	15264	24	3	20736	5184	≥ 2
	10-20	40	12	16QAM	3/4	16992	24	3	23040	5760	≥ 2
	10-20	45	12	16QAM	3/4	19080	24	4	25920	6480	≥ 2
	10-20	48	12	16QAM	3/4	20616	24	4	27648	6912	≥ 2
	15 - 20	50	12	16QAM	3/4	21384	24	4	28800	7200	≥ 2
	15 - 20	54	12	16QAM	3/4	22920	24	4	31104	7776	≥ 2
	15 - 20	60	12	16QAM	2/3	23688	24	4	34560	8640	≥ 2
	15 - 20	64	12	16QA	2/3	25456	24	4	36864	9216	≥ 2

				M							
	15 - 20	72	12	16QAM	1/2	20616	24	4	41472	10368	≥ 2
	20	75	12	16QAM	1/2	21384	24	4	43200	10800	≥ 2
	20	80	12	16QAM	1/2	22920	24	4	46080	11520	≥ 2
	20	81	12	16QAM	1/2	22920	24	4	46656	11664	≥ 2
	20	90	12	16QAM	2/5	20616	24	4	51840	12960	≥ 2
	20	96	12	16QAM	2/5	22152	24	4	55296	13824	≥ 2
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)											

Table A.2.2.2.2-1a: Reference Channels for 16-QAM with partial RB allocation for UE category 0

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category
Unit	**MHz**					**Bits**	**Bits**		**Bits**		
	1.4 - 20	1	12	16QAM	3/4	408	24	1	576	144	0
	1.4 - 20	2	12	16QAM	3/4	840	24	1	1152	288	0
	1.4 - 20	4	12	16QAM	2/5	904	24	1	2304	576	0
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). Note 2: For HD-FDD UE, the uplink subframes are scheduled at the 4th, 5th, 6th, 12th, 13th, 14th, 20th, 21st, 22nd, 28th, 29th, 30th, 36th, 37th, and 38th subframes every 40ms. Information bit payload is available if uplink subframe is scheduled.											

Table A.2.2.2.2-1b: Reference Channels for 16-QAM with partial RB allocation for UE category M1

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category
Unit	**MHz**					**Bits**	**Bits**		**Bits**		
	1.4 - 20	1	12	16QAM	1/2	256	24	1	576	144	M1
	1.4 - 20	2	12	16QAM	1/2	552	24	1	1152	288	M1
	1.4 - 20	3	12	16QAM	1/2	840	24	1	1728	432	M1
	1.4 - 20	4	12	16QAM	2/5	904	24	1	2304	576	M1
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). Note 2: For HD-FDD UE, the uplink subframes are scheduled at the 4th, 5th and 6thsubframes every 10ms for the channel bandwidth 5MHz/10MHz/15MHz/20MHz. For HD-FDD UE, the uplink subframes are scheduled at the 5th, 6th, and 7th subframes every 10ms for the channel bandwidth 1.4MHz/3MHz. Information bit payload is available if uplink subframe is scheduled.											

A.2.2.2.3 64-QAM

Table A.2.2.2.3-1: Reference Channels for 64-QAM with partial RB allocation

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Trans-port block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category (Note 2)	UE UL Category (Note 2)
Unit	MHz					Bits	Bits		Bits			
	1.4 - 20	1	12	64QAM	3/4	616	24	1	864	144	5,8	5, 8, 13, 14
	1.4 - 20	2	12	64QAM	3/4	1256	24	1	1728	288	5,8	5, 8, 13, 14
	1.4 - 20	3	12	64QAM	3/4	1864	24	1	2592	432	5,8	5, 8, 13, 14
	1.4 - 20	4	12	64QAM	3/4	2536	24	1	3456	576	5,8	5, 8, 13, 14
	1.4 - 20	5	12	64QAM	3/4	3112	24	1	4320	720	5,8	5, 8, 13, 14
	3-20	6	12	64QAM	3/4	3752	24	1	5184	864	5,8	5, 8, 13, 14
	3-20	8	12	64QAM	3/4	5160	24	1	6912	1152	5,8	5, 8, 13, 14
	3-20	9	12	64QAM	3/4	5736	24	1	7776	1296	5,8	5, 8, 13, 14
	3-20	10	12	64QAM	3/4	6200	24	2	8640	1440	5,8	5, 8, 13, 14
	3-20	12	12	64QAM	3/4	7480	24	2	10368	1728	5,8	5, 8, 13, 14
	5-20	15	12	64QAM	3/4	9528	24	2	12960	2160	5,8	5, 8, 13, 14
	5-20	16	12	64QAM	3/4	10296	24	2	13824	2304	5,8	5, 8, 13, 14
	5-20	18	12	64QAM	3/4	11448	24	2	15552	2592	5,8	5, 8, 13, 14
	5-20	20	12	64QAM	3/4	12576	24	3	17280	2880	5,8	5, 8, 13, 14
	5-20	24	12	64QAM	3/4	15264	24	3	20736	3456	5,8	5, 8, 13, 14
	10-20	25	12	64QAM	3/4	15840	24	3	21600	3600	5,8	5, 8, 13, 14
	10-20	27	12	64QAM	3/4	16992	24	3	23328	3888	5,8	5, 8, 13, 14
	10-20	30	12	64QAM	3/4	19080	24	4	25920	4320	5,8	5, 8, 13, 14
	10-20	32	12	64QAM	3/4	20616	24	4	27648	4608	5,8	5, 8, 13, 14
	10-20	36	12	64QAM	3/4	22920	24	4	31104	5184	5,8	5, 8, 13, 14
	10-20	40	12	64QAM	3/4	25456	24	5	34560	5760	5,8	5, 8, 13, 14
	10-20	45	12	64QAM	3/4	28336	24	5	38880	6480	5,8	5, 8, 13, 14
	10-20	48	12	64QAM	3/4	30576	24	5	41472	6912	5,8	5, 8, 13, 14
	15 - 20	50	12	64QAM	3/4	31704	24	6	43200	7200	5,8	5, 8, 13, 14
	15 - 20	54	12	64QAM	3/4	34008	24	6	46656	7776	5,8	5, 8, 13, 14
	15 - 20	60	12	64QAM	3/4	37888	24	7	51840	8640	5,8	5, 8, 13, 14
	15 - 20	64	12	64QAM	3/4	40576	24	7	55296	9216	5,8	5, 8, 13, 14
	15 - 20	72	12	64QAM	3/4	45352	24	8	62208	10368	5,8	5, 8, 13, 14
	20	75	12	64QAM	3/4	46888	24	8	64800	10800	5,8	5, 8, 13, 14
	20	80	12	64QAM	3/4	51024	24	9	69120	11520	5,8	5, 8, 13, 14
	20	81	12	64QAM	3/4	51024	24	9	69984	11664	5,8	5, 8, 13, 14
	20	90	12	64QAM	2/3	51024	24	9	77760	12960	5,8	5, 8, 13,

												14
	20	96	12	64QAM	3/4	61664	24	11	82944	13824	5,8	5, 8, 13, 14
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note2 : If UE does not report UE UL category, then the applicability of reference channel is determined by UE category. If UE reports UE UL category, then the applicability of reference channel is determined by UE UL category.												

A.2.2.3 Reference measurement channels for sustained downlink data rate provided by lower layers

Table A.2.2.3-1: Uplink Reference Channels for sustained data-rate test (FDD)

Parameter	Unit	Value					
Reference Channel		R.1-1 FDD	R.1-2 FDD	R.1-3 FDD	R.1-3A FDD	R.1-4 FDD	R.1-4B FDD
Channel Bandwidth	MHz	10	10	20	10	20	15
Allocated Resource Blocks		40 (Note 2)	40 (Note 2)	90 (Note 3)	40(Note 2)	90 (Note 3)	60 (Note 4)
Allocated Sub-Frames per Radio-Frame		10	10	10	10	10	10
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Coding Rate		0.31	0.31	0.31	0.31	0.31	0.31
Information Bit Payload per Sub-Frame	Bits	3496	3496	7992	3496	7992	5352
Number of Code Blocks per Sub-Frame (Note 1)		1	1	2	1	2	2
Modulation Symbols per Sub-Frame		5760	5760	12960	5760	12960	5760
Binary Channel Bits per Sub-Frame		11520	11520	25920	11520	25920	17260
Max Throughput over 1 Radio-Frame	Mbps	3.496	3.496	7.992	3.496	7.992	5.352
UE Category		≥ 1	≥ 1	≥ 2	≥ 1	≥ 2	≥ 1
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: RB-s 5-44 allocated with PUSCH. Note 3: RB-s 5-94 allocated with PUSCH. Note 4: RB-s 7-66 allocated with PUSCH.							

A.2.3 Reference measurement channels for TDD

For TDD the measurement channel is based on DL/UL configuration ratio of 2DL:2UL or 1DL:4UL. 2DL:2UL is the default and used unless explicitly specified in test case.

A.2.3.1 Full RB allocation

A.2.3.1.1 QPSK

Table A.2.3.1.1-1: Reference Channels for QPSK with full RB allocation

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3	1/3	1/5	1/6
Payload size							
For Sub-Frame 2,3,7,8	Bits	600	1544	2216	5160	4392	4584
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)		1	1	1	1	1	1
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,7,8	Bits	1728	4320	7200	14400	21600	28800
Total symbols per Sub-Frame							
For Sub-Frame 2,3,7,8		864	2160	3600	7200	10800	14400
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: As per Table 4.2-2 in TS 36.211 [8]							

Table A.2.3.1.1-1A: Reference Channels for QPSK with full RB allocation, UL-DL configuration 0

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Uplink-Downlink Configuration (Note 2)		0	0	0	0	0	0
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3	1/3	1/5	1/6
Payload size							
For Sub-Frame 2,3,4,7,8,9	Bits	600	1544	2216	5160	4392	4584
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)		1	1	1	1	1	1
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,4,7,8,9	Bits	1728	4320	7200	14400	21600	28800
Total symbols per Sub-Frame							
For Sub-Frame 2,3,4,7,8,9		864	2160	3600	7200	10800	14400
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: As per Table 4.2-2 in TS 36.211 [8]							

Table A.2.3.1.1-1a: Reference Channels for QPSK with full/maximum RB allocation for UE UL category 0

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	[36]	[36]	[36]
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/5	1/8	[1/10]	[1/10]	[1/10]
Payload size							
For Sub-Frame 2,3,7,8	Bits	600	872	904	[1000]	[1000]	[1000]
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)							
For Sub-Frame 2,3,7,8		1	1	1	1	1	1
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,7,8	Bits	1728	4320	7200	[10368]	[10368]	[10368]
Total symbols per Sub-Frame							
For Sub-Frame 2,3,7,8		864	2160	3600	[5184]	[5184]	[5184]
UE Category		0	0	0	0	0	0
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) NOTE 2: As per Table 4.2-2 in TS 36.211 [8]							

Table A.2.3.1.1-1b: Reference Channels for QPSK with full/maximum RB allocation for UE UL category M1

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	6	6	6	6	6
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Payload size							
For Sub-Frame 2,3,7,8	Bits	600	600	600	600	600	600
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)							
For Sub-Frame 2,3,7,8		1	1	1	1	1	1
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,7,8	Bits	1728	1728	1728	1728	1728	1728
Total symbols per Sub-Frame							
For Sub-Frame 2,3,7,8		864	864	864	864	864	864
UE Category		M1	M1	M1	M1	M1	M1
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) NOTE 2: As per Table 4.2-2 in TS 36.211							

A.2.3.1.2 16-QAM

Table A.2.3.1.2-1: Reference Channels for 16-QAM with full RB allocation

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		3/4	1/2	1/3	3/4	1/2	1/3
Payload size							
For Sub-Frame 2,3,7,8	Bits	2600	4264	4968	21384	21384	19848
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks - C		1	1	1	4	4	4
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,7,8	Bits	3456	8640	14400	28800	43200	57600
Total symbols per Sub-Frame							
For Sub-Frame 2,3,7,8		864	2160	3600	7200	10800	14400
UE Category		≥ 1	≥ 1	≥ 1	≥ 2	≥ 2	≥ 2
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: As per Table 4.2-2 in TS 36.211 [8]							

Table A.2.3.1.2-1A: Reference Channels for 16-QAM with full RB allocation, UL-DL configuration 0

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Uplink-Downlink Configuration (Note 2)		0	0	0	0	0	0
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		3/4	1/2	1/3	3/4	1/2	1/3
Payload size							
For Sub-Frame 2,3,4,7,8,9	Bits	2600	4264	4968	21384	21384	19848
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks - C		1	1	1	4	4	4
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,4,7,8,9	Bits	3456	8640	14400	28800	43200	57600
Total symbols per Sub-Frame							
For Sub-Frame 2,3,4,7,8,9		864	2160	3600	7200	10800	14400
UE Category		≥ 1	≥ 1	≥ 1	≥ 2	≥ 2	≥ 2
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: As per Table 4.2-2 in TS 36.211 [8]							

Table A.2.3.1.2-1a: Reference Channels for 16-QAM with maximum RB allocation for UE UL category 0

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		5	5	5	5	5	5
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Payload size							
For Sub-Frame 2,3,7,8	Bits	872	872	872	872	872	872
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)							
For Sub-Frame 2,3,7,8		1	1	1	1	1	1
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,7,8	Bits	2880	2880	2880	2880	2880	2880
Total symbols per Sub-Frame							
For Sub-Frame 2,3,7,8		720	720	720	720	720	720
UE Category		0	0	0	0	0	0
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) NOTE 2: As per Table 4.2-2 in TS 36.211 [8]							

Table A.2.3.1.2-1b: Reference Channels for 16-QAM with maximum RB allocation for UE UL category M1

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		5	5	5	5	5	5
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Payload size							
For Sub-Frame 2,3,7,8	Bits	872	872	872	872	872	872
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)							
For Sub-Frame 2,3,7,8		1	1	1	1	1	1
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,7,8	Bits	2880	2880	2880	2880	2880	2880
Total symbols per Sub-Frame							
For Sub-Frame 2,3,7,8		720	720	720	720	720	720
UE Category		M1	M1	M1	M1	M1	M1
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) NOTE 2: As per Table 4.2-2 in TS 36.211[4]							

A.2.3.1.3 64-QAM

Table A.2.3.1.3-1 Reference Channels for 64-QAM with full RB allocation

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding rate		3/4	3/4	3/4	3/4	3/4	3/4
Payload size							
For Sub-Frame 2,3,7,8	Bits	3752	9528	15840	31704	46888	63776
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)							
For Sub-Frame 2,3,7,8		1	2	3	6	8	11
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,7,8	Bits	5184	12960	21600	43200	64800	86400
Total symbols per Sub-Frame							
For Sub-Frame 2,3,7,8		864	2160	3600	7200	10800	14400
UE Category (Note 3)		5,8	5,8	5,8	5,8	5,8	5,8
UE UL Category (Note 3)		5, 8, 13, 14	5, 8, 13, 14	5, 8, 13, 14	5, 8, 13, 14	5, 8, 13, 14	5, 8, 13, 14

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 2: As per Table 4.2-2 in TS 36.211 [4]
Note 3: If UE does not report UE UL category, then the applicability of reference channel is determined by UE category. If UE reports UE UL category, then the applicability of reference channel is determined by UE UL category.

A.2.3.2 Partial RB allocation

For each channel bandwidth, various partial RB allocations are specified. The number of allocated RBs is chosen according to values specified in the Tx and Rx requirements. The single allocated RB case is included.

The allocated RBs are contiguous and start from one end of the channel bandwidth. A single allocated RB is at one end of the channel bandwidth.

A.2.3.2.1 QPSK

Table A.2.3.2.1-1: Reference Channels for QPSK with partial RB allocation

Parameter	Ch BW	Allocated RBs	UDL Configuration (Note 2)	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size for Sub-Frame 2, 3, 7, 8	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame for Sub-Frame 2, 3, 7, 8	Total symbols per Sub-Frame for Sub-Frame 2, 3, 7, 8	UE Category
Unit	**MHz**						**Bits**	**Bits**		**Bits**		
	1.4-20	1	1	12	QPSK	1/3	72	24	1	288	144	≥ 1
	1.4-20	2	1	12	QPSK	1/3	176	24	1	576	288	≥ 1
	1.4-20	3	1	12	QPSK	1/3	256	24	1	864	432	≥ 1
	1.4-20	4	1	12	QPSK	1/3	392	24	1	1152	576	≥ 1
	1.4-20	5	1	12	QPSK	1/3	424	24	1	1440	720	≥ 1
	3-20	6	1	12	QPSK	1/3	600	24	1	1728	864	≥ 1
	3-20	8	1	12	QPSK	1/3	808	24	1	2304	1152	≥ 1
	3-20	9	1	12	QPSK	1/3	776	24	1	2592	1296	≥ 1
	3-20	10	1	12	QPSK	1/3	872	24	1	2880	1440	≥ 1
	3-20	12	1	12	QPSK	1/3	1224	24	1	3456	1728	≥ 1
	5-20	15	1	12	QPSK	1/3	1320	24	1	4320	2160	≥ 1
	5-20	16	1	12	QPSK	1/3	1384	24	1	4608	2304	≥ 1
	5-20	18	1	12	QPSK	1/3	1864	24	1	5184	2592	≥ 1
	5-20	20	1	12	QPSK	1/3	1736	24	1	5760	2880	≥ 1
	5-20	24	1	12	QPSK	1/3	2472	24	1	6912	3456	≥ 1
	10-20	25	1	12	QPSK	1/3	2216	24	1	7200	3600	≥ 1
	10-20	27	1	12	QPSK	1/3	2792	24	1	7776	3888	≥ 1
	10-20	30	1	12	QPSK	1/3	2664	24	1	8640	4320	≥ 1
	10-20	32	1	12	QPSK	1/3	2792	24	1	9216	4608	≥ 1
	10-20	36	1	12	QPSK	1/3	3752	24	1	10368	5184	≥ 1
	10-20	40	1	12	QPSK	1/3	4136	24	1	11520	5760	≥ 1
	10-20	45	1	12	QPSK	1/3	4008	24	1	12960	6480	≥ 1
	10-20	48	1	12	QPSK	1/3	4264	24	1	13824	6912	≥ 1
	15-20	50	1	12	QPSK	1/3	5160	24	1	14400	7200	≥ 1
	15-20	54	1	12	QPSK	1/3	4776	24	1	15552	7776	≥ 1
	15-20	60	1	12	QPSK	1/4	4264	24	1	17280	8640	≥ 1
	15-20	64	1	12	QPSK	1/4	4584	24	1	18432	9216	≥ 1
	15-20	72	1	12	QPSK	1/4	5160	24	1	20736	10368	≥ 1
	20	75	1	12	QPSK	1/5	4392	24	1	21600	10800	≥ 1
	20	80	1	12	QPSK	1/5	4776	24	1	23040	11520	≥ 1
	20	81	1	12	QPSK	1/5	4776	24	1	23328	11664	≥ 1
	20	90	1	12	QPSK	1/6	4008	24	1	25920	12960	≥ 1
	20	96	1	12	QPSK	1/6	4264	24	1	27648	13824	≥ 1

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 2: As per Table 4.2-2 in TS 36.211 [8]

Table A.2.3.2.1-1A: Reference Channels for QPSK with partial RB allocation, UL-DL configuration 0

Parameter	Ch BW	Allocated RBs	UDL Configuration (Note 2)	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size for Sub-Frame 2, 3, 4, 7, 8, 9	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame for Sub-Frame 2, 3, 4, 7, 8, 9	Total symbols per Sub-Frame for Sub-Frame 2, 3, 4, 7, 8, 9	UE Category
Unit	**MHz**						**Bits**	**Bits**		**Bits**		
	1.4-20	1	0	12	QPSK	1/3	72	24	1	288	144	≥ 1
	1.4-20	2	0	12	QPSK	1/3	176	24	1	576	288	≥ 1
	1.4-20	3	0	12	QPSK	1/3	256	24	1	864	432	≥ 1
	1.4-20	4	0	12	QPSK	1/3	392	24	1	1152	576	≥ 1
	1.4-20	5	0	12	QPSK	1/3	424	24	1	1440	720	≥ 1
	3-20	6	0	12	QPSK	1/3	600	24	1	1728	864	≥ 1
	3-20	8	0	12	QPSK	1/3	808	24	1	2304	1152	≥ 1
	3-20	9	0	12	QPSK	1/3	776	24	1	2592	1296	≥ 1
	3-20	10	0	12	QPSK	1/3	872	24	1	2880	1440	≥ 1
	3-20	12	0	12	QPSK	1/3	1224	24	1	3456	1728	≥ 1
	5-20	15	0	12	QPSK	1/3	1320	24	1	4320	2160	≥ 1
	5-20	16	0	12	QPSK	1/3	1384	24	1	4608	2304	≥ 1
	5-20	18	0	12	QPSK	1/3	1864	24	1	5184	2592	≥ 1
	5-20	20	0	12	QPSK	1/3	1736	24	1	5760	2880	≥ 1
	5-20	24	0	12	QPSK	1/3	2472	24	1	6912	3456	≥ 1
	10-20	25	0	12	QPSK	1/3	2216	24	1	7200	3600	≥ 1
	10-20	27	0	12	QPSK	1/3	2792	24	1	7776	3888	≥ 1
	10-20	30	0	12	QPSK	1/3	2664	24	1	8640	4320	≥ 1
	10-20	32	0	12	QPSK	1/3	2792	24	1	9216	4608	≥ 1
	10-20	36	0	12	QPSK	1/3	3752	24	1	10368	5184	≥ 1
	10-20	40	0	12	QPSK	1/3	4136	24	1	11520	5760	≥ 1
	10-20	45	0	12	QPSK	1/3	4008	24	1	12960	6480	≥ 1
	10-20	48	0	12	QPSK	1/3	4264	24	1	13824	6912	≥ 1
	15-20	50	0	12	QPSK	1/3	5160	24	1	14400	7200	≥ 1
	15-20	54	0	12	QPSK	1/3	4776	24	1	15552	7776	≥ 1
	15-20	60	0	12	QPSK	1/4	4264	24	1	17280	8640	≥ 1
	15-20	64	0	12	QPSK	1/4	4584	24	1	18432	9216	≥ 1
	15-20	72	0	12	QPSK	1/4	5160	24	1	20736	10368	≥ 1
	20	75	0	12	QPSK	1/5	4392	24	1	21600	10800	≥ 1
	20	80	0	12	QPSK	1/5	4776	24	1	23040	11520	≥ 1
	20	81	0	12	QPSK	1/5	4776	24	1	23328	11664	≥ 1
	20	90	0	12	QPSK	1/6	4008	24	1	25920	12960	≥ 1
	20	96	0	12	QPSK	1/6	4264	24	1	27648	13824	≥ 1

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 2: As per Table 4.2-2 in TS 36.211 [8]

Table A.2.3.2.1-1a: Reference Channels for QPSK with partial RB allocation for UE category 0

Parameter	Ch BW	Allocated RBs	UDL Configuration (Note 2)	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size for Sub-Frame 2, 3, 7, 8	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame for Sub-Frame 2, 3, 7, 8	Total symbols per Sub-Frame for Sub-Frame 2, 3, 7, 8	UE Category
Unit	MHz						Bits	Bits		Bits		
	1.4 - 20	1	1	12	QPSK	1/3	72	24	1	288	144	0
	1.4 - 20	2	1	12	QPSK	1/3	176	24	1	576	288	0
	1.4 - 20	3	1	12	QPSK	1/3	256	24	1	864	432	0
	1.4 - 20	4	1	12	QPSK	1/3	392	24	1	1152	576	0
	1.4 - 20	5	1	12	QPSK	1/3	424	24	1	1440	720	0
	3-20	6	1	12	QPSK	1/3	600	24	1	1728	864	0
	3-20	8	1	12	QPSK	1/3	808	24	1	2304	1152	0
	3-20	9	1	12	QPSK	1/3	776	24	1	2592	1296	0
	3-20	10	1	12	QPSK	1/3	872	24	1	2880	1440	0
	3-20	12	1	12	QPSK	1/4	840	24	1	3456	1728	0
	5-20	15	1	12	QPSK	1/5	872	24	1	4320	2160	0
	5-20	16	1	12	QPSK	1/5	904	24	1	4608	2304	0
	5-20	18	1	12	QPSK	1/6	776	24	1	5184	2592	0
	5-20	20	1	12	QPSK	1/6	872	24	1	5760	2880	0
	5-20	24	1	12	QPSK	1/8	872	24	1	6912	3456	0
	10-20	25	1	12	QPSK	1/8	904	24	1	7200	3600	0
	10-20	27	1	12	QPSK	1/8	968	24	1	7776	3888	0
	10-20	30	1	12	QPSK	1/10	808	24	1	8640	4320	0

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 2: As per Table 4.2-2 in TS 36.211 [8]

Table A.2.3.2.1-1b: Reference Channels for QPSK with partial RB allocation for UE category M1

Parameter	Ch BW	Allocated RBs	UDL Configuration (Note 2)	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size for Sub-Frame 2, 3, 7, 8	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame for Sub-Frame 2, 3, 7, 8	Total symbols per Sub-Frame for Sub-Frame 2, 3, 7, 8	UE Category
Unit	MHz						Bits	Bits		Bits		
	1.4 - 20	1	1	12	QPSK	1/3	72	24	1	288	144	M1
	1.4 - 20	2	1	12	QPSK	1/3	176	24	1	576	288	M1
	1.4 - 20	3	1	12	QPSK	1/3	256	24	1	864	432	M1
	1.4 - 20	4	1	12	QPSK	1/3	392	24	1	1152	576	M1
	1.4 - 20	5	1	12	QPSK	1/3	424	24	1	1440	720	M1
	3-20	6	1	12	QPSK	1/3	600	24	1	1728	864	M1

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 2: As per Table 4.2-2 in TS 36.211 [4]

A.2.3.2.2 16-QAM

Table A.2.3.2.2-1: Reference Channels for 16-QAM with partial RB allocation

Parameter	Ch BW	Allocated RBs	UDL Configuration (Note 2)	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size for Sub-Frame 2, 3, 7, 8	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame for Sub-Frame 2, 3, 7, 8	Total symbols per Sub-Frame for Sub-Frame 2, 3, 7, 8	UE Category
Unit	MHz						Bits	Bits		Bits		
	1.4-20	1	1	12	16QAM	3/4	408	24	1	576	144	≥ 1
	1.4-20	2	1	12	16QAM	3/4	840	24	1	1152	288	≥ 1
	1.4-20	3	1	12	16QAM	3/4	1288	24	1	1728	432	≥ 1
	1.4-20	4	1	12	16QAM	3/4	1736	24	1	2304	576	≥ 1
	1.4-20	5	1	12	16QAM	3/4	2152	24	1	2880	720	≥ 1
	3-20	6	1	12	16QAM	3/4	2600	24	1	3456	864	≥ 1
	3-20	8	1	12	16QAM	3/4	3496	24	1	4608	1152	≥ 1
	3-20	9	1	12	16QAM	3/4	3880	24	1	5184	1296	≥ 1
	3-20	10	1	12	16QAM	3/4	4264	24	1	5760	1440	≥ 1
	3-20	12	1	12	16QAM	3/4	5160	24	1	6912	1728	≥ 1
	5-20	15	1	12	16QAM	1/2	4264	24	1	8640	2160	≥ 1
	5-20	16	1	12	16QAM	1/2	4584	24	1	9216	2304	≥ 1
	5-20	18	1	12	16QAM	1/2	5160	24	1	10368	2592	≥ 1
	5-20	20	1	12	16QAM	1/3	4008	24	1	11520	2880	≥ 1
	5-20	24	1	12	16QAM	1/3	4776	24	1	13824	3456	≥ 1
	10-20	25	1	12	16QAM	1/3	4968	24	1	14400	3600	≥ 1
	10-20	27	1	12	16QAM	1/3	4776	24	1	15552	3888	≥ 1
	10-20	30	1	12	16QAM	3/4	12960	24	3	17280	4320	≥ 2
	10-20	32	1	12	16QAM	3/4	13536	24	3	18432	4608	≥ 2
	10-20	36	1	12	16QAM	3/4	15264	24	3	20736	5184	≥ 2
	10-20	40	1	12	16QAM	3/4	16992	24	3	23040	5760	≥ 2
	10-20	45	1	12	16QAM	3/4	19080	24	4	25920	6480	≥ 2
	10-20	48	1	12	16QAM	3/4	20616	24	4	27648	6912	≥ 2
	15-20	50	1	12	16QAM	3/4	21384	24	4	28800	7200	≥ 2
	15-20	54	1	12	16QAM	3/4	22920	24	4	31104	7776	≥ 2

	15-20	60	1	12	16QAM	2/3	23688	24	4	34560	8640	≥ 2
	15-20	64	1	12	16QAM	2/3	25456	24	4	36864	9216	≥ 2
	15-20	72	1	12	16QAM	1/2	20616	24	4	41472	10368	≥ 2
	20	75	1	12	16QAM	1/2	21384	24	4	43200	10800	≥ 2
	20	80	1	12	16QAM	1/2	22920	24	4	46080	11520	≥ 2
	20	81	1	12	16QAM	1/2	22920	24	4	46656	11664	≥ 2
	20	90	1	12	16QAM	2/5	20616	24	4	51840	12960	≥ 2
	20	96	1	12	16QAM	2/5	22152	24	4	55296	13824	≥ 2
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: As per Table 4.2-2 in TS 36.211 [8]												

Table A.2.3.2.2-1A: Reference Channels for 16-QAM with partial RB allocation, UL-DL configuration 0

Parameter	Ch BW	Allocated RBs	UDL Configuration (Note 2)	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size for Sub-Frame 2, 3, 4, 7, 8, 9	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame for Sub-Frame 2, 3, 4, 7, 8, 9	Total symbols per Sub-Frame for Sub-Frame 2, 3, 4, 7, 8, 9	UE Category
Unit	MHz						Bits	Bits		Bits		
	1.4-20	1	0	12	16QAM	3/4	408	24	1	576	144	≥ 1
	1.4-20	2	0	12	16QAM	3/4	840	24	1	1152	288	≥ 1
	1.4-20	3	0	12	16QAM	3/4	1288	24	1	1728	432	≥ 1
	1.4-20	4	0	12	16QAM	3/4	1736	24	1	2304	576	≥ 1
	1.4-20	5	0	12	16QAM	3/4	2152	24	1	2880	720	≥ 1
	3-20	6	0	12	16QAM	3/4	2600	24	1	3456	864	≥ 1
	3-20	8	0	12	16QAM	3/4	3496	24	1	4608	1152	≥ 1
	3-20	9	0	12	16QAM	3/4	3880	24	1	5184	1296	≥ 1
	3-20	10	0	12	16QAM	3/4	4264	24	1	5760	1440	≥ 1
	3-20	12	0	12	16QAM	3/4	5160	24	1	6912	1728	≥ 1
	5-20	15	0	12	16QAM	1/2	4264	24	1	8640	2160	≥ 1
	5-20	16	0	12	16QAM	1/2	4584	24	1	9216	2304	≥ 1
	5-20	18	0	12	16QAM	1/2	5160	24	1	10368	2592	≥ 1
	5-20	20	0	12	16QAM	1/3	4008	24	1	11520	2880	≥ 1
	5-20	24	0	12	16QAM	1/3	4776	24	1	13824	3456	≥ 1
	10-20	25	0	12	16QAM	1/3	4968	24	1	14400	3600	≥ 1
	10-20	27	0	12	16QAM	1/3	4776	24	1	15552	3888	≥ 1
	10-20	30	0	12	16QAM	3/4	12960	24	3	17280	4320	≥ 2
	10-20	32	0	12	16QAM	3/4	13536	24	3	18432	4608	≥ 2
	10-20	36	0	12	16QAM	3/4	15264	24	3	20736	5184	≥ 2
	10-20	40	0	12	16QAM	3/4	16992	24	3	23040	5760	≥ 2
	10-20	45	0	12	16QAM	3/4	19080	24	4	25920	6480	≥ 2
	10-20	48	0	12	16QAM	3/4	20616	24	4	27648	6912	≥ 2
	15-20	50	0	12	16QAM	3/4	21384	24	4	28800	7200	≥ 2
	15-20	54	0	12	16QAM	3/4	22920	24	4	31104	7776	≥ 2
	15-20	60	0	12	16QA	2/3	23688	24	4	34560	8640	≥ 2

					M							
	15-20	64	0	12	16QAM	2/3	25456	24	4	36864	9216	≥ 2
	15-20	72	0	12	16QAM	1/2	20616	24	4	41472	10368	≥ 2
	20	75	0	12	16QAM	1/2	21384	24	4	43200	10800	≥ 2
	20	80	0	12	16QAM	1/2	22920	24	4	46080	11520	≥ 2
	20	81	0	12	16QAM	1/2	22920	24	4	46656	11664	≥ 2
	20	90	0	12	16QAM	2/5	20616	24	4	51840	12960	≥ 2
	20	96	0	12	16QAM	2/5	22152	24	4	55296	13824	≥ 2
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: As per Table 4.2-2 in TS 36.211 [8]												

Table A.2.3.2.2-1a: Reference Channels for 16QAM with partial RB allocation UE category 0

Parameter	Ch BW	Allocated RBs	UDL Configuration (Note 2)	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size for Sub-Frame 2, 3, 7, 8	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame for Sub-Frame 2, 3, 7, 8	Total symbols per Sub-Frame for Sub-Frame 2, 3, 7, 8	UE Category
Unit	MHz						Bits	Bits		Bits		
	1.4 - 20	1	1	12	16QAM	3/4	408	24	1	576	144	0
	1.4 - 20	2		12	16QAM	3/4	840	24	1	1152	288	0
	1.4 - 20	4		12	16QAM	2/5	904	24	1	2304	576	0
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: As per Table 4.2-2 in TS 36.211 [8]												

Table A.2.3.2.2-1b: Reference Channels for 16QAM with partial RB allocation UE category M1

Parameter	Ch BW	Allocated RBs	UDL Configuration (Note 2)	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size for Sub-Frame 2, 3, 7, 8	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame for Sub-Frame 2, 3, 7, 8	Total symbols per Sub-Frame for Sub-Frame 2, 3, 7, 8	UE Category
Unit	MHz						Bits	Bits		Bits		
	1.4 - 20	1	1	12	16QAM	1/2	256	24	1	576	144	M1
	1.4 - 20	2	1	12	16QAM	1/2	552	24	1	1152	288	M1
	1.4 - 20	3	1	12	16QAM	1/2	840	24	1	1728	432	M1
	1.4 - 20	4	1	12	16QAM	2/5	904	24	1	2304	576	M1
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 2: As per Table 4.2-2 in TS 36.211 [4]												

A.2.3.2.3 64-QAM

Table A.2.3.2.3-1: Reference Channels for 64-QAM with partial RB allocation

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Trans-port block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category (Note 3)	UE UL Category (Note 3)
Unit	MHz					Bits	Bits		Bits			
	1.4 - 20	1	12	64QAM	3/4	616	24	1	864	144	5,8	5, 8, 13, 14
	1.4 - 20	2	12	64QAM	3/4	1256	24	1	1728	288	5,8	5, 8, 13, 14
	1.4 - 20	3	12	64QAM	3/4	1864	24	1	2592	432	5,8	5, 8, 13, 14
	1.4 - 20	4	12	64QAM	3/4	2536	24	1	3456	576	5,8	5, 8, 13, 14
	1.4 - 20	5	12	64QAM	3/4	3112	24	1	4320	720	5,8	5, 8, 13, 14
	3-20	6	12	64QAM	3/4	3752	24	1	5184	864	5,8	5, 8, 13, 14
	3-20	8	12	64QAM	3/4	5160	24	1	6912	1152	5,8	5, 8, 13, 14
	3-20	9	12	64QAM	3/4	5736	24	1	7776	1296	5,8	5, 8, 13, 14
	3-20	10	12	64QAM	3/4	6200	24	2	8640	1440	5,8	5, 8, 13, 14
	3-20	12	12	64QAM	3/4	7480	24	2	10368	1728	5,8	5, 8, 13, 14
	5-20	15	12	64QAM	3/4	9528	24	2	12960	2160	5,8	5, 8, 13, 14
	5-20	16	12	64QAM	3/4	10296	24	2	13824	2304	5,8	5, 8, 13, 14
	5-20	18	12	64QAM	3/4	11448	24	2	15552	2592	5,8	5, 8, 13, 14
	5-20	20	12	64QAM	3/4	12576	24	3	17280	2880	5,8	5, 8, 13, 14
	5-20	24	12	64QAM	3/4	15264	24	3	20736	3456	5,8	5, 8, 13, 14
	10-20	25	12	64QAM	3/4	15840	24	3	21600	3600	5,8	5, 8, 13, 14
	10-20	27	12	64QAM	3/4	16992	24	3	23328	3888	5,8	5, 8, 13, 14
	10-20	30	12	64QAM	3/4	19080	24	4	25920	4320	5,8	5, 8, 13, 14
	10-20	32	12	64QAM	3/4	20616	24	4	27648	4608	5,8	5, 8, 13, 14
	10-20	36	12	64QAM	3/4	22920	24	4	31104	5184	5,8	5, 8, 13, 14
	10-20	40	12	64QAM	3/4	25456	24	5	34560	5760	5,8	5, 8, 13, 14
	10-20	45	12	64QAM	3/4	28336	24	5	38880	6480	5,8	5, 8, 13, 14
	10-20	48	12	64QAM	3/4	30576	24	5	41472	6912	5,8	5, 8, 13, 14
	15 - 20	50	12	64QAM	3/4	31704	24	6	43200	7200	5,8	5, 8, 13, 14
	15 - 20	54	12	64QAM	3/4	34008	24	6	46656	7776	5,8	5, 8, 13, 14
	15 - 20	60	12	64QAM	3/4	37888	24	7	51840	8640	5,8	5, 8, 13, 14
	15 - 20	64	12	64QAM	3/4	40576	24	7	55296	9216	5,8	5, 8, 13, 14
	15 - 20	72	12	64QAM	3/4	45352	24	8	62208	10368	5,8	5, 8, 13, 14
	20	75	12	64QAM	3/4	46888	24	8	64800	10800	5,8	5, 8, 13, 14
	20	80	12	64QAM	3/4	51024	24	9	69120	11520	5,8	5, 8, 13, 14
	20	81	12	64QAM	3/4	51024	24	9	69984	11664	5,8	5, 8, 13, 14
	20	90	12	64QAM	2/3	51024	24	9	77760	12960	5,8	5, 8, 13,

												14
	20	96	12	64QAM	3/4	61664	24	11	82944	13824	5,8	5, 8, 13, 14

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 2: As per Table 4.2-2 in TS 36.211 [4].
Note 3: If UE does not report UE UL category, then the applicability of reference channel is determined by UE category. If UE reports UE UL category, then the applicability of reference channel is determined by UE UL category.

A.2.3.3 Reference measurement channels for sustained downlink data rate provided by lower layers

Table A.2.3.3-1: Uplink Reference Channels for sustained data-rate test (TDD)

Parameter	Unit	Value					
Reference Channel		R.1-1 TDD	R.1-2 TDD	R.1-3 TDD	R.1-3B TDD	R.1-4 TDD	R.1-5 TDD
Channel Bandwidth	MHz	10	10	20	15	20	10
Uplink-Downlink Configuration (Note 2)		5	5	5	1	1	1
Allocated Resource Blocks		40 (Note 3)	40 (Note 3)	90 (Note 5)	60 (Note 4)	90 (Note 5)	40 (Note 3)
Allocated Sub-Frames per Radio-Frame		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Coding Rate							
For Sub-Frame 2		0.43	0.61	0.49	0.42	0.49	0.61
For Sub-Frame 3,7,8		n/a	n/a	n/a	0.42	0.49	0.61
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 2		4968	6968	12576	7224	12576	6968
For Sub-Frame 3,7,8		0	0	0	7224	12576	6968
Number of Code Blocks per Sub-Frame (Note 1)							
For Sub-Frame 2		1	2	3	2	3	2
For Sub-Frame 3,7,8		0	0	0	2	3	2
Modulation Symbols per Sub-Frame							
For Sub-Frame 2		5760	5760	12960	8640	10240	5760
For Sub-Frame 3,7,8		0	0	0	8640	10240	5760
Binary Channel Bits per Sub-Frame							
For Sub-Frame 2		11520	11520	25920	17280	25920	11520
For Sub-Frame 3,7,8		n/a	n/a	n/a	17280	25920	11520
Max Throughput over 1 Radio-Frame	Mbps	0.4968	0.6968	1.2576	2.8896	5.0304	2.7872
UE Category		≥ 1	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2

Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 2: As per Table 4.2-2 in TS 36.211 [8]
Note 3: RB-s 5-44 allocated with PUSCH.
Note 4: RB-s 7-66 allocated with PUSCH.
Note 5: RB-s 5-94 allocated with PUSCH.

A.2.4 Reference measurement channels for category NB1

Table A.2.4-1 Reference Channels for category NB1

Parameter	Value						
Sub-carrier spacing (kHz)	3.75	3.75	15	15	15	15	15
Number of tone	1	1	1	1	3	6	12
Modulation	π/2 BPSK	π/4 QPSK	π/2 BPSK	π/4 QPSK	QPSK	QPSK	QPSK
Number of NPUSCH repetition	1	1	1	1	1	1	1
IMCS / ITBS	0 / 0	3 / 3	0 / 0	3 / 3	5 / 5	5 / 5	5 / 5
Payload size (bits)	32	40	32	40	72	72	72
Allocated resource unit	2	1	2	1	1	1	1
Code rate (target)	1/3	1/3	1/3	1/3	1/3	1/3	1/3
Code rate (effective)	0.29	0.33	0.29	0.33	0.33	0.33	0.33
Transport block CRC (bits)	24	24	24	24	24	24	24
Code block CRC size (bits)	0	0	0	0	0	0	0
Number of code blocks - C	1	1	1	1	1	1	1
Total number of bits per resource unit	96	192	96	192	288	288	288
Total symbols per resource unit	96	96	96	96	144	144	144
Tx time (ms)	64	32	16	8	4	2	1
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: Parameters related to NPUSCH format 1 scheduling are defined in Table A.2.4-2. NOTE 3: NPDCCH is not transmitted in the subframes used for transmission of SI messages. NOTE 4: SI messages transmission should be prioritized over NPDCCH transmission in case of collision. NPDCCH transmission is postponed until the next NB-IoT downlink subframe in case NPDCCH transmission occurs in a non NB-IoT downlink subframe, where an NB-IoT downlink subframe is a subframe that does not contain NPSS/NSSS/NPBCH/SIB1-NB transmission.							

Following NOTEs are included in TS 36.521-1 as an addition to TS 36.101, to define examples of UL scheduling patterns based on Table A.2.4-1 and Table A.2.4-2. Overall period of UL scheduling pattern corresponds with Si-periodicity and it consists of two different patterns with dependencies on SI transmission.

- One pattern applies for period containing SI messages transmission. This pattern has a period with same duration as SI windows length (time period where SI messages are transmitted).
- Another pattern for period where there is no transmission of SI messages. This pattern is repeated during SI periodicity.

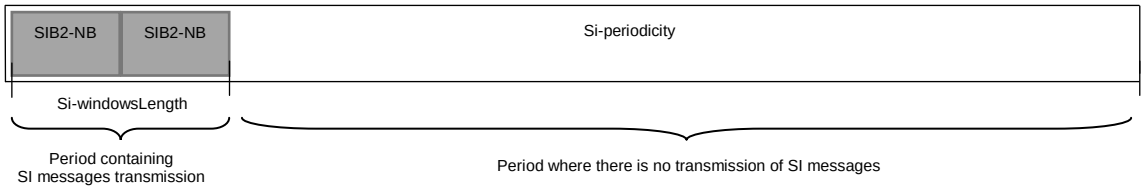


Figure A.2.4-1: NPDCCH scheduling based on SI transmission

NOTE 1: For 3.75kHz, 1 tone, and π/2 BPSK modulation. NPDCCH transmission is scheduled at the 18th subframe (starting from the 0th subframe) every 80ms and its corresponding NPUSCH format 1 is scheduled 9 subframes after NPDCCH transmission. NPUSCH format 1 transmission has a duration of 64 consecutive ms. This pattern applies for both periods containing and not containing SI messages transmission.

NOTE 2: For 3.75kHz, 1 tone, and π/4 QPSK modulation. NPDCCH transmissions are scheduled at the 18th, 66th and 114th subframe (starting from the 0th subframe) every 160ms for periods containing SI messages transmission and at the 2nd, 51th, 98th, 146th and 194th subframe (starting from the 0th subframe) every 240ms for periods where there is no transmission of SI messages. The corresponding NPUSCH format 1 are scheduled 9 subframes after each NPDCCH transmission. NPUSCH format 1 transmission has a duration of 32 consecutive ms.

NOTE 3: For 15kHz, 1 tone, and π/2 BPSK modulation. NPDCCH transmissions are scheduled at the 18th, 51th, 98th and 131th subframe (starting from the 0th subframe) every 160ms for periods containing SI messages transmission and at the 2nd, 34th, 66th, 98th and 131th subframe (starting from the 0th subframe) every 160ms for periods where there is no transmission of SI messages. The corresponding NPUSCH format 1 are scheduled 9 subframes after each NPDCCH transmission. NPUSCH format 1 transmission has a duration of 16 consecutive ms.

NOTE 4: For 15kHz, 1 tone, and π/4 QPSK modulation. NPDCCH transmissions are scheduled at the 18th, 42th, 66th, 98th, 122th and 146th subframe (starting from the 0th subframe) every 160ms for periods containing SI messages transmission and at the 11th, 34th, 58th, 82th and 106th subframe (starting from the 0th subframe) every 120ms for periods where there is no transmission of SI messages. The corresponding NPUSCH format 1 are scheduled 9 subframes after each NPDCCH transmission. NPUSCH format 1 transmission has a duration of 8 consecutive ms.

NOTE 5: For 15kHz, 3 tones, and QPSK modulation. NPDCCH transmissions are scheduled at the 18th, 34th, 51th, 74th, 98th, 114th, 131th and 154th subframe (starting from the 0th subframe) every 160ms for periods containing SI messages transmission and at the 11th and 34th subframe (starting from the 0th subframe) every 40ms for periods where there is no transmission of SI messages. The corresponding NPUSCH format 1 are scheduled 9 subframes after each NPDCCH transmission. NPUSCH format 1 transmission has a duration of 4 consecutive ms.

NOTE 6: For 15kHz, 6 tones, and QPSK modulation. NPDCCH transmissions are scheduled at the 18th, 34th, 51th, 66th, 98th, 114th, 131th and 146th subframe (starting from the 0th subframe) every 160ms for periods containing SI messages transmission and at the 2nd, 18th, 34th, 51th and 66th subframe (starting from the 0th subframe) every 80ms for periods where there is no transmission of SI messages. The corresponding NPUSCH format 1 are scheduled 9 subframes after each NPDCCH transmission. NPUSCH format 1 transmission has a duration of 2 consecutive ms.

NOTE 7: For 15kHz, 12 tones, and QPSK modulation. NPDCCH transmissions are scheduled at the 18th, 34th, 51th, 66th, 98th, 114th, 131th and 146th subframe (starting from the 0th subframe) every 160ms for periods containing SI messages transmission and at the 2nd, 18th, 34th, 51th and 66th subframe (starting from the 0th subframe) every 80ms for periods where there is no transmission of SI messages. The corresponding NPUSCH format 1 are scheduled 9 subframes after each NPDCCH transmission. NPUSCH format 1 transmission has a duration of 1 ms.

Table A.2.4-2: NPDCCH configuration for NPUSCH format 1 scheduling

Parameter	Unit	Value
DCI format		DCI format N0
NPDCCH format		1
Scheduling delay (I_{Delay})		0
DCI subframe repetition number		00
$R_{\max}$ (*npdcch-NumRepetitions*)		1
G (*NPDCCH-startSF-USS*)		8
α_{offset} (*npdcch-Offset-USS*)		1/4

A.3 DL reference measurement channels

A.3.1 General

The number of available channel bits varies across the sub-frames due to PBCH and PSS/SSS overhead. The payload size per sub-frame is varied in order to keep the code rate constant throughout a frame.

No user data is scheduled on subframes #5 in order to facilitate the transmission of system information blocks (SIB).

The algorithm for determining the payload size A is as follows; given a desired coding rate R and radio block allocation N_{RB}

1. Calculate the number of channel bits N_{ch} that can be transmitted during the first transmission of a given sub-frame.
2. Find A such that the resulting coding rate is as close to R as possible, that is,

$$\min\left|R-(A+24*(N_{CB}+1))/N_{ch}\right|, \text{ where } N_{CB}=\begin{cases}0, \text{if } C=1\\ C, \text{if } C>1\end{cases},$$

subject to

a) A is a valid TB size (according to TS 36.213 [10] clause 7.1.7) assuming an allocation of N_{RB} resource blocks

b) C is the number of Code Blocks calculated according to section 5.1.2 of TS 36.212 [9].

3. If there is more than one A that minimizes the equation above, then the larger value is chosen per default and the chosen code rate should not exceed 0.93.
4. For TDD, the measurement channel is based on DL/UL configuration ratio of 2DL+DwPTS (12 OFDM symbol): 2UL.

A.3.1.1 Overview of DL reference measurement channels

In Table A.3.1.1-1 are listed the DL reference measurement channels specified in annexes A.3.2 to A.3.10 of this release of TS 36.521-1. This table is informative and serves only to a better overview. The reference for the concrete reference measurement channels and corresponding implementation's parameters as to be used for testing are annexes A.3.2 to A.3.10 as appropriate.

Table A.3.1.1-1: Overview of DL reference measurement channels

Duplex	Table	Name	BW	Mod	TCR	RB	RB Offset	UE Categ	Notes
FDD, Receiver requirements									
FDD	Table A.3.2-1		1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.3.2-1		3	QPSK	1/3	15		≥ 1	
FDD	Table A.3.2-1		5	QPSK	1/3	25		≥ 1	
FDD	Table A.3.2-1		10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.2-1		15	QPSK	1/3	75		≥ 1	
FDD	Table A.3.2-1		20	QPSK	1/3	100		≥ 1	
FDD / HD-FDD	Table A.3.2-1a		1.4	QPSK	1/3	6		0	
FDD / HD-FDD	Table A.3.2-1a		3	QPSK	1/3	14		0	
FDD / HD-FDD	Table A.3.2-1a		5	QPSK	1/3	14		0	
FDD / HD-FDD	Table A.3.2-1a		10	QPSK	1/3	14		0	
FDD / HD-FDD	Table A.3.2-1a		15	QPSK	1/3	14		0	
FDD / HD-FDD	Table A.3.2-1a		20	QPSK	1/3	14		0	
FDD / HD-FDD	Table A.3.2-1b		1.4	QPSK	1/3	4		M1	
FDD / HD-FDD	Table A.3.2-1b		3	QPSK	1/3	4		M1	
FDD / HD-FDD	Table A.3.2-1b		5	QPSK	1/3	4		M1	
FDD / HD-FDD	Table A.3.2-1b		10	QPSK	1/3	4		M1	
FDD / HD-FDD	Table A.3.2-1b		15	QPSK	1/3	4		M1	
FDD / HD-FDD	Table A.3.2-1b		20	QPSK	1/3	4		M1	
HD-FDD	Table A.3.2-1c		0.2	QPSK	1/3			NB1	
HD-FDD	Table A.3.2-1d		0.2	QPSK	1/3			NB1	
TDD, Receiver requirements									
TDD	Table A.3.2-2		1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.3.2-2		3	QPSK	1/3	15		≥ 1	
TDD	Table A.3.2-2		5	QPSK	1/3	25		≥ 1	
TDD	Table A.3.2-2		10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.2-2		15	QPSK	1/3	75		≥ 1	
TDD	Table A.3.2-2		20	QPSK	1/3	100		≥ 1	
TDD	Table A.3.2-2a		1.4	QPSK	1/3	6		0	
TDD	Table A.3.2-2a		3	QPSK	1/3	14		0	
TDD	Table A.3.2-2a		5	QPSK	1/3	14		0	
TDD	Table A.3.2-2a		10	QPSK	1/3	14		0	
TDD	Table A.3.2-2a		15	QPSK	1/3	14		0	

TDD	Table A.3.2-2a		20	QPSK	1/3	14		0	
TDD	Table A.3.2-2b		1.4	QPSK	1/3	4		M1	
TDD	Table A.3.2-2b		3	QPSK	1/3	4		M1	
TDD	Table A.3.2-2b		5	QPSK	1/3	4		M1	
TDD	Table A.3.2-2b		10	QPSK	1/3	4		M1	
TDD	Table A.3.2-2b		15	QPSK	1/3	4		M1	
TDD	Table A.3.2-2b		20	QPSK	1/3	4		M1	
TDD	Table A.3.2-2c		20	QPSK	1/3	100		≥ 1	
FDD, Receiver requirements, Maximum input level for UE Categories 3-5									
FDD	Table A.3.2-3		1.4	64QAM	3/4	6		-	
FDD	Table A.3.2-3		3	64QAM	3/4	15		-	
FDD	Table A.3.2-3		5	64QAM	3/4	25		-	
FDD	Table A.3.2-3		10	64QAM	3/4	50		-	
FDD	Table A.3.2-3		15	64QAM	3/4	75		-	
FDD	Table A.3.2-3		20	64QAM	3/4	100		-	
FDD, Receiver requirements, Maximum input level for UE Categories 1									
FDD	Table A.3.2-3a		1.4	64QAM	3/4	6		-	
FDD	Table A.3.2-3a		3	64QAM	3/4	15		-	
FDD	Table A.3.2-3a		5	64QAM	3/4	18		-	
FDD	Table A.3.2-3a		10	64QAM	3/4	17		-	
FDD	Table A.3.2-3a		15	64QAM	3/4	17		-	
FDD	Table A.3.2-3a		20	64QAM	3/4	17		-	
FDD, Receiver requirements, Maximum input level for UE Categories 2									
FDD	Table A.3.2-3b		1.4	64QAM	3/4	6		-	
FDD	Table A.3.2-3b		3	64QAM	3/4	15		-	
FDD	Table A.3.2-3b		5	64QAM	3/4	25		-	
FDD	Table A.3.2-3b		10	64QAM	3/4	50		-	
FDD	Table A.3.2-3b		15	64QAM	3/4	75		-	
FDD	Table A.3.2-3b		20	64QAM	3/4	83		-	
FDD, Receiver requirements, Maximum input level for UE Categories 0									
FDD	Table A.3.2-3c		1.4	64QAM	3/4	2		-	
FDD	Table A.3.2-3c		3	64QAM	3/4	2		-	
FDD	Table A.3.2-3c		5	64QAM	3/4	2		-	
FDD	Table A.3.2-3c		10	64QAM	3/4	2		-	
FDD	Table A.3.2-3c		15	64QAM	3/4	2		-	
FDD	Table A.3.2-3c		20	64QAM	3/4	2		-	
TDD, Receiver requirements, Maximum input level for UE Categories 3-5									
TDD	Table A.3.2-4		1.4	64QAM	3/4	6		-	
TDD	Table A.3.2-4		3	64QAM	3/4	15		-	
TDD	Table A.3.2-4		5	64QAM	3/4	25		-	
TDD	Table A.3.2-4		10	64QAM	3/4	50		-	
TDD	Table A.3.2-4		15	64QAM	3/4	75		-	
TDD	Table A.3.2-4		20	64QAM	3/4	100		-	
TDD	Table A.3.2-4d		20	64QAM	3/4	100		≥ 3	
TDD, Receiver requirements, Maximum input level for UE Categories 1									
TDD	Table A.3.2-4a		1.4	64QAM	3/4	6		-	
TDD	Table A.3.2-4a		3	64QAM	3/4	15		-	
TDD	Table A.3.2-4a		5	64QAM	3/4	18		-	

TDD	Table A.3.2-4a		10	64QAM	3/4	17		-	
TDD	Table A.3.2-4a		15	64QAM	3/4	17		-	
TDD	Table A.3.2-4a		20	64QAM	3/4	17		-	
TDD, Receiver requirements, Maximum input level for UE Categories 2									
TDD	Table A.3.2-4b		1.4	64QAM	3/4	6		-	
TDD	Table A.3.2-4b		3	64QAM	3/4	15		-	
TDD	Table A.3.2-4b		5	64QAM	3/4	25		-	
TDD	Table A.3.2-4b		10	64QAM	3/4	50		-	
TDD	Table A.3.2-4b		15	64QAM	3/4	75		-	
TDD	Table A.3.2-4b		20	64QAM	3/4	83		-	
TDD, Receiver requirements, Maximum input level for UE DL Categories 0									
TDD	Table A.3.2-4c		1.4	64QAM	3/4	2		-	
TDD	Table A.3.2-4c		3	64QAM	3/4	2		-	
TDD	Table A.3.2-4c		5	64QAM	3/4	2		-	
TDD	Table A.3.2-4c		10	64QAM	3/4	2		-	
TDD	Table A.3.2-4c		15	64QAM	3/4	2		-	
TDD	Table A.3.2-4c		20	64QAM	3/4	2		-	
FDD, Receiver requirements, Maximum input level for UE Categories 11/12/13/14/15									
FDD	Table A.3.2-5		1.4	256QAM	4/5	6		-	
FDD	Table A.3.2-5		3	256QAM	4/5	15		-	
FDD	Table A.3.2-5		5	256QAM	4/5	25		-	
FDD	Table A.3.2-5		10	256QAM	4/5	50		-	
FDD	Table A.3.2-5		15	256QAM	4/5	75		-	
FDD	Table A.3.2-5		20	256QAM	4/5	100		-	
TDD, Receiver requirements, Maximum input level for UE Categories 11/12/13/14/15									
TDD	Table A.3.2-6		1.4	256QAM	4/5	6		-	
TDD	Table A.3.2-6		3	256QAM	4/5	15		-	
TDD	Table A.3.2-6		5	256QAM	4/5	25		-	
TDD	Table A.3.2-6		10	256QAM	4/5	50		-	
TDD	Table A.3.2-6		15	256QAM	4/5	75		-	
TDD	Table A.3.2-6		20	256QAM	4/5	100		-	
TDD	Table A.3.2-7		20	256QAM	4/5	100		≥ 11	
FDD, Transmitter requirements									
FDD	Table A.3.2A-1		1.4	QPSK	1/8-1/3	3		≥ 1	
FDD	Table A.3.2A-1		3	QPSK	1/3	4		≥ 1	
FDD	Table A.3.2A-1		5	QPSK	1/3	8		≥ 1	
FDD	Table A.3.2A-1		10	QPSK	1/3	16		≥ 1	
FDD	Table A.3.2A-1		15	QPSK	1/3	25		≥ 1	
FDD	Table A.3.2A-1		20	QPSK	1/3	30		≥ 1	
FDD	Table A.3.2A-1a		1.4	QPSK	1/3	4		M1	
FDD	Table A.3.2A-1a		3	QPSK	1/3	4		M1	
FDD	Table A.3.2A-1a		5	QPSK	1/3	4		M1	
FDD	Table A.3.2A-1a		10	QPSK	1/3	4		M1	
FDD	Table A.3.2A-1a		15	QPSK	1/3	4		M1	
FDD	Table A.3.2A-1a		20	QPSK	1/3	4		M1	
TDD, Transmitter requirements									
TDD	Table A.3.2A-2		1.4	QPSK	1/8-1/3	3		≥ 1	
TDD	Table A.3.2A-2		3	QPSK	1/3	4		≥ 1	

TDD	Table A.3.2A-2		5	QPSK	1/3	8		≥ 1	
TDD	Table A.3.2A-2		10	QPSK	1/3	16		≥ 1	
TDD	Table A.3.2A-2		15	QPSK	1/3	25		≥ 1	
TDD	Table A.3.2A-2		20	QPSK	1/3	30		≥ 1	
TDD	Table A.3.2A-3a		1.4	QPSK	1/8-1/3	4		M1	
TDD	Table A.3.2A-3a		3	QPSK	1/3	4		M1	
TDD	Table A.3.2A-3a		5	QPSK	1/3	4		M1	
TDD	Table A.3.2A-3a		10	QPSK	1/3	4		M1	
TDD	Table A.3.2A-3a		15	QPSK	1/3	4		M1	
TDD	Table A.3.2A-3a		20	QPSK	1/3	4		M1	
FDD, PDSCH Performance, Single-antenna transmission (CRS)									
FDD	Table A.3.3.1-1	R.4 FDD	1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.3.3.1-1	R.42 FDD	20	QPSK	1/3	100		≥ 1	
FDD	Table A.3.3.1-1	R.42-1 FDD	3	QPSK	1/3	15		≥ 1	
FDD	Table A.3.3.1-1	R.42-2 FDD	5	QPSK	1/3	25		≥ 1	
FDD	Table A.3.3.1-1	R.42-3 FDD	15	QPSK	1/3	75		≥ 1	
FDD	Table A.3.3.1-1	R.2 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.1-2	R.3-1 FDD	5	16QAM	1/2	25		≥ 1	
FDD	Table A.3.3.1-2	R.3 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.1-3	R.5 FDD	3	64QAM	3/4	15		≥ 1	
FDD	Table A.3.3.1-3	R.6 FDD	5	64QAM	3/4	25		≥ 2	
FDD	Table A.3.3.1-3	R.7 FDD	10	64QAM	3/4	50		≥ 2	
FDD	Table A.3.3.1-3	R.8 FDD	15	64QAM	3/4	75		≥ 2	
FDD	Table A.3.3.1-3	R.9 FDD	20	64QAM	3/4	100		≥ 3	
FDD	Table A.3.3.1-3a	R.6-1 FDD	5	64QAM	3/4	18		≥ 1	
FDD	Table A.3.3.1-3a	R.7-1 FDD	10	64QAM	3/4	17		≥ 1	
FDD	Table A.3.3.1-3a	R.8-1 FDD	15	64QAM	3/4	17		≥ 1	
FDD	Table A.3.3.1-3a	R.9-1 FDD	20	64QAM	3/4	17		≥ 1	
FDD	Table A.3.3.1-3a	R.9-2 FDD	20	64QAM	3/4	83		≥ 2	
FDD	Table A.3.3.1-6	R.41 FDD	10	QPSK	1/10	50		≥ 1	
FDD, PDSCH Performance, Single-antenna transmission (CRS), Single PRB (Channel edge)									
FDD	Table A.3.3.1-4	R.0 FDD	3	16QAM	1/2	1		≥ 1	
FDD	Table A.3.3.1-4	R.1 FDD	10 / 20	16QAM	1/2	1		≥ 1	
FDD, PDSCH Performance, Single-antenna transmission (CRS), Single PRB (MBSFN Configuration)									
FDD	Table A.3.3.1-5	R.29 FDD	10	16QAM	1/2	1		≥ 1	
FDD, Pcell PDSCH Performance, CA with power imbalance									
FDD	Table A.3.3.1-7	R.49 FDD	20	64QAM	0.84-0.87	100		≥ 5	
FDD	Table A.3.3.1-7	R.49-1 FDD	10	64QAM	0.84 - 0.87	50		≥2	
FDD	Table A.3.3.1-7	R.49-2 FDD	5	64QAM	0.84 - 0.86	25		≥2	
FDD, PDSCH Performance, Multi-antenna transmission (CRS), Two antenna ports									
FDD	Table A.3.3.2.1-1	R.10 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.2.1-1	R.10-2 FDD	5	QPSK	1/3	25		≥ 1	
FDD	Table A.3.3.2.1-1	R.11 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.2.1-1	R.11-1 FDD	10	16QAM	1/2	50		≥ 2	

FDD	Table A.3.3.2.1-1	R.11-2 FDD	5	16QAM	1/2	25		≥ 1	
FDD	Table A.3.3.2.1-1	R.11-3 FDD	10	16QAM	1/2	40		≥ 1	
FDD	Table A.3.3.2.1-1	R.11-4 FDD	10	QPSK	1/2	50		≥ 1	
FDD	Table A.3.3.2.1-1	R.30 FDD	20	16QAM	1/2	100		≥ 2	
FDD	Table A.3.3.2.1-1	R.30-1 FDD	15	16QAM	1/2	75		≥ 2	
FDD	Table A.3.3.2.1-1	R.35 FDD	10	64QAM	1/2	50		≥ 2	
FDD	Table A.3.3.2.1-1	R.35-1 FDD	20	64QAM	0.39	100		≥ 2	
FDD	Table A.3.3.2.1-1	R.35-2 FDD	15	64QAM	0.39	75		≥ 2	
FDD	Table A.3.3.2.1-1	R.35-3 FDD	10	64QAM	0.39	50		≥ 2	
FDD	Table A.3.3.2.1-2	R.35-4 FDD	10	64QAM	0.47	50		≥ 2	
FDD	Table A.3.3.2.1-2	R.46 FDD	10	QPSK		50		≥ 1	
FDD	Table A.3.3.2.1-2	R.47 FDD	10	16QAM		50		≥ 1	
FDD	Table A.3.3.2.1-2	R.11-5 FDD	1.4	16QAM	1/2	6		≥ 1	
FDD	Table A.3.3.2.1-2	R.11-6 FDD	3	16QAM	1/2	15		≥ 1	
FDD	Table A.3.3.2.1-2	R.11-7 FDD	15	16QAM	1/2	75		≥ 2	
FDD	Table A.3.3.2.1-2	R.11-8 FDD	10	QPSK	3/5	50		≥ 2	
FDD	Table A.3.3.2.1-2	R.11-9 FDD	10	QPSK	0.58	50		≥ 1	
FDD	Table A.3.3.2.1-2	R.11-10 FDD	10	QPSK	0.67	50		≥ 1	
FDD	Table A.3.3.2.1-2	R.65 FDD	10	256QAM	0.55	50		11-12	
FDD	Table A.3.3.2.1-2	R.10-2 FDD	5	QPSK	1/3	25		≥ 1	
FDD	Table A.3.3.2.1-3	R.62 FDD	10	16QAM	1/2	3		0	
FDD	Table A.3.3.2.1-3	R.63 FDD	10	64QAM	1/2	1		0	
FDD	Table A.3.3.2.1-4	R.79 FDD	10	16QAM	1/2	3		M1, ≥ 0	
FDD	Table A.3.3.2.1-5	R.81 FDD	10	QPSK	1/10	6		M1, ≥ 0	
FDD	Table A.3.3.2.1-6	R.87 FDD	10	64QAM	0.39	50		≥ 1	
FDD, PDSCH Performance, Multi-antenna transmission (CRS), Four antenna ports									
FDD	Table A.3.3.2.2-1	R.12 FDD	1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.3.3.2.2-1	R.13 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.2.2-1	R.14 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.2.2-1	R.14-1 FDD	10	16QAM	1/2	6		≥ 1	
FDD	Table A.3.3.2.2-1	R.14-2 FDD	10	16QAM	1/2	3		≥ 1	
FDD	Table A.3.3.2.2-1	R.14-3 FDD	20	16QAM	1/2	100		≥ 1	
FDD	Table A.3.3.2.2-1	R.36 FDD	10	64QAM	1/2	50		≥ 2	
FDD	Table A.3.3.2.2-1	R.14-4 FDD	1.4	16QAM	1/2	6		≥ 1	
FDD	Table A.3.3.2.2-1	R.14-5 FDD	3	16QAM	1/2	15		≥ 1	
FDD	Table A.3.3.2.2-1	R.14-6 FDD	5	16QAM	1/2	25		≥ 1	
FDD	Table A.3.3.2.2-1	R.14-7 FDD	15	16QAM	1/2	75		≥ 2	
FDD	Table A.3.3.2.2-1	R.72 FDD	10	256QAM	0.62	50		≥ 11	
FDD	Table A.3.3.2.2-1	R.73 FDD	10	64QAM	0.43	50		≥ 5	
FDD	Table A.3.3.2.2-1	R.74 FDD	10	64QAM	1/2	50		≥ 5	
FDD, PDSCH Performance (UE specific RS) without CSI-RS									
FDD	Table A.3.3.3.0-1	R.70 FDD	10	QPSK	0.65	50		≥ 1	
FDD	Table A.3.3.3.0-1	R.71 FDD	10	16QAM	0.6	50		≥ 2	
FDD	Table A.3.3.3.0-2	R.80 FDD	10	QPSK	1/3	6		M1, ≥ 0	
FDD, PDSCH Performance (UE specific RS) Two antenna ports (CSI-RS)									
FDD	Table A.3.3.3.1-1	R.51 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.1-1	R.51-1 FDD	10	16QAM	0.54	50		≥ 2	

FDD	Table A.3.3.3.1-1	R.76 FDD	10	QPSK		50		≥ 2	
FDD, PDSCH Performance (UE specific RS) Two antenna ports (CSI-RS, non Quasi Co-located)									
FDD	Table A.3.3.3.1-2	R.52 FDD	10	64QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.1-2	R.53 FDD	10	64QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.1-2	R.54 FDD	10	16QAM	1/2	50		≥ 2	
FDD, PDSCH Performance (UE specific RS) Four antenna ports (CSI-RS)									
FDD	Table A.3.3.3.2-1	R.43 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.3.2-1	R.43-1 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.3.2-1	R.43-2 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.3.2-1	R.50 FDD	10	64QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.2-1	R.48 FDD	10	QPSK		50		≥ 1	
FDD	Table A.3.3.3.2-1	R.66 FDD	10	256QAM	0.77	50		11-12	
FDD	Table A.3.3.3.2-2	R.44 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.3.2-2	R.45 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.2-2	R.45-1 FDD	10	16QAM	1/2	39		≥ 1	
FDD	Table A.3.3.3.2-1	R.48 FDD	10	QPSK		50		≥ 1	
FDD	Table A.3.3.3.2-2	R.60 FDD	10	QPSK	1/2	50		≥ 1	
FDD	Table A.3.3.3.2-3	R.64 FDD	10	QPSK	1/3	6		0	
FDD	Table A.3.3.3.2-1	R.66 FDD	10	256QAM	0.77	50		11-15	
FDD	Table A.3.3.3.2-1	R.69 FDD	10	QPSK	0.74-0.8	50		≥ 1	
FDD	Table A.3.3.3.2-1	R.75 FDD	10	16QAM	0.57	50		≥ 5	
TDD, PDSCH Performance, Single-antenna transmission (CRS)									
TDD	Table A.3.4.1-1	R.4 TDD	1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.3.4.1-1	R.42 TDD	20	QPSK	1/3	100		≥ 1	
TDD	Table A.3.4.1-1	R.2 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.1-1	R.2A TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.1-1	R.42-1 TDD	3	QPSK	1/3	15		≥ 1	
TDD	Table A.3.4.1-1	R.42-2 TDD	5	QPSK	1/3	25		≥ 1	
TDD	Table A.3.4.1-1	R.42-3 TDD	15	QPSK	1/3	75		≥ 1	
TDD	Table A.3.4.1-2	R.3-1 TDD	5	16QAM	1/2	25		≥ 1	
TDD	Table A.3.4.1-2	R.3 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.1-3	R.5 TDD	3	64QAM	3/4	15		≥ 1	
TDD	Table A.3.4.1-3	R.6 TDD	5	64QAM	3/4	25		≥ 2	
TDD	Table A.3.4.1-3	R.7 TDD	10	64QAM	3/4	50		≥ 2	
TDD	Table A.3.4.1-3	R.8 TDD	15	64QAM	3/4	75		≥ 2	
TDD	Table A.3.4.1-3	R.9 TDD	20	64QAM	3/4	100		≥ 3	
TDD	Table A.3.4.1-3a	R.6-1 TDD	5	64QAM	3/4	18		≥ 1	
TDD	Table A.3.4.1-3a	R.7-1 TDD	10	64QAM	3/4	17		≥ 1	
TDD	Table A.3.4.1-3a	R.8-1 TDD	15	64QAM	3/4	17		≥ 1	
TDD	Table A.3.4.1-3a	R.9-1 TDD	20	64QAM	3/4	17		≥ 1	
TDD	Table A.3.4.1-3a	R.9-2 TDD	20	64QAM	3/4	83		≥ 2	
TDD	Table A.3.4.1-6	R.41 TDD	10	QPSK	1/10	50		≥ 1	
TDD, PDSCH Performance, Single-antenna transmission (CRS), Single PRB (Channel edge)									
TDD	Table A.3.4.1-4	R.0 TDD	3	16QAM	1/2	1		≥ 1	
TDD	Table A.3.4.1-4	R.1 TDD	10 / 20	16QAM	1/2	1		≥ 1	
TDD, PDSCH Performance, Single-antenna transmission (CRS), Single PRB (MBSFN Configuration)									

TDD	Table A.3.4.1-5	R.29 TDD	10	16QAM	1/2	1		≥ 1	
TDD, PDSCH Performance: Carrier aggregation with power imbalance									
TDD	Table A.3.4.1-7	R.49 TDD	20	64QAM	0.81-087	100		≥ 5	
TDD	Table A.3.4.1-7	R.49-1 TDD	15	64QAM	0.80-0.86	75		≥ 3	
TDD, PDSCH Performance, Multi-antenna transmission (CRS), Two antenna ports									
TDD	Table A.3.4.2.1-1	R.10 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.2.1-1	R.11 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.1-1	R.11-1 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.1-1	R.11-2 TDD	5	16QAM	1/2	25		≥ 1	
TDD	Table A.3.4.2.1-1	R.11-3 TDD	10	16QAM	1/2	40		≥ 1	
TDD	Table A.3.4.2.1-1	R.11-4 TDD	10	QPSK	1/2	50		≥ 1	
TDD	Table A.3.4.2.1-1	R.30 TDD	20	16QAM	1/2	100		≥ 2	
TDD	Table A.3.4.2.1-1	R.30-1 TDD	20	16QAM	1/2	100		≥ 2	
TDD	Table A.3.4.2.1-1	R.30-2 TDD	20	16QAM	1/2	100		≥ 2	
TDD	Table A.3.4.2.1-1	R.35 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.1-1	R.35-1 TDD	20	64QAM	0.39	100		≥ 2	
TDD	Table A.3.4.2.1-2	R.35-2 TDD	10	64QAM	0.47	50		≥ 2	
TDD	Table A.3.4.2.1-2	R.46 TDD	10	QPSK	0.39	50		≥ 1	
TDD	Table A.3.4.2.1-2	R.47 TDD	10	16QAM	1/2	50		≥ 1	
TDD	Table A.3.4.2.1-2	R.11-5 TDD	1.4	16QAM	1/2	6		≥ 1	
TDD	Table A.3.4.2.1-2	R.11-6 TDD	3	16QAM	1/2	15		≥ 1	
TDD	Table A.3.4.2.1-2	R.11-7 TDD	5	16QAM	1/2	25		≥ 1	
TDD	Table A.3.4.2.1-2	R.11-8 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.1-2	R.11-9 TDD	15	16QAM	1/2	75		≥ 2	
TDD	Table A.3.4.2.1-2	R.11-10 TDD	10	QPSK	3/5	50		≥ 2	
TDD	Table A.3.4.2.1-2	R.11-11 TDD	10	QPSK	0.48-0.58	50		≥ 1	
TDD	Table A.3.4.2.1-2	R.11-12 TDD	10	QPSK	0.54-0.66	50		≥ 1	
TDD	Table A.3.4.2.1-3	R.62 TDD	10	16QAM	1/2	3		0	
TDD	Table A.3.4.2.1-3	R.63 TDD	10	64QAM	1/2	1		0	
TDD	Table A.3.4.2.1-4	R.65 TDD	20	256QAM	0.6	100		11-12	
TDD	Table A.3.4.2.1-5	R.67 TDD	10	16QAM	0.4	50		≥ 1	
TDD	Table A.3.4.2.1-6	R.79 TDD	10	16QAM	½	3		M1, ≥ 0	
TDD	Table A.3.4.2.1-7	R.81 TDD	10	QPSK	1/10	6		M1, ≥ 0	
TDD	Table A.3.4.2.1-8	R.87 TDD	10	64QAM	0.39	50		≥ 1	
TDD, PDSCH Performance, Multi-antenna transmission (CRS), Four antenna ports									
TDD	Table A.3.4.2.2-1	R.12 TDD	1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.3.4.2.2-1	R.13 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.2.2-1	R.14 TDD	10	16QAM	½	50		≥ 2	
TDD	Table A.3.4.2.2-1	R.14-1 TDD	10	16QAM	1/2	6		≥ 1	
TDD	Table A.3.4.2.2-1	R.14-2 TDD	10	16QAM	1/2	3		≥ 1	
TDD	Table A.3.4.2.2-1	R.43 TDD	20	16QAM	1/2	100		≥ 2	
TDD	Table A.3.4.2.2-1	R.36 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.2-1	R.43-1 TDD	1.4	16QAM	1/2	6		≥ 1	
TDD	Table A.3.4.2.2-1	R.43-2 TDD	3	16QAM	1/2	15		≥ 1	
TDD	Table A.3.4.2.2-1	R.43-3 TDD	5	16QAM	1/2	25		≥ 1	
TDD	Table A.3.4.2.2-1	R.43-4 TDD	10	16QAM	1/2	50		≥ 2	

TDD	Table A.3.4.2.2-1	R.43-5 TDD	15	16QAM	1/2	75		≥ 2	
TDD	Table A.3.4.2.2-1	R.72 TDD	10	256QAM	0.62	50		≥ 11	
TDD	Table A.3.4.2.2-1	R.73 TDD	10	64QAM	0.44	50		≥ 5	
TDD	Table A.3.4.2.2-1	R.74 TDD	10	16QAM	1/2	50		≥ 5	
TDD, PDSCH Performance, Single antenna port (DRS)									
TDD	Table A.3.4.3.1-1	R.25 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.3.1-1	R.26 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.1-1	R.26-1 TDD	5	16QAM	1/2	25		≥ 1	
TDD	Table A.3.4.3.1-1	R.27 TDD	10	64QAM	3/4	50		≥ 2	
TDD	Table A.3.4.3.1-1	R.27-1 TDD	10	64QAM	3/4	18		≥ 1	
TDD	Table A.3.4.3.1-1	R.28 TDD	10	16QAM	1/2	1		≥ 1	
TDD	Table A.3.4.3.1-2	R.80 TDD	10	QPSK	1/3	6		M1, ≥ 0	
TDD, PDSCH Performance, Two antenna ports (DRS)									
TDD	Table A.3.4.3.2-1	R.31 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.3.2-1	R.32 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.2-1	R.32-1 TDD	5	16QAM	1/2	[25]		≥ 1	
TDD	Table A.3.4.3.2-1	R.33 TDD	10	64QAM	3/4	50		≥ 2	
TDD	Table A.3.4.3.2-1	R.33-1 TDD	10	64QAM	3/4	[18]		≥ 1	
TDD	Table A.3.4.3.2-1	R.34 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.2	R.70 TDD	10	QPSK	0.54-0.65	50		≥ 1	
TDD	Table A.3.4.3.2	R.71 TDD	10	16QAM	0.5-0.6	50		≥ 2	
TDD, PDSCH Performance (UE specific RS) Two antenna ports (CSI-RS)									
TDD	Table A.3.4.3.3-1	R.51 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.3-1	R.51-1 TDD	10	16QAM	0.57	50		≥ 2	
TDD	Table A.3.4.3.3-1	R.76 TDD	10	QPSK		50		≥ 2	
TDD, PDSCH Performance (UE specific RS) Two antenna ports (CSI-RS, non Quasi Co-located)									
TDD	Table A.3.4.3.3-2	R.52 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.3-2	R.52 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.3-2	R.52 TDD	10	16QAM	1/2	50		≥ 2	
TDD, PDSCH Performance (UE specific RS) Four antenna ports (CSI-RS)									
TDD	Table A.3.4.3.4-1	R.44 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.4-1	R.48 TDD	10	QPSK		50		≥ 1	
TDD	Table A.3.4.3.4-1	R.66 TDD	20	256QAM		100		11-12	
TDD	Table A.3.4.3.4-2	R.60 TDD	10	QPSK	1/2	50		≥ 1	
TDD	Table A.3.4.3.4-2	R.61 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.4-2	R.61-1 TDD	10	16QAM	1/2	50		≥ 1	
TDD	Table A.3.4.3.4-3	R.64 TDD	10	QPSK	1/3	6		0	
TDD	Table A.3.4.3.4-1	R.69 TDD	10	QPSK	0.61-0.8	50		≥ 1	
TDD	Table A.3.4.3.4-1	R.75 TDD	10	16QAM	0.57	50		≥ 5	
TDD, PDSCH Performance (UE specific RS) Eight antenna ports (CSI-RS)									
TDD	Table A.3.4.3.5-1	R.50 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.3.5-2	R.45 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.5-2	R.45-1 TDD	10	16QAM	1/2	39		≥ 1	
TDD	Table A.3.4.3.5-2	R.45-2 TDD	10	64QAM		50		≥ 2	
FDD, PDCCH / PCFICH Performance									
FDD	Table A.3.5.1-1	R.15 FDD	10	PDCCH					
FDD	Table A.3.5.1-1	R.15-1 FDD	10	PDCCH					

FDD	Table A.3.5.1-1	R.15-2 FDD	10	PDCCH					
FDD	Table A.3.5.1-1	R.16 FDD	1.4	PDCCH					
FDD	Table A.3.5.1-1	R.17 FDD	10	PDCCH					
FDD	Table A.3.5.1-1A	R.16_1 FDD	10	PDCCH					
FDD	Table A.3.5.1-1A	R.17_1 FDD	5	PDCCH					
FDD	Table A.3.5.1-2		10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.5.1-2		1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.3.5.1-2		10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.5.1-2		10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.5.1-2		5	QPSK	1/3	25		≥ 1	
FDD	Table A.3.5.1-2A		10	QPSK	1/3	50		≥ 1	
TDD, PDCCH / PCFICH Performance									
TDD	Table A.3.5.2-1	R.15 TDD	10	PDCCH					
TDD	Table A.3.5.2-1	R.15-1 TDD	10	PDCCH					
TDD	Table A.3.5.2-1	R.15-2 TDD	10	PDCCH					
TDD	Table A.3.5.2-1	R.16 TDD	1.4	PDCCH					
TDD	Table A.3.5.2-1	R.17 TDD	10	PDCCH					
TDD	Table A.3.5.2-1A	R.16_1 TDD	10	PDCCH					
TDD	Table A.3.5.2-1A	R.17_1 TDD	5	PDCCH					
TDD	Table A.3.5.2-2		10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.5.2-2		1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.3.5.2-2		10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.5.2-2		10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.5.2-2		5	QPSK	1/3	25		≥ 1	
TDD	Table A.3.5.2-2A		10	QPSK	1/3	50		≥ 1	
FDD / TDD, PHICH Performance									
FDD / TDD	Table A.3.6-1	R.18	10	PHICH					
FDD / TDD	Table A.3.6-1	R.19	1.4	PHICH					
FDD / TDD	Table A.3.6.1	R.19-1	5	PHICH					
FDD / TDD	Table A.3.6-1	R.20	10	PHICH					
FDD / TDD	Table A.3.6-1	R.24	10	PHICH					
FDD / TDD	Table A.3.6-1A	R.19_1	10	PHICH					
FDD / TDD	Table A.3.6-1A	R.20_1	5	PHICH					
FDD, PMCH Performance									
FDD	Table A.3.8.1-1	R.40 FDD	1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.3.8.1-1	R.37 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.8.1-2	R.38 FDD	10	16QAM	1/2	50		≥ 1	
FDD	Table A.3.8.1-3	R.39-1 FDD	5	64QAM	2/3	25		≥ 1	
FDD	Table A.3.8.1-3	R.39 FDD	10	64QAM	2/3	50		≥ 2	
TDD, PMCH Performance									
TDD	Table A.3.8.2-1	R.40 TDD	1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.3.8.2-1	R.37 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.8.2-2	R.38 TDD	10	16QAM	1/2	50		≥ 1	
TDD	Table A.3.8.2-3	R.39-1 TDD	5	64QAM	2/3	25		≥ 1	
TDD	Table A.3.8.2-3	R.39 TDD	10	64QAM	2/3	50		≥ 2	
FDD, Sustained data rate (CRS)									

FDD	Table A.3.9.1-1	R.31-1 FDD	10	64QAM	0.40			≥ 1	
FDD	Table A.3.9.1-2	R.31-1A FDD	20	64QAM	0.41			≥ 1	
FDD	Table A.3.9.1-1	R.31-2 FDD	10	64QAM	0.59-0.64			≥ 2	
FDD	Table A.3.9.1-1	R.31-3 FDD	20	64QAM	0.59-0.62			≥ 2	
FDD	Table A.3.9.1-1	R.31-3A FDD	10	64QAM	0.85-0.90			≥ 2	
FDD	Table A.3.9.1-1	R.31-3C FDD	15	64QAM	0.87-0.91			≥ 3	
FDD	Table A.3.9.1-1	R.31-4 FDD	20	64QAM	0.87-0.90			≥ 3	
FDD	Table A.3.9.1-1	R.31-4B FDD	15	64QAM	0.85-0.88			≥ 4	
FDD	Table A.3.9.1-1	R.31-5 FDD	15	64QAM	0.85-0.91			≥ 3	
FDD	Table A.3.9.1-2	R.31-6 FDD	5	64QAM	0.83-0.85			≥ 2	
FDD	Table A.3.9.1-2	R.31-7 FDD	10	64QAM	0.78-0.83			≥ 6	
FDD	Table A.3.9.1-2	R.31-8 FDD	15	64QAM	0.77-0.80			≥ 6	
FDD	Table A.3.9.1-2	R.31-9 FDD	20	64QAM	0.79-0.81			≥ 6	
FDD	Table A.3.9.1-2	R.31-10 FDD	5	64QAM	0.78-0.85			≥ 6	
FDD	Table A.3.9.1-3	R.68 FDD	20	256QAM	0.74-0.85			11-12	
FDD	Table A.3.9.1-3	R.68-1 FDD	15	256QAM	0.74-0.88			11-12	
FDD	Table A.3.9.1-3	R.68-2 FDD	10	256QAM	0.74-0.85			11-12	
FDD	Table A.3.9.1-3	R.68-3 FDD	5	256QAM	0.77-0.85			11-12	
FDD	Table A.3.9.1-3	R.68-4 FDD	10	256QAM	0.78-0.83			11-12	
FDD	Table A.3.9.1-3	R.68-5 FDD	15	256QAM	0.79-0.82			11-12	
FDD	Table A.3.9.1-3	R.68-6 FDD	20	256QAM	0.78-0.80			11-12	
FDD	Table A.3.9.1-3	R.68-7 FDD	5	256QAM	0.77-0.85			11-12	
TDD, Sustained data rate (CRS)									
TDD	Table A.3.9.2-1	R.31-1 TDD	10	64QAM	0.40			≥ 1	
TDD	Table A.3.9.2-1	R.31-1A TDD	20	64QAM	0.41			≥ 1	
TDD	Table A.3.9.2-1	R.31-2 TDD	10	64QAM	0.59-0.64			≥ 2	
TDD	Table A.3.9.2-1	R.31-3 TDD	20	64QAM	0.59-0.62			≥ 2	
TDD	Table A.3.9.2-1	R.31-3A TDD	15	64QAM	0.87-0.90			≥ 2	
TDD	Table A.3.9.2-1	R.31-4 TDD	20	64QAM	0.87-0.90			≥ 3	
TDD	Table A.3.9.2-1	R.31-4A TDD	20	64QAM	0.87-0.90			≥ 3	
TDD	Table A.3.9.2-1	R.31-5 TDD	15	64QAM	0.87-0.88			≥ 3	
TDD	Table A.3.9.2-1A	R.31-6 TDD	10	64QAM	0.85-0.90			≥ 2	
TDD	Table A.3.9.2-1A	R.31-7 TDD	10	64QAM	0.78-0.82			≥ 6	
TDD	Table A.3.9.2-1A	R.31-8 TDD	15	64QAM	0.77-0.79			≥ 6	
TDD	Table A.3.9.2-1A	R.31-9 TDD	20	64QAM	0.79-0.81			≥ 6	
TDD	Table A.3.9.2-2	R.68 TDD	20	256QAM	0.74-0.85			11-12	
TDD	Table A.3.9.2-2	R.68-1 TDD	15	256QAM	0.76-0.88			11-12	
TDD	Table A.3.9.2-2	R.68-2 TDD	10	256QAM	0.74-0.85			11-12	
TDD	Table A.3.9.2-2	R.68-3 TDD	20	256QAM	0.74-			11-	

					0.85			12	
TDD	Table A.3.9.2-2	R.68-4 TDD	15	256QAM	0.76-0.88			11-12	
TDD	Table A.3.9.2-3	R.68-5 TDD	10	256QAM	0.78-0.82			11-12	
TDD	Table A.3.9.2-3	R.68-6 TDD	15	256QAM	0.79-0.82			11-12	
TDD	Table A.3.9.2-3	R.68-7 TDD	20	256QAM	0.78-0.80			11-12	
FDD, Sustained data rate test with EPDCCH scheduling (CRS)									
FDD	Table A.3.9.3-1	R.31E-1 FDD	10	64QAM	0.40-0.41			≥ 1	
FDD	Table A.3.9.3-1	R.31E-2 FDD	10	64QAM	0.59-0.66			≥ 2	
FDD	Table A.3.9.3-1	R.31E-3 FDD	20	64QAM	0.59-0.63			≥ 2	
FDD	Table A.3.9.3-1	R.31E-3A FDD	10	64QAM	0.85-0.92			≥ 2	
FDD	Table A.3.9.3-1	R.31E-3C FDD	15	64QAM	0.87-0.92			≥ 3	
FDD	Table A.3.9.3-1	R.31E-4 FDD	20	64QAM	0.87-0.91			≥ 3	
FDD	Table A.3.9.3-1	R.31E-4B FDD	15	64QAM	0.85-0.90			≥4	
TDD, Sustained data rate test with EPDCCH scheduling (CRS)									
TDD	Table A.3.9.4-1	R.31E-1 TDD	10	64QAM	0.40-0.41			≥ 1	
TDD	Table A.3.9.4-1	R.31E-2 TDD	10	64QAM	0.59-0.65			≥ 2	
TDD	Table A.3.9.4-1	R.31E-3 TDD	20	64QAM	0.59-0.63			≥ 2	
TDD	Table A.3.9.4-1	R.31E-3A TDD	15	64QAM	0.87-0.92			≥ 2	
TDD	Table A.3.9.4-1	R.31E-4 TDD	20	64QAM	0.87-0.90			≥ 3	
FDD, EPDCCH Performance									
FDD	Table A.3.10.1-1	R.55 FDD	10	EPDCCH					
FDD	Table A.3.10.1-1	R.56 FDD	10	EPDCCH					
FDD	Table A.3.10.1-1	R.57 FDD	10	EPDCCH					
FDD	Table A.3.10.1-1	R.58 FDD	10	EPDCCH					
FDD	Table A.3.10.1-1	R.59 FDD	10	EPDCCH					
TDD, EPDCCH Performance									
TDD	Table A.3.10.2-1	R.55 TDD	10	EPDCCH					
TDD	Table A.3.10.2-1	R.56 TDD	10	EPDCCH		x			
TDD	Table A.3.10.2-1	R.57 TDD	10	EPDCCH					
TDD	Table A.3.10.2-1	R.58 TDD	10	EPDCCH					
TDD	Table A.3.10.2-1	R.59 TDD	10	EPDCCH					
FDD, MPDCCH performance									
FDD	Table A.3.11.1-1	R.82 FDD	10	MPDCCH					
FDD	Table A.3.11.1-1	R.83 FDD	10	MPDCCH					
TDD, MPDCCH performance									
TDD	Table A.3.11.2-1	R.82 TDD	10	MPDCCH					
TDD	Table A.3.11.2-1	R.83 TDD	10	MPDCCH					
LAA, Multi-Antenna Transmission PDSCH Performance									
FDD	Table A.3.15.1.1-1	R.1 FS3	20	64 QAM	6/10	100		≥ 5	

FDD	Table A.3.15.2.1-1	R.2 FS3	20	16QAM	1/2	100		≥ 5	

A.3.2 Reference measurement channel for receiver characteristics

Unless otherwise stated, Tables A.3.2-1, A.3.2-1a, A.3.2-1b, A.3.2-2, A.3.2-2a and A.3.2-2b are applicable for measurements on the Receiver Characteristics (clause 7) with the exception of subclause 7.4 (Maximum input level).

Unless otherwise stated, Tables A.3.2-3, A.3.2-3a, A.3.2-3b, A.3.2-4, A.3.2-4a and A.3.2-4b are applicable for subclause 7.4 (Maximum input level).

Unless otherwise stated, Tables A.3.2-1, A.3.2-1a, A.3.2-1b, A.3.2-2, A.3.2-2a and A.3.2-2b also apply for the modulated interferer used in Clauses 7.5, 7.6 and 7.8 with test specific bandwidths.

For transmissions in TDD Band 46, Table A.3.2-2c is applicable for measurements of Receiver Characteristics (clause 7) except for the Maximum Input Level (clause 7.4A) for which Table A.3.2-4d and Table A.3.2-7 apply. For these measurements, the discovery signals measurement timing configuration (DMTC) periodicity shall be set at *dmtc-Periodicity* = 40 ms with an offset *dmtc-Offset* = 0 for the channel and the DRS shall be transmitted in the first subframe of each DMTC occasion. Furthermore, no PBCH is transmitted and the PDSCH is also scheduled in subframe #5.

Table A.3.2-1: Fixed Reference Channel for Receiver Requirements (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		9	9	9	9	9	9
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408	1320	2216	4392	6712	8760
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	152	872	1800	4392	6712	8760
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1	1	1	1	2	2
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	1	1	1	1	2	2
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368	3780	6300	13800	20700	27600
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	528	2940	5460	12960	19860	26760
Max. Throughput averaged over 1 frame	kbps	341.6	1143.2	1952.8	3952.8	6040.8	7884
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.2-1a: Fixed Reference Channel for Receiver Requirements for UE Category 0 (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	14	14	14	14	14
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		9	9	9	9	9	9
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3
Number of HARQ Processes	Processes	[8]	[8]	[8]	[8]	[8]	[8]
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408	1000	1000	1000	1000	1000
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0 (Note 3)	Bits	152	840	840	904	904	904
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1	1	1	1	1	1
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	1	1	1	1	1	1
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368	3528	3528	3864	3864	3864
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0 (Note 3)	Bits	528	2688	2688	3024	3024	3024
Max. Throughput averaged over 1 frame	kbps	341.6	884	884	890.4	890.4	890.4
UE DL Category		0	0	0	0	0	0

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz.
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: For Sub-Frame 0, it is assumed the 6PRBs are allocated in the centre of the channel where some REs of the same PRBs are occupied by PBCH and synchronization signals.
Note 4: For HD-FDD UE, the downlink subframes are scheduled at the 0th, 1st, 2nd, 8th, 9th, 10th, 16th, 17th, 18th, 24th, 25th, 26th, 32nd, 33rd, 34th subframes every 40ms. Information bit payload is available if downlink subframe is scheduled.

Table A.3.2-1b: Fixed Reference Channel for Receiver Requirements (FDD) for UE Category M1

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		4	4	4	4	4	4
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		2	2	8	8	8	8
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 3, 8	Bits	256	256	256	328	328	328
For Sub-Frames 0,1,2,5,7,9	Bits	N/A	N/A	256	328	328	328
For Sub-Frame 4	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 6	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
For Sub-Frames 3, 8	Bits	1	1	1	1	1	1
For Sub-Frames 0,1,2,5,7,9	Bits	N/A	N/A	1	1	1	1
For Sub-Frame 4	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 6	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 3, 8	Bits	912	1008	1008	1104	1104	1104
For Sub-Frames 0,1,2,5,7,9	Bits	N/A	N/A	1008	1104	1104	1104
For Sub-Frame 4	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 6	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Max. Throughput averaged over 1 frame for FDD	kbps	51.2	51.2	204.8	262.4	262.2	262.4
Max. Throughput averaged over 1 frames for HD-FDD	kbps	25.6	25.6	76.8	98.4	98.4	98.4
UE DL Category		M1	M1	M1	M1	M1	M1

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz

Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211.

Note 3: The scheduled narrowband other than 1.4MHz and 3MHz channel BW avoids the centre of the channel where some REs of the same PRBs are occupied by PBCH and synchronization signals.

Note 4: For HD-FDD UE, PDSCH are scheduled at the 3rd subframe every 1 radio frame for 1.4MHz and 3MHz channel BW. For other channel BW, PDSCH are scheduled at the 0th, 1st, and 2nd subframes every 1 radio frame. Information bit payload is available if downlink subframe is scheduled. The corresponding M-PDCCH is scheduled 2 subframes before the corresponding PDSCH transmission.

Note 5: 2 resource blocks allocated to M-PDCCH

Table A.3.2-1c: Fixed Reference Channel for Receiver Requirements (HD-FDD) without repetition – for CAT-NB1

Parameter	Unit	Value
Channel bandwidth	MHz	0.2
Number of subcarriers		12
Modulation		QPSK
Target Coding Rate		1/3
Number of HARQ Processes	Processes	1
Maximum number of HARQ transmissions		1
Transport block size	Bits	88
Number of Sub-Frames per transport block		1
Transport block CRC	Bits	24
Binary Channel Bits Per Sub-Frame	Bits	320
LTE CRS port		N/A
Number of NRS ports		1
Number of NPDSCH repetitions		0
UE DL Category		NB1
Note 1: NB-IoT in stand-alone mode has been considered here Note 2: Reference signal, Synchronization signals and NPBCH allocated as per TS 36.211. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 4: Parameters related to NPDSCH scheduling are defined in Table A.3.2-1e to Table A.3.2-1g. Note 5: NPDCCH and information bit payload are not transmitted in the subframes used for transmission of SI messages. Note 6: SI messages transmission should be prioritized over NPDCCH transmission in case of collision. NPDCCH transmission is postponed until the next NB-IoT downlink subframe in case NPDCCH transmission occurs in a non NB-IoT downlink subframe, where an NB-IoT downlink subframe is a subframe that does not contain NPSS/NSSS/NPBCH/SIB1-NB transmission.		

Table A.3.2-1ca Example scheduling pattern with SI periodicity of 64 radio frames for Receiver Requirements (HD-FDD) without repetition – for CAT-NB1

Subframeth from the 0th subframe	NPDCCH	NPDSCH	NPUSCH
	18, 42, 66, 98, 122, 146, 171, 194, 218, 242, 266, 291, 314, 338, 362, 386, 411, 434, 458, 482, 506, 531, 554, 578, 602, 626	+5 from corresponding NPDCCH	+13 and +14 from corresponding NPDSCH. NPUSCH transmission occupies 2 subframes

Table A.3.2-1d: Fixed Reference Channel for Receiver Requirements (HD-FDD) with repetition – for CAT-NB1

Parameter	Unit	Value
Channel bandwidth	MHz	0.2
Number of subcarriers		12
Modulation		QPSK
Target Coding Rate		1/3
Number of HARQ Processes	Processes	1
Maximum number of HARQ transmissions		1
Transport block size	Bits	88
Number of Sub-Frames per transport block		1
Transport block CRC	Bits	24
Binary Channel Bits Per Sub-Frame	Bits	320
LTE CRS port		N/A
Number of NRS ports		1
Number of NPDSCH repetitions		TBD
UE DL Category		NB1
Note 1: NB-IoT in stand-alone mode has been considered here Note 2: Reference signal, Synchronization signals and NPBCH allocated as per TS 36.211. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit) Note 4: Parameters related to NPDSCH scheduling are defined in Table A.3.2-1e to Table A.3.2-1g.		

Table A.3.2-1e: General configuration for CAT-NB1

Parameter	Unit	Value
NB-IoT downlink subframe bitmap for anchor carrier *(downlinkBitmap)*		Not configured
NB-IoT downlink subframe bitmap for non-anchor carrier *(downlinkBitmapNonAnchor)*		Not configured
Downlink gap configuration for anchor carrier *(dl-Gap)*		Not configured
Downlink gap configuration for non-anchor carrier *(dl-GapNonAnchor)*		Not configured

Table A.3.2-1f: NPDCCH configuration for NPDSCH scheduling

Parameter	Unit	Value
DCI format		DCI format N1
NPDCCH format		1
Scheduling delay (I_{Delay})		0
DCI subframe repetition number		00
$R_{\max}$ (*npdcch-NumRepetitions*)		1
G (*NPDCCH-startSF-USS*)		8
α_{offset} (*npdcch-Offset-USS*)		1/4

Table A.3.2-1g: NPUSCH format 2 configurations for NPDSCH scheduling

Parameter	Unit	Value
Scheduling delay (I_{Delay})		0
N_{Rep}^{AN} (*ack-NACK-NumRepetitions*)		1
ACK/NACK resource field		0

Table A.3.2-2: Fixed Reference Channel for Receiver Requirements (TDD)

Parameter	Unit	Value					
Channel Bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Uplink-Downlink Configuration (Note 6)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3	3+2	3+2	3+2	3+2	3+2
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmission		1	1	1	1	1	1
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 4, 9		408	1320	2216	4392	6712	8760
For Sub-Frame 1, 6		n/a	968	1544	3240	4968	6712
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		208	1064	1800	4392	6712	8760
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frame 4, 9		1	1	1	1	2	2
For Sub-Frame 1, 6		n/a	1	1	1	1	2
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		1	1	1	1	2	2
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 4, 9		1368	3780	6300	13800	20700	27600
For Sub-Frame 1, 6		n/a	3276	5556	11256	16956	22656
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		672	3084	5604	13104	20004	26904
Max. Throughput averaged over 1 frame	kbps	102.4	564	932	1965.6	3007.2	3970.4
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1

Note 1: For normal subframes(0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 2: For 1.4MHz, no data shall be scheduled on special subframes (1&6) to avoid problems with insufficient PDCCH performance
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: As per Table 4.2-2 in TS 36.211 [8]

Table A.3.2-2a: Fixed Reference Channel for Receiver Requirements for UE Category 0 (TDD)

Parameter	Unit	Value					
Channel Bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	14	14	14	14	14
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3	3+2	3+2	3+2	3+2	3+2
Number of HARQ Processes	Processes	[7]	[7]	[7]	[7]	[7]	[7]
Maximum number of HARQ transmission		1	1	1	1	1	1
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 4, 9		408	1000	1000	1000	1000	1000
For Sub-Frame 1, 6		N/A	872	872	872	872	872
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		208	1000	1000	1000	1000	1000
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frame 4, 9		1	1	1	1	1	1
For Sub-Frame 1, 6		N/A	1	1	1	1	1
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		1	1	1	1	1	1
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 4, 9		1368	3528	3528	3864	3864	3864
For Sub-Frame 1, 6		N/A	3048	3048	3048	3048	3048
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		672	2832	2832	3168	3168	3168
Max. Throughput averaged over 1 frame	kbps	102.4	474.4	474.4	474.4	474.4	474.4
UE DL Category		0	0	0	0	0	0

Note 1: For normal subframes(0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 2: For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: As per Table 4.2-2 in TS 36.211 [8]

Table A.3.2-2b: Fixed Reference Channel for Receiver Requirements for UE category M1 (TDD)

Parameter	Unit	Value					
Channel Bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		4	4	4	4	4	4
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D)		3	3	3	3	3	3
Number of HARQ Processes	Processes	[7]	[7]	[7]	[7]	[7]	[7]
Maximum number of HARQ transmission		1	1	1	1	1	1
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 4, 9		256	256	256	328	328	328
For Sub-Frame 1, 6		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		256	256	256	328	328	328
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frame 4, 9		1	1	1	1	1	1
For Sub-Frame 1, 6		N/A	1	1	1	1	1
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		1	1	1	1	1	1
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 4, 9		912	1008	1008	1104	1104	1104
For Sub-Frame 1, 6		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		912	1008	1008	1104	1104	1104
Max. Throughput averaged over 1 frame	kbps	76.8	76.8	76.8	98.4	98.4	98.4
UE DL Category		M1	M1	M1	M1	M1	M1

Note 1: For normal subframes(0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 2: No data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [4]
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: As per Table 4.2-2 in TS 36.211 [4]
Note 6: For Sub-Frame 0, the scheduled narrowband avoids the centre of the channel where some REs of the same PRBs are occupied by PBCH and synchronization signals.
Note 7: 2 resource blocks allocated to M-PDCCH

Table A.3.2-2c Fixed Reference Channel for Receiver Requirements (TDD Band 46)

Parameter	Unit	Value
Channel bandwidth	MHz	20
Allocated resource blocks		100
Uplink-Downlink Configuration		N/A
Subcarriers per resource block		12
Allocated subframes per Radio Frame (D)		8
Modulation		QPSK
Target Coding Rate		1/3
Number of HARQ Processes	Processes	N/A
Maximum number of HARQ transmissions		N/A
Information Bit Payload per Sub-Frame		
For Sub-Frames 3,4,6,7,8,9	Bits	8760
For Sub-Frame 1,2	Bits	N/A
For Sub-Frame 0,5	Bits	8760
Transport block CRC	Bits	24
Number of Code Blocks per Sub-Frame (Note 3)		
For Sub-Frames 3,4,6,7,8,9	Bits	2
For Sub-Frame 1,2	Bits	N/A
For Sub-Frame 0,5	Bits	2
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 3,4,6,7,8,9	Bits	27600
For Sub-Frame 1,2	Bits	N/A
For Sub-Frame 0,5	Bits	27312
Max. Throughput averaged over 1 frame	kbps	7008
UE Category		≥ 1
Note 1: 2 symbols allocated to PDCCH. Note 2: Reference signal and Synchronization signals allocated as per TS 36.211 [8]. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).		

Table A.3.2-3: Fixed Reference Channel for Maximum input level for UE Categories 3-8 (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		8	9	9	9	9	9
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	14112	30576	46888	61664
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6456	12576	28336	45352	61664
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	3	5	8	11
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		n/a	2	3	5	8	11
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	18900	41400	62100	82800
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	8820	16380	38880	59580	80280
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	12547	27294	42046	55498

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.2-3a: Fixed Reference Channel for Maximum input level for UE Category 1 (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	18	17	17	17
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		8	9	9	9	9	9
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	10296	10296	10296	10296
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6456	8248	10296	10296	10296
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	2	2	2	2
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		n/a	2	2	2	2	2
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	13608	14076	14076	14076
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	8820	11088	14076	14076	14076
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	9079.6	9266.4	9266.4	9266.4

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.2-3b: Fixed Reference Channel for Maximum input level for UE Category 2 (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	83
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		8	9	9	9	9	9
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	14112	30576	46888	51024
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6456	12576	28336	45352	51024
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	3	5	8	9
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		n/a	2	3	5	8	9
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	18900	41400	62100	68724
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	8820	16380	38880	59580	66204
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	12547	27294	42046	45922

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz

Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]

Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.2-3c: Fixed Reference Channel for Maximum input level for UE DL Category 0 (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		2	2	2	2	2	2
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		8	9	9	9	9	9
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	[8]	[8]	[8]	[8]	[8]	[8]
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1000	1000	1000	1000	1000	1000
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0 (Note 3)	Bits	N/A	1000	1000	1000	1000	1000
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9		1	1	1	1	1	1
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	1	1	1	1	1
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368	1512	1512	1656	1656	1656
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0 (Note 3)	Bits	N/A	1512	1512	1656	1656	1656
Max. Throughput averaged over 1 frame	kbps	800	900	900	900	900	900

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz.

Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8].

Note 3: For Sub-Frame 0, it is assumed that the allocated 2PRBs are scheduled on the RBs other than the centre 6PRBs as most of the symbols are occupied by PBCH and synchronization signals.

Table A.3.2-3d: Fixed Reference Channel for Maximum input level for UE DL Category M1 (FDD and HD-FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		2	2	2	2	2	2
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame (Note 6)		2	2	8	8	8	8
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding Rate		3/5	3/5	3/5	3/5	3/5	3/5
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload							
For Sub-Frames 3,8	Bits	552	552	552	552	552	552
For Sub-Frames 0,1,2,5,7,9	Bits	N/A	N/A	552	552	552	552
For Sub-Frame 4	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 6	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
For Sub-Frames 3, 8		1	1	1	1	1	1
For Sub-Frames 0,1,2,5,7,9		N/A	N/A	1	1	1	1
For Sub-Frame 4		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 6		N/A	N/A	N/A	N/A	N/A	N/A
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	832	832	832	832	832	832
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0 (Note 3)	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Max. Throughput averaged over 1 frame for FDD	kbps	110.4	110.4	441.6	441.6	441.6	441.6
Max. Throughput averaged over 1 frame for HD-FDD		55.2	55.2	165.6	165.6	165.6	165.6

Note 1: 4 symbols allocated to PDCCH for all channel bandwidths.
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211.
Note 3: The scheduled narrowband other than 1.4MHz and 3MHz channel bandwidth avoids the centre of the channel where some Res of the same PRBs are occupied by PBCH and synchronization signals.
Note 4: For HD-FDD UE, PDSCH are scheduled at the 3rd subframe every 1 radio frame for 1.4MHz and 3MHz channel bandwidth. For other channel bandwidth, PDSCH are scheduled at the 0th, 1st, and 2nd subframes every 1 radio frame. Information bit payload is available if downlink subframe is scheduled. The corresponding MPDCCH is scheduled 2 subframes before the corresponding PDSCH transmission.
Note 5: 2 resource blocks allocated to MPDCCH.

Table A.3.2-4: Fixed Reference Channel for Maximum input level for UE Categories 3-8 (TDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 6)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	2984	8504	14112	30576	46888	61664
For Sub-Frames 1,6	Bits	n/a	6968	11448	23688	35160	46888
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6968	12576	30576	45352	61664
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frames 4,9		1	2	3	5	8	11
For Sub-Frames 1,6		n/a	2	2	4	6	8
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		n/a	2	3	5	8	11
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	4104	11340	18900	41400	62100	82800
For Sub-Frames 1,6		n/a	9828	16668	33768	50868	67968
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	9252	16812	39312	60012	80712
Max. Throughput averaged over 1 frame	kbps	596.8	3791.2	6369.6	13910	20945	27877

Note 1: For normal subframes(0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 2: For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: As per Table 4.2-2 in TS 36.211 [8]

Table A.3.2-4a: Fixed Reference Channel for Maximum input level for UE Category 1 (TDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	18	17	17	17
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	2984	8504	10296	10296	10296	10296
For Sub-Frames 1,6	Bits	n/a	6968	8248	7480	7480	7480
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6968	8248	10296	10296	10296
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frames 4,9		1	2	2	2	2	2
For Sub-Frames 1,6		n/a	2	2	2	2	2
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		n/a	2	2	2	2	2
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	4104	11340	13608	14076	14076	14076
For Sub-Frames 1,6		n/a	9828	11880	11628	11628	11628
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	9252	11520	14076	14076	14076
Max. Throughput averaged over 1 frame	kbps	596.8	3791.2	4533.6	4584.8	4584.8	4584.8

Note 1: For normal subframes(0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.

Note 2: For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance

Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]

Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Note 5: As per Table 4.2-2 in TS 36.211 [8]

Table A.3.2-4b: Fixed Reference Channel for Maximum input level for UE Category 2 (TDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	83
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	2984	8504	14112	30576	46888	51024
For Sub-Frames 1,6	Bits	n/a	6968	11448	23688	35160	39232
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	6968	12576	30576	45352	51024
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frames 4,9		1	2	3	5	8	9
For Sub-Frames 1,6		n/a	2	3	5	7	7
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		n/a	2	3	5	8	9
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	4104	11340	18900	41400	62100	68724
For Sub-Frames 1,6		n/a	9828	16668	33768	50868	56340
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	n/a	9252	16380	39312	60012	66636
Max. Throughput averaged over 1 frame	kbps	596.8	3791.2	6369.6	13910	20945	23154

Note 1: For normal subframes(0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.

Note 2: For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance

Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]

Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Note 5: As per Table 4.2-2 in TS 36.211 [8]

Table A.3.2-4c: Fixed Reference Channel for Maximum input level for UE DL Category 0 (TDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		2	2	2	2	2	2
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	[7]	[7]	[7]	[7]	[7]	[7]
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	1000	1000	1000	1000	1000	1000
For Sub-Frames 1,6	Bits	N/A	712	712	712	712	712
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	1000	1000	1000	1000	1000
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frames 4,9		1	1	1	1	1	1
For Sub-Frames 1,6		N/A	1	1	1	1	1
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	1	1	1	1	1
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	1368	1512	1512	1656	1656	1656
For Sub-Frames 1,6		N/A	1224	1224	1368	1368	1368
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	1512	1512	1656	1656	1656
Max. Throughput averaged over 1 frame	kbps	200	442.4	442.4	442.4	442.4	442.4

Note 1: For normal subframes(0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.

Note 2: For 1.4MHz, no data shall be scheduled on special subframes (1&6) to avoid problems with insufficient PDCCH performance.

Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8].

Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Note 5: As per Table 4.2-2 in TS 36.211 [8].

Table A.3.2-4d: Fixed Reference Channel for Maximum input level for UE Categories ≥ 3 (TDD Band 46)

Parameter	Unit	Value
Channel bandwidth	MHz	20
Allocated resource blocks		100
Uplink-Downlink Configuration		N/A
Subcarriers per resource block		12
Allocated subframes per Radio Frame (D)		8
Modulation		64QAM
Target Coding Rate		3/4
Number of HARQ Processes	Processes	N/A
Maximum number of HARQ transmissions		N/A
Information Bit Payload per Sub-Frame		
For Sub-Frames 3,4,6,7,8,9	Bits	61664
For Sub-Frame 1,2	Bits	N/A
For Sub-Frame 0,5	Bits	61664
Transport block CRC	Bits	24
Number of Code Blocks per Sub-Frame (Note 3)		
For Sub-Frames 3,4,6,7,8,9		11
For Sub-Frame 1,2		N/A
For Sub-Frame 0,5		11
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 3,4,6,7,8,9	Bits	82800
For Sub-Frame 1,2	Bits	N/A
For Sub-Frame 0,5	Bits	81936
Max. Throughput averaged over 1 frame	kbps	49331.2
Note 1: 2 symbols allocated to PDCCH for 20 MHz. Note 2: Reference signal, Synchronization signals allocated as per TS 36.211 [8]. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).		

Table A.3.2-4e: Fixed Reference Channel for Maximum input level for UE DL Category M1 (TDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		2	2	2	2	2	2
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	2	2	2	2	2
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding Rate		3/5	3/5	3/5	3/5	3/5	3/5
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	552	552	552	552	552	552
For Sub-Frames 1,6	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frames 4,9		1	1	1	1	1	1
For Sub-Frames 1,6		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	N/A	N/A	N/A	N/A	N/A
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	912	912	912	912	912	912
For Sub-Frames 1,6		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Max. Throughput averaged over 1 frame	kbps	110.4	110.4	110.4	110.4	110.4	110.4

Note 1: For normal subframes (0,4,5,9), 4 symbols allocated to PDCCH for all channel bandwidths. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 2: For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance.
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: As per Table 4.2-2 in TS 36.211 [4].
Note 6: 2 resource blocks allocated to MPDCCH.

Table A.3.2-5: Fixed Reference Channel for Maximum input level for UE Categories 11/12 and UE DL categories ≥11 (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		8	9	9	9	9	9
Modulation		256QAM	256QAM	256QAM	256QAM	256QAM	256QAM
Target Coding Rate		4/5	4/5	4/5	4/5	4/5	4/5
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4392	12216	19848	42368	63776	84760
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	9912	17568	40576	63776	84760
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	4	7	11	14
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	2	3	7	11	14
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	5472	15120	25200	55200	82800	110400
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	12210	22290	51840	79440	107040
Max. Throughput averaged over 1 frame	kbps	3513.6	10764	17635.2	37952	57398.4	76284

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz.
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Table A.3.2-6: Fixed Reference Channel for Maximum input level for UE Categories 11/12 and UE DL categories ≥11 (TDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	3+2	3+2	3+2	3+2	3+2
Modulation		256QAM	256QAM	256QAM	256QAM	256QAM	256QAM
Target Coding Rate		4/5	4/5	4/5	4/5	4/5	4/5
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	4392	12216	19848	42368	63776	84760
For Sub-Frames 1,6	Bits	N/A	10680	17568	36696	55056	75376
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	9912	17568	42368	63776	84760
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frames 4,9		1	2	4	7	11	14
For Sub-Frames 1,6		N/A	2	3	6	9	13
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	2	3	7	11	14
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	5472	15120	25200	55200	82800	110400
For Sub-Frames 1,6		N/A	13104	22224	45024	67824	90624
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	12336	22416	52416	80016	107616
Max. Throughput averaged over 1 frame	kbps	878.4	5570.4	9240	20049.6	30144	40503.2

Note 1: For normal subframes (0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.

Note 2: For 1.4MHz, no data shall be scheduled on special subframes (1&6) to avoid problems with insufficient PDCCH performance.

Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8].

Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Note 5: As per Table 4.2-2 in TS 36.211 [8].

Table A.3.2-7: Fixed Reference Channel for Maximum input level for UE Categories 11/12 and UE DL categories ≥ 11 (TDD Band 46)

Parameter	Unit	Value
Channel bandwidth	MHz	20
Allocated resource blocks		100
Uplink-Downlink Configuration		N/A
Subcarriers per resource block		12
Allocated subframes per Radio Frame (D)		8
Modulation		256QAM
Target Coding Rate		4/5
Number of HARQ Processes	Processes	N/A
Maximum number of HARQ transmissions		N/A
Information Bit Payload per Sub-Frame		
For Sub-Frames 3,4,6,7,8,9	Bits	84760
For Sub-Frame 1,2	Bits	N/A
For Sub-Frame 0,5	Bits	84760
Transport block CRC	Bits	24
Number of Code Blocks per Sub-Frame (Note 3)		
For Sub-Frames 3,4,6,7,8,9		14
For Sub-Frame 1,2		N/A
For Sub-Frame 0,5		14
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 3,4,6,7,8,9	Bits	110400
For Sub-Frame 1,2	Bits	N/A
For Sub-Frame 0,5	Bits	109248
Max. Throughput averaged over 1 frame	kbps	67808
Note 1: 2 symbols allocated to PDCCH for 20 MHz. Note 2: Reference signal, Synchronization signals allocated as per TS 36.211 [8]. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).		

A.3.2A Downlink Reference measurement channel for TX characteristics

Tables A.3.2A-1 and A.3.2A-2 describes the reference measurement channels to be used on the downlink during Transmitter Characteristics (clause 6) for FDD and TDD respectively. The number of allocated resource blocks have been defined (partial allocation) to allow the transmission of PBCH, PSS/SSS and system information mapped on PDSCH.

For TDD the measurement channel is based on DL/UL configuration ratio of 2DL:2UL or 1DL:4UL. 2DL:2UL is the default and used unless explicitly specified in test case.

Table A.3.2A-1: Fixed DL PDSCH Dedicated Reference Channel for TX Requirements (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		3	4	8	16	25	30
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		10	10	10	10	10	10
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		(Note 4)	1/3	1/3	1/3	1/3	1/3
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload							
For Sub-Frames 0, 1, 2, 3, 4, 5, 6, 7, 8, 9	Bits	88	328	680	1384	2216	2664
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame		1	1	1	1	1	1
Code block CRC size	Bits	0	0	0	0	0	0
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1, 2, 3, 4, 6, 7, 8, 9	Bits	684	1008	2016	4416	6900	8280
For Sub-Frames 5		540	1008	2016	4416	6900	8280
For Sub-Frames 0		264	1008	2016	4416	6900	8280
Max. Throughput averaged over 1 frame	kbps	88	328	680	1384	2216	2664
UE-Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz

Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]

Note 3: The PDSCH shall be assigned to the UE under test with a set of allocated localized virtual resource blocks starting from one end of the channel.

Note 4: To ensure constant transport block size in 1.4MHz, the code rate for subframes varies approx. within {1/8-1/3}

Table A.3.2A-1a: Fixed DL PDSCH Dedicated Reference Channel for TX Requirements (FDD) for UE Category M1

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		4	4	4	4	4	4
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		2	2	8	8	8	8
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3
Number of HARQ Processes	Processes	[8]	[8]	[8]	[8]	[8]	[8]
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 3, 8	Bits	256	256	256	328	328	328
For Sub-Frames 0,1,2,5,7,9	Bits	N/A	N/A	256	328	328	328
For Sub-Frame 4	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 6	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
For Sub-Frames 3, 8	Bits	1	1	1	1	1	1
For Sub-Frames 0,1,2,5,7,9	Bits	N/A	N/A	1	1	1	1
For Sub-Frame 4	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 6	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 3, 8	Bits	912	1008	1008	1104	1104	1104
For Sub-Frames 0,1,2,5,7,9	Bits	N/A	N/A	1008	1104	1104	1104
For Sub-Frame 4	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 6	Bits	N/A	N/A	N/A	N/A	N/A	N/A
Max. Throughput averaged over 1 frame for FDD	kbps	51.2	51.2	204.8	204.8	204.8	204.8
Max. Throughput averaged over 1 frames for HD-FDD	kbps	25.6	25.6	76.8	76.8	76.8	76.8
UE DL Category		M1	M1	M1	M1	M1	M1

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211.
Note 3: The scheduled narrowband other than 1.4MHz and 3MHz channel BW avoids the centre of the channel where some REs of the same PRBs are occupied by PBCH and synchronization signals.
Note 4: For HD-FDD UE, PDSCH are scheduled at the [3rd] subframe every 1 radio frame for 1.4MHz and 3MHz channel BW. For other channel BW, PDSCH are scheduled at the 0th, 1st, and 2th subframes every 1 radio frame. Information bit payload is available if downlink subframe is scheduled. The corresponding M-PDCCH is scheduled 2 subframes before the corresponding PDSCH transmission.
Note 5: 2 resource blocks allocated to M-PDCCH

Table A.3.2A-2: Fixed DL PDSCH Dedicated Reference Channel for TX Requirements (TDD)

Parameter	Unit	Value					
Channel Bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		3	4	8	16	25	30
Uplink-Downlink Configuration (Note 6)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		4	4	4	4	4	4
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmission		1	1	1	1	1	1
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK

Target coding rate		(Note 5)	1/3	1/3	1/3	1/3	1/3
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 1, 6		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0, 4, 5, 9		88	328	680	1384	2216	2664
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks		1	1	1	1	1	1
Code block CRC size		0	0	0	0	0	0
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 1, 6		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 4, 9		684	1008	2016	4416	6900	8280
For Sub-Frame 0		336	1008	2016	4416	6900	8280
For Sub-Frame 5		612	1008	2016	4416	6900	8280
Max. Throughput averaged over one frame	kbps	35.2	131.2	272	553.6	886.4	1065.6
UE-Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1

Note 1: For normal subframes (0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 2: For simplicity, no data shall be scheduled on special subframes (1&6).
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 4: The PDSCH shall be assigned to the UE under test with a set of allocated localized virtual resource blocks starting from one end of the channel.
Note 5: To ensure constant transport block size in 1.4MHz, the code rate for subframes varies approx. within {1/8-1/3}.
Note 6: As per Table 4.2-2 in TS 36.211 [8]

Table A.3.2A-3: Fixed DL PDSCH Dedicated Reference Channel for TX Requirements (TDD) for UL-DL configuration 0

Parameter	Unit	Value					
Channel Bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		3	4	8	16	25	30
Uplink-Downlink Configuration (Note 6)		0	0	0	0	0	0
Allocated subframes per Radio Frame (D+S)		2	2	2	2	2	2
Number of HARQ Processes	Processes	4	4	4	4	4	4
Maximum number of HARQ transmission		1	1	1	1	1	1
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target coding rate		(Note 5)	1/3	1/3	1/3	1/3	1/3
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 1, 6		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0, 5		88	328	680	1384	2216	2664
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks		1	1	1	1	1	1
Code block CRC size		0	0	0	0	0	0
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 1, 6		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 4, 9		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		336	1008	2016	4416	6900	8280
For Sub-Frame 5		612	1008	2016	4416	6900	8280
Max. Throughput averaged over one frame	kbps	17.6	65.6	136	276.8	443.2	532.8
UE-Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1

Note 1: For normal subframes (0,5), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 2: For simplicity, no data shall be scheduled on special subframes (1&6).
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 4: The PDSCH shall be assigned to the UE under test with a set of allocated localized virtual resource blocks starting from one end of the channel.
Note 5: To ensure constant transport block size in 1.4MHz, the code rate for subframes varies approx. within {1/8-1/3}.
Note 6: As per Table 4.2-2 in TS 36.211 [8]

Table A.3.2A-3a: Fixed DL PDSCH Dedicated Reference Channel for TX Requirements (TDD) for UE category M1 (TDD)

Parameter	Unit	Value					
Channel Bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		4	4	4	4	4	4
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D)		3	3	3	3	3	3
Number of HARQ Processes	Processes	[7]	[7]	[7]	[7]	[7]	[7]
Maximum number of HARQ transmission		1	1	1	1	1	1
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 4, 9		256	256	256	328	328	328
For Sub-Frame 1, 6		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		256	256	256	328	328	328
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frame 4, 9		1	1	1	1	1	1
For Sub-Frame 1, 6		N/A	1	1	1	1	1
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		1	1	1	1	1	1
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 4, 9		912	1008	1008	1104	1104	1104
For Sub-Frame 1, 6		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		912	1008	1008	1104	1104	1104
Max. Throughput averaged over 1 frame	kbps	76.8	76.8	76.8	98.4	98.4	98.4
UE DL Category		M1	M1	M1	M1	M1	M1

Note 1: For normal subframes(0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 2: No data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [4]
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: As per Table 4.2-2 in TS 36.211 [4]
Note 6: For Sub-Frame 0, the scheduled narrowband avoids the centre of the channel where some REs of the same PRBs are occupied by PBCH and synchronization signals.
Note 7: 2 resource blocks allocated to M-PDCCH

A.3.2B Downlink Reference measurement channel for ProSe testing

Tables A.3.2B-1 and A.3.2B-2 describes the reference measurement channels to be used on the downlink during ProSe testing for FDD and TDD respectively. The number of allocated resource blocks have been defined (partial allocation) to allow the transmission of PBCH, PSS/SSS and system information mapped on PDSCH.

Table A.3.2B-1: Fixed DL PDSCH Dedicated Reference Channel for ProSe testing (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				8	16	25	30
Subcarriers per resource block				12	12	12	12
Allocated subframes per Radio Frame				10	10	10	10
Modulation				QPSK	QPSK	QPSK	QPSK
Target Coding Rate				1/3	1/3	1/3	1/3
Number of HARQ Processes	Processes			8	8	8	8
Maximum number of HARQ transmissions				1	1	1	1
Information Bit Payload							
For Sub-Frames 0, 1, 2, 3, 4, 5, 6, 7, 8, 9	Bits			680	1384	2216	2664
Transport block CRC	Bits			24	24	24	24
Number of Code Blocks per Sub-Frame				1	1	1	1
Code block CRC size	Bits			0	0	0	0
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1, 2, 3, 4, 6, 7, 8, 9	Bits			2016	4416	6900	8280
For Sub-Frames 5				2016	4416	6900	8280
For Sub-Frames 0				2016	4416	6900	8280
Max. Throughput averaged over 1 frame	kbps			680	1384	2216	2664
UE-Category				≥ 1	≥ 1	≥ 1	≥ 1
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz. Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 3: The PDSCH shall be assigned to the UE under test with a set of allocated localized virtual resource blocks starting from one end of the channel.							

Table A.3.2B-1: Fixed DL PDSCH Dedicated Reference Channel for ProSe testing (TDD)

Parameter	Unit	Value					
Channel Bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				8	16	25	30
Uplink-Downlink Configuration (Note 5)				1	1	1	1
Allocated subframes per Radio Frame (D+S)				4	4	4	4
Number of HARQ Processes	Processes			7	7	7	7
Maximum number of HARQ transmission				1	1	1	1
Modulation				QPSK	QPSK	QPSK	QPSK
Target coding rate				1/3	1/3	1/3	1/3
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 1, 6				n/a	n/a	n/a	n/a
For Sub-Frame 0, 4, 5, 9				680	1384	2216	2664
Transport block CRC	Bits			24	24	24	24
Number of Code Blocks				1	1	1	1
Code block CRC size				0	0	0	0
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 1, 6				n/a	n/a	n/a	n/a
For Sub-Frame 4, 9				2016	4416	6900	8280
For Sub-Frame 0				2016	4416	6900	8280
For Sub-Frame 5				2016	4416	6900	8280
Max. Throughput averaged over one frame	kbps			272	553.6	886.4	1065.6
UE-Category				≥ 1	≥ 1	≥ 1	≥ 1
Note 1: For normal subframes (0,4,5,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs. Note 2: For simplicity, no data shall be scheduled on special subframes (1&6). Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 4: The PDSCH shall be assigned to the UE under test with a set of allocated localized virtual resource blocks starting from one end of the channel. Note 5: As per Table 4.2-2 in TS 36.211 [8].							

A.3.3 Reference measurement channel for PDSCH performance requirements (FDD)

A.3.3.1 Single-antenna transmission (Common Reference Symbols)

Table A.3.3.1-1: Fixed Reference Channel QPSK R=1/3

Parameter	Unit	Value					
Reference channel		R.4 FDD	R.42 FDD	R.42-1 FDD	R.42-2 FDD	R.42-3 FDD	R.2 FDD
Channel bandwidth	MHz	1.4	20	3	5	15	10
Allocated resource blocks (Note 4)		6	100	15	25	75	50
Allocated subframes per Radio Frame		9	9	9	9	9	9
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3
Information Bit Payload (Note 4)							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408	8760	1320	2216	6712	4392
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	152	8760	1064	1800	6712	4392
Number of Code Blocks (Notes 3 and 4)							
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	1	1	2	1
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		1	2	1	1	2	1
Binary Channel Bits (Note 4)							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368	27600	3780	6300	20700	13800
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	528	26760	2940	5460	19860	12960
Max. Throughput averaged over 1 frame (Note 4)	Mbps	0.342	7.884	1.162	1.953	6.041	3.953
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 4: Given per component carrier per codeword.

Table A.3.3.1-2: Fixed Reference Channel 16QAM R=1/2

Parameter	Unit	Value					
Reference channel				R.3-1 FDD	R.3 FDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	50		
Allocated subframes per Radio Frame				9	9		
Modulation				16QAM	16QAM		
Target Coding Rate				1/2	1/2		
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits			6456	14112		
For Sub-Frame 5	Bits			n/a	n/a		
For Sub-Frame 0	Bits			5736	12960		
Number of Code Blocks per Sub-Frame (see Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9				2	3		
For Sub-Frame 5				n/a	n/a		
For Sub-Frame 0				1	3		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits			12600	27600		
For Sub-Frame 5	Bits			n/a	n/a		
For Sub-Frame 0	Bits			10920	25920		
Max. Throughput averaged over 1 frame	Mbps			5.738	12.586		
UE Category				≥ 1	≥ 2		

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.3.1-3: Fixed Reference Channel 64QAM R=3/4

Parameter	Unit	Value					
Reference channel			R.5 FDD	R.6 FDD	R.7 FDD	R.8 FDD	R.9 FDD
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks			15	25	50	75	100
Allocated subframes per Radio Frame			9	9	9	9	9
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		8504	14112	30576	46888	61664
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		6456	12576	28336	45352	61664
Number of Code Blocks per Sub-Frame (see Note 3)			2	3	5	8	11
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		11340	18900	41400	62100	82800
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		8820	16380	38880	59580	80280
Max. Throughput averaged over 1 frame	Mbps		7.449	12.547	27.294	42.046	55.498
UE Category			≥ 1	≥ 2	≥ 2	≥ 2	≥ 3

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.3.1-3a: Fixed Reference Channel 64QAM R=3/4

Parameter	Unit	Value					
Reference channel			R.6-1 FDD	R.7-1 FDD	R.8-1 FDD	R.9-1 FDD	R.9-2 FDD
Channel bandwidth	MHz		5	10	15	20	20
Allocated resource blocks (Note 3)			18	17	17	17	83
Allocated subframes per Radio Frame			9	9	9	9	9
Modulation			64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate			3/4	3/4	3/4	3/4	3/4
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		10296	10296	10296	10296	51024
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		8248	10296	10296	10296	51024
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frames 1,2,3,4,6,7,8,9			2	2	2	2	9
For Sub-Frame 5			n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0			2	2	2	2	9
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		13608	14076	14076	14076	68724
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		11088	14076	14076	14076	66204
Max. Throughput averaged over 1 frame	Mbps			9.266	9.266	9.266	45.922
UE Category			≥ 1	≥ 1	≥ 1	≥ 1	≥ 2

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: Localized allocation started from RB #0 is applied.
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.3.1-4: Fixed Reference Channel Single PRB (Channel Edge)

Parameter	Unit	Value					
Reference channel			R.0 FDD		R.1 FDD		
Channel bandwidth	MHz	1.4	3	5	10/20	15	20
Allocated resource blocks			1		1		
Allocated subframes per Radio Frame			9		9		
Modulation			16QAM		16QAM		
Target Coding Rate			1/2		1/2		
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		224		256		
For Sub-Frame 5	Bits		n/a		n/a		
For Sub-Frame 0	Bits		224		256		
Number of Code Blocks per Sub-Frame (see Note 3)			1		1		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		504		552		
For Sub-Frame 5	Bits		n/a		n/a		
For Sub-Frame 0	Bits		504		552		
Max. Throughput averaged over 1 frame	Mbps		0.202		0.230		
UE Category			≥ 1		≥ 1		

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.3.1-5: Fixed Reference Channel Single PRB (MBSFN Configuration)

Parameter	Unit	Value
Reference channel		R.29 FDD (MBSFN)
Channel bandwidth	MHz	10
Allocated resource blocks		1
MBSFN Configuration (Note 3)		111111
Allocated subframes per Radio Frame		3
Modulation		16QAM
Target Coding Rate		1/2
Information Bit Payload		
For Sub-Frames 4,9	Bits	256
For Sub-Frame 5	Bits	n/a
For Sub-Frame 0	Bits	256
For Sub-Frame 1,2,3,6,7,8	Bits	0 (MBSFN)
Number of Code Blocks per Sub-Frame (see Note 4)		1
For Sub-Frames 4,9		1
For Sub-Frame 5		n/a
For Sub-Frame 0		1
For Sub-Frame 1,2,3,6,7,8		0 (MBSFN)
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 4,9	Bits	552
For Sub-Frame 5	Bits	n/a
For Sub-Frame 0	Bits	552
For Sub-Frame 1,2,3,6,7,8	Bits	0 (MBSFN)
Max. Throughput averaged over 1 frame	kbps	76.8
UE Category		≥ 1
Note 1: 2 symbols allocated to PDCCH Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8] Note 3: MBSFN Subframe Allocation as defined in [5], one frame with 6 bits is chosen for MBSFN subframe allocation Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit		

Table A.3.3.1-6: Fixed Reference Channel QPSK R=1/10

Parameter	Unit	Value					
Reference channel					R.41 FDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks (Note 3)					50		
Allocated subframes per Radio Frame					9		
Modulation					QPSK		
Target Coding Rate					1/10		
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits				1384		
For Sub-Frame 5	Bits				N/A		
For Sub-Frame 0	Bits				1384		
Number of Code Blocks per Sub-Frame (Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9					1		
For Sub-Frame 5					N/A		
For Sub-Frame 0					1		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits				13800		
For Sub-Frame 5	Bits				N/A		
For Sub-Frame 0	Bits				12960		
Max. Throughput averaged over 1 frame	Mbps				1.246		
UE Category					≥ 1		
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

Table A.3.3.1-7: PCell Fixed Reference Channel for CA demodulation with power imbalance

Parameter	Unit	Value		
Reference channel		R.49 FDD	R.49-1 FDD	R.49-2 FDD
Channel bandwidth	MHz	20	10	5
Allocated resource blocks		100	50	25
Allocated subframes per Radio Frame		9	9	9
Modulation		64QAM	64QAM	64QAM
Coding Rate				
For Sub-Frame 1,2,3,4,6,7,8,9,		0.84	0.84	0.84
For Sub-Frame 5		N/A	N/A	N/A
For Sub-Frame 0		0.87	0.87	0.86
Information Bit Payload				
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	63776	31704	15840
For Sub-Frame 5	Bits	N/A	N/A	N/A
For Sub-Frame 0		63776	30576	14112
Number of Code Blocks per Sub-Frame (Note 3)				
For Sub-Frames 0,1,2,3,4,6,7,8,9	Code Blocks	11	6	3
For Sub-Frame 5	Code Blocks	N/A	N/A	N/A
Binary Channel Bits Per Sub-Frame			5	3
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	75600		
For Sub-Frame 5	Bits	N/A	37800	18900
For Sub-Frame 0	Bits	73080	N/A	N/A
Max. Throughput averaged over 1 frame	Mbps	57.398	35280	16380
UE Category		≥5	≥2	≥2
Note 1: 3 symbols allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).				

A.3.3.2 Multi-antenna transmission (Common Reference Symbols)

A.3.3.2.1 Two antenna ports

Table A.3.3.2.1-1: Fixed Reference Channel two antenna ports

Parameter	Unit	Value												
eference annel		R.10 FDD	R.10-2 FDD	R.11 FDD	R.11-1 FDD	R.11-2 FDD	R.11-3 FDD Note 5	R.11-4 FDD	R.30 FDD	R.30-1 FDD	R.35 FDD	R.35-1 FDD	R.35-2 FDD	R.35 FD
annel ndwidth	MHz	10	5	10	10	5	10	10	20	15	10	20	15	10
ocated source blocks ote 4)		50	25	50	50	25	40	50	100	75	50	100	75	50
ocated bframes per dio Frame		9	9	9	9	9	9	9	9	8	9	8	8	8
odulation		QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	QPSK	16QAM	16QAM	64QAM	64QAM	64QAM	64QM
rget Coding te		1/3	1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	0.39	0.39	0.3
ormation Bit yload (Note 4)														
or Sub-Frames ,3,4,6,7,8,9	Bits	4392	1800	12960	12960	5736	10296	6968	25456	19080	19848	30576	22920	152
or Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
or Sub-Frame 0	Bits	4392	1800	12960	N/A	4968	10296	6968	25456	N/A	18336	N/A	N/A	N/
mber of Code ocks otes 3 and 4)														
or Sub-Frames ,3,4,6,7,8,9	Bits	1	1	3	3	1	2	2	5	4	4	5	4	3
or Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
or Sub-Frame 0	Bits	1	1	3	N/A	1	2	2	5	N/A	3	N/A	N/A	N/
nary Channel s (Note 4)														
or Sub-Frames ,3,4,6,7,8,9	Bits	13200	6000	26400	26400	12000	21120	13200	52800	39600	39600	79200	59400	396
or Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/
or Sub-Frame 0	Bits	12384	5184	24768	N/A	10368	19488	12384	51168	N/A	37152	N/A	N/A	N/
ax. Throughput eraged over 1 me (Note 4)	Mbps	3.953	1.620	11.664	10.368	5.086	9.266	6.271	22.910	15.264	17.712	24.461	18.336	12.2
E Category		≥ 1	≥ 1	≥ 2	≥ 2	≥ 1	≥ 1	≥ 1	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2

te 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz.
te 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
te 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bi
te 4: Given per component carrier per codeword.
te 5: For R.11-3 resource blocks of RB6–RB45 are allocated.

Table A.3.3.2.1-2: Fixed Reference Channel two antenna ports

Parameter	Unit	Value								
Reference channel		R.46 FDD	R.47 FDD	R.35-4 FDD	R.11-5 FDD	R.11-6 FDD	R.11-7 FDD	R.11-8 FDD	R.11- 9 FDD	R.11 10 F
Channel bandwidth	MHz	10	10	10	1.4	3	15	10	10	10
Allocated resource blocks (Note 4)		50	50	50	6	15	75	50	50	50
Allocated subframes per Radio Frame		9	9	9	9	9	9	9	8	8
Allocated number of PDCCH symbols		2	2	2	4	3	2	2	3	3
Modulation		QPSK	16QAM	64QAM	16QAM	16QAM	16QAM	QPSK	QPSK	QPS
Target Coding Rate				0.47	1/2	1/2	1/2	3/5	0.58	0.67
Information Bit Payload (Note 4)										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	5160	8760	18336	1352	3368	19080	7992	6968	799
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	5160	8760	16416	N/A	2664	19080	6968	N/A	N/A
Number of Code Blocks (Notes 3 and 4)										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1	2	3	1	1	4	2	2	2
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	1	2	3	1	1	4	2	N/A	N/A
Binary Channel Bits (Note 4)										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	13200	26400	39600	2592	7200	39600	13200	12000	120
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	12384	24768	37152	N/A	5568	37968	12384	N/A	N/A
Max. Throughput averaged over 1 frame (Note 4)	Mbps	4.644	7.884	16.310	1.082	2.961	17.172	7.0904	5.5744	6.39
UE Category		≥ 1	≥ 1	≥ 2	≥ 1	≥ 1	≥ 2	≥ 2	≥ 1	≥ 1
UE DL Category		≥ 6	≥ 6	≥ 6	≥ 6	≥ 6	≥ 6	≥ 6		

Note 1: Void
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (other
Note 4: Given per component carrier per codeword.

Table A.3.3.2.1-3: Fixed Reference Channel two antenna ports for UE category 0

Parameter	Unit	Value	
Reference channel		R.62 FDD	R.63 FDD
Channel bandwidth	MHz	10	10
Allocated resource blocks (Note 4)		3	1
Allocated DL subframes per 4 Radio Frames (Note 3)		15	15
Modulation		16QAM	64QAM
Target Coding Rate		1/2	1/2
Information Bit Payload			
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	744	408
Number of Code Blocks			
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Code blocks	1	1
Binary Channel Bits			
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	1584	792
Max. Throughput averaged over 4 frames	Mbps	0.279	0.153
UE DL Category		0	0

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: The downlink subframes are scheduled at the 0th, 1st, 2nd, 8th, 9th, 10th, 16th, 17th, 18th, 24th, 25th, 26th, 32nd, 33rd, 34th subframes every 40ms. Information bit payload is available if downlink subframe is scheduled.
Note 4: Allocated PRB positions start from {9, 10, …, 9+N-1}, where N is the number of allocated resource blocks.

Table A.3.3.2.1-4: Fixed Reference Channel two antenna ports for UE category M1

Parameter	Unit	Values
Reference channel		R.79 FDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		3
Allocated DL subframes per Radio Frames (Note 3)		2
Modulation		16QAM
Target Coding Rate		1/2
Information Bit Payload		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	744
Number of Code Blocks		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Code blocks	1
Binary Channel Bits		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	1584
Max. Throughput averaged over 1 frame	Mbps	0.149
UE DL Category		M1, ≥ 0

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: The downlink subframes are scheduled at the 0th and 1st subframes every 10ms. Information bit payload is available if downlink subframe is scheduled (starting from 0th subframe). The corresponding MPDCCH is scheduled 2 subframes before the corresponding PDSCH transmissions.
Note 4: Allocated PRB positions for PDSCH are {3, 4, 5} within the assigned narrowband. Allocated PRB positions for MPDCCH are {0, 1} within the assigned narrowband.

Table A.3.3.2.1-5: Fixed Reference Channel two antenna ports for UE category M1

Parameter	Unit	Values
Reference channel		R.81 FDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		6
Allocated DL subframes per Y subframes (Note 3)		64
Modulation		QPSK
Target Coding Rate		1/10
Information Bit Payload		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	152
Number of Code Blocks		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Code blocks	1
Binary Channel Bits		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	1584
Max. Throughput	kbps	0.950
UE DL Category		M1, ≥ 0

Note 1: 2 symbols allocated to PDCCH
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]
Note 3: The downlink subframes are scheduled at the 65th to 128th subframes every 160 ms. Information bit payload is available at the 65th to 128th subframes with repetition. (Starting from the 0th subframe)
Note 4: Allocated PRB positions are {0, 1, 2, 3, 4, 5} within the assigned narrowband.
Note 5: MPDCCH are scheduled at the 0th to 63rd subframes with repetition. The allocated PRB positions are {0, 1, 2, 3, 4, 5} within the assigned narrowband. (Starting from the 0th subframe)

Table A.3.3.2.1-6: Fixed Reference Channel two antenna ports

Parameter	Unit	Values	
Reference channel		R.87 FDD	R.84 FDD
Channel bandwidth	MHz	10	10
Allocated resource blocks (Note 4)		50	39
Allocated number of PDCCH symbols		2	2
Allocated subframes per Radio subframes		8	9
Modulation		64QAM	16QAM
Target Coding Rate		0.39	1/2
Information Bit Payload (Note 4)			
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	15264	9912
For Sub-Frames 5	Bits	N/A	N/A
For Sub-Frames 0		N/A	9912
Number of Code Blocks(Notes 3 and 4)			
For Sub-Frames 1,2,3,4,6,7,8,9		3	2
For Sub-Frames 5		N/A	N/A
For Sub-Frames 0		N/A	2
Binary Channel Bits (Note 4)			
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	39600	20592
For Sub-Frames 5		N/A	N/A
For Sub-Frames 0		N/A	20592
Max. Throughput averaged over 1 frame (Note 4)	Mbps	12.211	8.9208
UE Category		≥ 1	1bis
UE DL Category		≥6	N/A

NOTE 1: Void.
NOTE 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 4: Given per component carrier per codeword.
NOTE 5: For R.84 FDD, 39 RBs are allocated on RB 0-20 and 30-47.

A.3.3.2.2 Four antenna ports

Table A.3.3.2.2-1: Fixed Reference Channel four antenna ports

arameter	Unit	Value												
ce channel		R.12 FDD	R.13 FDD	R.14 FDD	R.14-1 FDD	R.14-2 FDD	R.14-3 FDD	R.36 FDD	R.14-4 FDD	R.14-5 FDD	R.14-6 FDD	R.14-7 FDD	R.72 FDD	R.73 FDD
l bandwidth	MHz	1.4	10	10	10	10	20	10	1.4	3	5	15	10	10
d resource Note 4)		6	50	50	6	3	100	50	6	15	25	75	50	50
d subframes io Frame		9	9	9	8	8	9	9	8	9	9	9	9	9
ion		QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	64QAM	16QAM	16QAM	16QAM	16QAM	256QAM	64QAM
Coding Rate		1/3	1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	0.62	0.43
ion Bit Payload														
b-Frames 6,7,8,9	Bits	408	4392	12960	1544	744	25456	18336	1192	3368	5736	19080	31704	16416 (CW0) 32856 (CW1)
b-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
b-Frame 0	Bits	152	3624	11448	N/A	N/A	22920	18336	N/A	2664	4968	19080	31704	15264 (CW0) 30576 (CW1)
of Code 3 and 4)														
b-Frames 6,7,8,9		1	1	3	1	1	5	3	1	1	1	4	3	3 (CW0) 6 (CW1)
b-Frame 5		N/A	N/A	N/A	N/A	N/A	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
b-Frame 0		1	1	2	N/A	N/A	4	3	N/A	1	1	4	3	3 (CW0) 5 (CW1)
Channel Bits														
b-Frames 6,7,8,9	Bits	1248	12800	25600	3072	1536	51200	38400	2496	6960	11600	38400	51200	38400 (CW0) 76800 (CW1)
b-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
b-Frame 0	Bits	480	12032	24064	N/A	N/A	49664	36096	N/A	5424	10064	36864	48128	36096 (CW0) 72192 (CW1)
roughput d over 1 frame	Mbps	0.342	3.876	11.513	1.235	0.595	22.656	16.502	0.954	2.961	5.086	17.172	28.534	14.659 (CW0) 29.342 (CW1)
egory		≥ 1	≥ 1	≥ 2	≥ 1	≥ 1	≥ 2	≥ 2	≥ 1	≥ 1	≥ 1	≥ 2	≥ 11	≥ 5

2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symb allocated to PDCCH for 1.4 MHz.
Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Given per component carrier per codeword.

A.3.3.3 Reference Measurement Channel for UE-Specific Reference Symbols

A.3.3.3.0 Two antenna ports (no CSI-RS)

The reference measurement channels in Table A.3.3.3.0-1 apply with two CRS antenna ports and without CSI-RS.

Table A.3.3.3.0-1: Fixed Reference Channel without CSI-RS

Parameter	Unit	Value	
Reference channel		R.70 FDD	R.71 FDD
Channel bandwidth	MHz	10	10
Allocated resource blocks		50	50
Allocated subframes per Radio Frame		10	10
Modulation		QPSK	16QAM
Target Coding Rate		0.65	0.6
Information Bit Payload			
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	6968	12960
For Sub-Frame 5	Bits	N/A	N/A
For Sub-Frame 0	Bits	N/A	N/A
Number of Code Blocks per Sub-Frame (Note 4)			
For Sub-Frames 1,2,3,4,6,7,8,9		2	3
For Sub-Frame 5		N/A	N/A
For Sub-Frame 0		N/A	N/A
Binary Channel Bits Per Sub-Frame			
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	10800	21600
For Sub-Frame 5	Bits	N/A	N/A
For Sub-Frame 0	Bits	N/A	N/A
Max. Throughput averaged over 1 frame	Mbps	5.5744	10.368
UE Category		≥ 1	≥ 2
Note 1: 3 symbols allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).			

Table A.3.3.3.0-2: Fixed Reference Channel without CSI-RS for UE category M1

Parameter	Unit	Value
Reference channel		R.80 FDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		6
Allocated DL subframes per 32 subframes (Note 3)		8
Modulation		QPSK
Target Coding Rate		1/3
Information Bit Payload		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	504
Number of Code Blocks		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Code blocks	1
Binary Channel Bits		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	1440
Max. Throughput	kbps	15.75
UE DL Category		M1, ≥ 0
Note 1: 2 symbols allocated to PDCCH Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4] Note 3: The downlink subframes are scheduled at the 9th to 16th subframes every 32 ms. Information bit payload is available from the 9th to 16th subframes with repetition. (Starting from the 0th subframe) Note 4: Allocated PRB positions are {0, 1, 2, 3, 4, 5} within the assigned narrowband. Note 5: MPDCCH are scheduled at the 0th to 7th subframes with repetition. The allocated PRB positions are {0, 1, 2, 3, 4, 5} within the assigned narrowband. (Starting from the 0th subframe)		

A.3.3.3.1 Two antenna port (CSI-RS)

The reference measurement channels in Table A.3.3.3.1-1 apply for verifying demodulation performance for UE-specific reference symbols with two cell-specific antenna ports and two CSI-RS antenna ports.

Table A.3.3.3.1-1: Fixed Reference Channel for CDM-multiplexed DM RS with two CSI-RS antenna ports

Parameter	Unit	Value					
Reference channel		R.51 FDD	R.51-1 FDD	R.76 FDD	R.51-2 FDD	R.51-3 FDD	R.51-4 FDD
Channel bandwidth	MHz	10	10	10	5	15	20
Allocated resource blocks		50 (Note 3)	50 (Note 3)	50 (Note 3)	25 (Note 5)	75 (Note 6)	100 (Note 7)
Allocated subframes per Radio Frame		9	9	9	9	9	9
Modulation		16QAM	16QAM	QPSK	16QAM	16QAM	16QAM
Target Coding Rate		1/2	0.54		1/2	1/2	1/2
Information Bit Payload							
For Sub-Frames 1,4,6,9	Bits	11448	12960	6200	5736	16992	22920
For Sub-Frames 2,3,7,8	Bits	11448	12960	6200	5736	16992	22920
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	9528	10680	4968	3880	14112	19848
Number of Code Blocks (Note 4)							
For Sub-Frames 1,4,6,9	Code blocks	2	3	2	1	3	4
For Sub-Frames 2,3,7,8	Code blocks	2	3	2	1	3	4
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	2	2	1	1	3	4
Binary Channel Bits							
For Sub-Frames 1,4,6,9	Bits	24000	24000	12000	10800	36000	48000
For Sub-Frames 2,7		23600	23600	11800	10600	35400	47200
For Sub-Frames 3,8		23200	23200	12000	10400	34800	46400
For Sub-Frame 5	Bits	N/A	N/A	n/a	N/A	N/A	N/A
For Sub-Frame 0	Bits	19680	19680	9840	6912	30240	42240
Max. Throughput averaged over 1 frame	Mbps	10.1112	11.436	5.4568	4.9768	15.0048	20.3208
UE Category		≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: 50 resource blocks are allocated in sub-frames 1, 2, 3, 4, 6, 7, 8, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0.
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

The reference measurement channels in Table A3.3.3.1-2 apply for verifying demodulation performance for UE-specific reference symbols with two cell specific antenna ports and two CSI-RS antenna ports with ZP CSI-RS and NZP CSI-RS in same subframe.

Table A.3.3.3.1-2: Fixed Reference Channel for CDM-multiplexed DM RS with two CSI-RS antenna ports with ZP CSI-RS and NZP CSI-RS

Parameter	Unit	Value		
Reference channel		R.52 FDD	R.53 FDD	R.54 FDD
Channel bandwidth	MHz	10	10	10
Allocated resource blocks		50 (Note 3)	50 (Note 3)	50 (Note 3)
Allocated subframes per Radio Frame		9	9	9
Modulation		64QAM	64QAM	16QAM
Target Coding Rate		1/2	1/2	1/2
Information Bit Payload				
For Sub-Frames 1,3,4,6,8,9	Bits	18336	18336	11448
For Sub-Frames 2,7	Bits	16416	16416	11448
For Sub-Frame 5	Bits	n/a	n/a	n/a
For Sub-Frame 0	Bits	14688	14688	9528
Number of Code Blocks (Note 4)				
For Sub-Frames 1,3,4,6,8,9	Code blocks	3	3	2
For Sub-Frames 2, 7	Code blocks	3	3	2
For Sub-Frame 5	Bits	n/a	n/a	n/a
For Sub-Frame 0	Bits	3	3	2
Binary Channel Bits				
For Sub-Frames 1,3,4,6,8,9	Bits	36000	36000	24000
For Sub-Frames 2,7		34200	33600	22800
For Sub-Frame 5	Bits	n/a	n/a	n/a
For Sub-Frame 0	Bits	29520	29520	19680
Max. Throughput averaged over 1 frame	Mbps	15.7536	15.7536	10.1112

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: 50 resource blocks are allocated in sub-frames 1, 2, 3, 4, 6, 7, 8, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0.
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

A.3.3.3.2 Four antenna ports (CSI-RS)

The reference measurement channels in Table A.3.3.3.2-1 apply for verifying demodulation performance for UE-specific reference symbols with two cell-specific antenna ports and four CSI-RS antenna ports.

Table A.3.3.3.2-1: Fixed Reference Channel for CDM-multiplexed DM RS with four CSI-RS antenna ports

Parameter	Unit	Value						
ference channel		R.43 FDD	R.43-1 FDD	R.43-2 FDD	R.50 FDD	R.48 FDD	R.66 FDD	R.75 FD
annel bandwidth	MHz	10	10	10	10	10	10	10
ocated resource blocks		50 (Note 3)	50 (Note 3)	50 (Note 5)	50 (Note 3)	50 (Note 3)	50 (Note 3)	50 (Not 3)
ocated subframes per Radio Frame		9	9	9	9	9	9	9
dulation		QPSK	QPSK	QPSK	64QAM	QPSK	256QAM	16QAM
rget Coding Rate		1/3	1/3	1/3	1/2		0.77	0.57
ormation Bit Payload								
or Sub-Frames 1,4,6,9	Bits	3624	3624	3624	18336	6200	36696	25456
or Sub-Frames 2,3,7,8	Bits	3624	3624	3624	16416	6200	35160	25456
or Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A
or Sub-Frame 0	Bits	2984	2984	3368	14688	4968	30576	21384
mber of Code Blocks (Note 4)								
or Sub-Frames 1,4,6,9	Code blocks	1	1	1	3	2	6	5
or Sub-Frames 2,3,7,8	Code blocks	1	1	1	3	2	6	5
or Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A
or Sub-Frame 0	Bits	1	1	1	3	1	5	4
ıary Channel Bits								
r Sub-Frames 1,6	Bits	12000	13200	13200	36000	12000	48000	43200
or Sub-Frames 4,9	Bits	12000	12000	12000	36000	12000	48000	43200
or Sub-Frames 2,7	Bits	11600	12800	12800	34800	11600	46400	41600
or Sub-Frames 3,8	Bits	11600	12800	12800	34800	12000	46400	41600
or Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A
or Sub-Frame 0	Bits	9840	9840	10560	29520	9840	39360	35424
ıx. Throughput averaged over 1 me	Mbps	3.1976	3.1976	3.236	15.3696	5.4568	31.800	22.503
Category		≥ 1	≥ 1	≥ 1	≥ 2	≥ 1	11-12	≥ 5
DL Category		≥ 6	≥ 6	≥ 6	≥ 6	≥ 6	≥ 11	≥ 6

te 1: 2 symbols allocated to PDCCH.
te 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
te 3: 50 resource blocks are allocated in sub-frames 1, 2, 3, 4, 6, 7, 8, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated sub-frame 0.
te 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit
te 5: 50 resource blocks are allocated in sub-frames 1, 2, 3, 4, 6, 7, 8, 9 and 47 resource blocks (RB0–RB23 and RB27–RB49) are allocated sub-frame 0. In sub-frame 0, PDSCH is rate matched around RB22, RB23 and RB27.

The reference measurement channels in Table A.3.3.3.2-2 apply for verifying FDD PMI accuracy measurement with two CRS antenna ports and four CSI-RS antenna ports.

Table A.3.3.3.2-2: Fixed Reference Channel for four antenna ports (CSI-RS)

Parameter	Unit	Value			
Reference channel		R.44 FDD	R.45 FDD	R.45-1 FDD	R.60 FDD
Channel bandwidth	MHz	10	10	10	10
Allocated resource blocks		50[3]	50[3]	39	50[3]
Allocated subframes per Radio Frame		10	10	10	10
Modulation		QPSK	16QAM	16QAM	QPSK
Target Coding Rate		1/3	1/2	1/2	1/2
Information Bit Payload					
For Sub-Frames (Non CSI-RS subframe)	Bits	3624	11448	8760	6200
For Sub-Frames (CSI-RS subframe)	Bits	3624	11448	8760	6200
For Sub-Frames (ZeroPowerCSI-RS subframe)	Bits	n/a	n/a	n/a	N/A
For Sub-Frame 5	Bits	n/a	n/a	n/a	N/A
For Sub-Frame 0	Bits	2984	9528	8760	N/A
Number of Code Blocks per Sub-Frame (Note 4)					
For Sub-Frames (Non CSI-RS subframe)		1	2	2	2
For Sub-Frames (CSI-RS subframe)		1	2	2	2
For Sub-Frames (ZeroPowerCSI-RS subframe)	Bits	n/a	n/a	n/a	N/A
For Sub-Frame 5		n/a	n/a	n/a	N/A
For Sub-Frame 0		1	2	2	N/A
Binary Channel Bits Per Sub-Frame					
For Sub-Frames (Non CSI-RS subframe)	Bits	12000	24000	18720	12000
For Sub-Frames (CSI-RS subframe)	Bits	11600	23200	18096	11600
For Sub-Frames (ZeroPowerCSI-RS subframe)	Bits	n/a	n/a	n/a	N/A
For Sub-Frame 5	Bits	n/a	n/a	n/a	N/A
For Sub-Frame 0	Bits	9840	19680	18720	N/A
Max. Throughput averaged over 1 frame	Mbps	3.1976	10.1112	7.884	4.96
UE Category		≥ 1	≥ 2	≥ 1	≥ 1

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: For R.44, R.45 and R.60, 50 resource blocks are allocated in sub-frames 1, 2, 3, 4, 6, 7, 8, 9 and 41 resource blocks (RB0-RB20 and RB30-RB49) are allocated in sub-frame 0. For R.45-1, 39 resource blocks are allocated in all subframes (RB0–RB20 and RB30–RB47).
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Table A.3.3.3.2-3: Fixed Reference Channel for CDM-multiplexed DM RS with four CSI-RS antenna ports

Parameter	Unit	Value
Reference channel		R.64 FDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		6
Allocated subframes per 4 Radio Frames		15
Modulation		QPSK
Target Coding Rate		1/3
Information Bit Payload		
For Sub-Frames 0,1,4,5,6,9 (Note 3)	Bits	504
For Sub-Frames 2,3,7,8 (Note 3)	Bits	504
Number of Code Blocks		
For Sub-Frames 0,1,4,5,6,9	Code blocks	1
For Sub-Frames 2,3,7,8	Code blocks	1
Binary Channel Bits		
For Sub-Frames 0,1,4,5,6,9	Bits	1440
For Sub-Frames 2,3,7,8	Bits	1392
Max. Throughput averaged over 4 frames	Mbps	0.189
UE DL Category		0
Note 1: 2 symbols allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 3: The downlink subframes are scheduled at the 0th, 1st, 2nd, 8th, 9th, 10th, 16th, 17th, 18th, 24th, 25th, 26th, 32nd, 33rd, 34th subframes every 40ms. Information bit payload is available if downlink subframe is scheduled. Note 4: Allocated PRB positions start from {9, 10, …, 9+N-1}, where N is the number of allocated resource blocks.		

The reference measurement channels in Table A.3.3.3.2-4 apply with two CRS antenna ports and four CSI-RS antenna ports.

Table A.3.3.3.2-4: Fixed Reference Channel for four antenna ports (CSI-RS)

Parameter	Unit	Value
Reference channel		R.69 FDD
Channel bandwidth	MHz	10
Allocated resource blocks		50
Allocated subframes per Radio Frame		10
Modulation		QPSK
Target Coding Rate		
For Sub-Frames 2,3,4,6,7,8,9		0.74
For Sub-Frame 1		0.8
Information Bit Payload		
For Sub-Frames 2,3,4,6,7,8,9	Bits	7992
For Sub-Frame 1	Bits	7992
For Sub-Frame 5	Bits	N/A
For Sub-Frame 0	Bits	N/A
Number of Code Blocks per Sub-Frame (Note 4)		
For Sub-Frames 2,3,4,6,7,8,9		2
For Sub-Frame 1		2
For Sub-Frame 5		N/A
For Sub-Frame 0		N/A
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 2,3,4,6,7,8,9	Bits	10800
For Sub-Frame 1	Bits	10000
2 For Sub-Frame 5	Bits	N/A
For Sub-Frame 0	Bits	N/A
Max. Throughput averaged over 1 frame	Mbps	6.3936
UE Category		≥ 1

Note 1: 3 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

A.3.4 Reference measurement channel for PDSCH performance requirements (TDD)

A.3.4.1 Single-antenna transmission (Common Reference Symbols)

Table A.3.4.1-1: Fixed Reference Channel QPSK R=1/3

Parameter	Unit	Value						
Reference channel		R.4 TDD	R.42 TDD	R.2A TDD	R.2 TDD	R.42-1 TDD	R.42-2 TDD	R.42-3 TDD
Channel bandwidth	MHz	1.4	20	10	10	3	5	15
Allocated resource blocks (Note 6)		6	100	50	50	15	25	75
Uplink-Downlink Configuration (Note 4)		1	1	2	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3	3+2	5+2	3+2	3+2	3+2	3+2
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3	1/3
Information Bit Payload (Note 6)								
For Sub-Frames 4,9	Bits	408	8760	4392	4392	1320	2216	6712
For Sub-Frames 1,6	Bits	N/A	7736	3240	3240	1128	1864	5992
For Sub-Frames 3,8	Bits	N/A	N/A	4392	N/A	N/A	N/A	N/A
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	208	8760	4392	4392	1064	1800	6712
Number of Code Blocks (Notes 5 and 6)								
For Sub-Frames 4,9		1	2	1	1	1	1	2
For Sub-Frames 1,6		N/A	2	1	1	1	1	1
For Sub-Frames 3,8		N/A	N/A	1	N/A	N/A	N/A	N/A
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		1	2	1	1	1	1	2
Binary Channel Bits (Note 6)								
For Sub-Frames 4,9	Bits	1368	27600	13800	13800	3780	6300	20700
For Sub-Frames 1,6	Bits	N/A	22656	11256	11256	3276	5556	16956
For Sub-Frames 3,8		N/A	N/A	13800	N/A	N/A	N/A	N/A
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	672	26904	13104	13104	3084	5604	20004
Max. Throughput averaged over 1 frame (Note 6)	Mbps	0.102	4.175	2.844	1.966	0.596	0.996	3.212
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1	≥ 1

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: For BW=1.4 MHz, the information bit payloads of special subframes are set to zero (no scheduling) to avoid problems with insufficient PDCCH performance at the test point.
Note 3: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 4: As per Table 4.2-2 in TS 36.211 [8].
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 6: Given per component carrier per codeword.

Table A.3.4.1-2: Fixed Reference Channel 16QAM R=1/2

Parameter	Unit	Value					
Reference channel				R.3-1 TDD	R.3 TDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	50		
Uplink-Downlink Configuration (Note 3)				1	1		
Allocated subframes per Radio Frame (D+S)				3+2	3+2		
Modulation				16QAM	16QAM		
Target Coding Rate				1/2	1/2		
Information Bit Payload							
For Sub-Frames 4,9	Bits			6456	14112		
For Sub-Frames 1,6	Bits			5160	11448		
For Sub-Frame 5	Bits			n/a	n/a		
For Sub-Frame 0	Bits			5736	12960		
Number of Code Blocks per Sub-Frame (see Note 4)							
For Sub-Frames 4,9				2	3		
For Sub-Frames 1,6				1	2		
For Sub-Frame 5				n/a	n/a		
For Sub-Frame 0				1	3		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits			12600	27600		
For Sub-Frames 1,6	Bits			11112	22512		
For Sub-Frame 5	Bits			n/a	n/a		
For Sub-Frame 0	Bits			11208	26208		
Max. Throughput averaged over 1 frame	Mbps			2.897	6.408		
UE Category				≥ 1	≥ 2		

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: As per Table 4.2-2 in TS 36.211 [8]
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.4.1-3: Fixed Reference Channel 64QAM R=3/4

Parameter	Unit	Value					
Reference channel			R.5 TDD	R.6 TDD	R.7 TDD	R.8 TDD	R.9 TDD
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks			15	25	50	75	100
Uplink-Downlink Configuration (Note 3)			1	1	1	1	1
Allocated subframes per Radio Frame (D+S)			3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate			3/4	3/4	3/4	3/4	3/4
Information Bit Payload							
For Sub-Frames 4,9	Bits		8504	14112	30576	46888	61664
For Sub-Frames 1,6	Bits		6968	11448	23688	35160	46888
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		6968	12576	30576	45352	61664
Number of Code Blocks per Sub-Frame (see Note 4)							
For Sub-Frames 4,9			2	3	5	8	11
For Sub-Frames 1,6			2	2	4	6	8
For Sub-Frame 5			n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0			2	3	5	8	11
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits		11340	18900	41400	62100	82800
For Sub-Frames 1,6	Bits		9828	16668	33768	50868	67968
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		9252	16812	39312	60012	80712
Max. Throughput averaged over 1 frame	Mbps		3.791	6.370	13.910	20.945	27.877
UE Category			≥ 1	≥ 2	≥ 2	≥ 2	≥ 3

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: As per Table 4.2-2 TS 36.211 [8]
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.4.1-3a: Fixed Reference Channel 64QAM R=3/4

Parameter	Unit		Value				
Reference channel			R.6-1 TDD	R.7-1 TDD	R.8-1 TDD	R.9-1 TDD	R.9-2 TDD
Channel bandwidth	MHz		5	10	15	20	20
Allocated resource blocks (Note 3)			18	17	17	17	83
Uplink-Downlink Configuration (Note 4)			1	1	1	1	1
Allocated subframes per Radio Frame (D+S)			3+2	3+2	3+2	3+2	3+2
Modulation			64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate			3/4	3/4	3/4	3/4	3/4
Information Bit Payload							
For Sub-Frames 4,9	Bits		10296	10296	10296	10296	51024
For Sub-Frames 1,6	Bits		8248	7480	7480	7480	39232
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		8248	10296	10296	10296	51024
Number of Code Blocks per Sub-Frame (Note 5)							
For Sub-Frames 4,9			2	2	2	2	9
For Sub-Frames 1,6			2	2	2	2	7
For Sub-Frame 5			n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0			2	2	2	2	9
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits		13608	14076	14076	14076	68724
For Sub-Frames 1,6	Bits		11880	11628	11628	11628	56340
For Sub-Frame 5	Bits		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits		11520	14076	14076	14076	66636
Max. Throughput averaged over 1 frame	Mbps		4.534	4.585	4.585	4.585	23.154
UE Category			≥ 1	≥ 1	≥ 1	≥ 1	≥ 2

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: Localized allocation started from RB #0 is applied.
Note 4: As per Table 4.2-2 TS 36.211 [8]
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.4.1-4: Fixed Reference Channel Single PRB

Parameter	Unit	Value					
Reference channel			R.0 TDD		R.1 TDD		
Channel bandwidth	MHz	1.4	3	5	10/20	15	20
Allocated resource blocks			1		1		
Uplink-Downlink Configuration (Note 3)			1		1		
Allocated subframes per Radio Frame (D+S)			3+2		3+2		
Modulation			16QAM		16QAM		
Target Coding Rate			1/2		1/2		
Information Bit Payload							
For Sub-Frames 4,9	Bits		224		256		
For Sub-Frames 1,6	Bits		208		208		
For Sub-Frame 5	Bits		n/a		n/a		
For Sub-Frame 0	Bits		224		256		
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frames 4,9			1		1		
For Sub-Frames 1,6			1		1		
For Sub-Frame 5			n/a		n/a		
For Sub-Frame 0			1		1		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits		504		552		
For Sub-Frames 1,6	Bits		456		456		
For Sub-Frame 5	Bits		n/a		n/a		
For Sub-Frame 0	Bits		504		552		
Max. Throughput averaged over 1 frame	Mbps		0.109		0.118		
UE Category			≥ 1		≥ 1		

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: As per Table 4.2-2 in TS 36.211 [8]
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.4.1-5: Fixed Reference Channel Single PRB (MBSFN Configuration)

Parameter	Unit	Value
Reference channel		R.29 TDD (MBSFN)
Channel bandwidth	MHz	10
Allocated resource blocks		1
MBSFN Configuration		010010
Uplink-Downlink Configuration (Note 4)		1
Allocated subframes per Radio Frame (D+S)		1+2
Modulation		16QAM
Target Coding Rate		1/2
Information Bit Payload		
For Sub-Frames 4,9	Bits	0 (MBSFN)
For Sub-Frames 1,6	Bits	208
For Sub-Frame 5	Bits	n/a
For Sub-Frame 0	Bits	256
Number of Code Blocks per Sub-Frame (Note 4)		
For Sub-Frames 4,9	Bits	0 (MBSFN)
For Sub-Frames 1,6	Bits	1
For Sub-Frame 5	Bits	n/a
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 4,9	Bits	0 (MBSFN)
For Sub-Frames 1,6	Bits	456
For Sub-Frame 5	Bits	n/a
For Sub-Frame 0	Bits	552
Max. Throughput averaged over 1 frame	kbps	67.2
UE Category		≥ 1

Note 1: 2 symbols allocated to PDCCH
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]
Note 3: MBSFN Subframe Allocation as defined in [5], one frame with 6 bits is chosen for MBSFN subframe allocation
Note 4: As per Table 4.2-2 in TS 36.211 [8]
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.3.4.1-7: Fixed Reference Channel for CA demodulation with power imbalance

Parameter	Unit	Value	
Reference channel		R.49 TDD	R.49-1 TDD
Channel bandwidth	MHz	20	15
Allocated resource blocks		100	75
Uplink-Downlink Configuration (Note 1)		1	1
Allocated subframes per Radio Frame (D+S)		3+2	3+2
Modulation		64QAM	64QAM
Number of OFDM symbols for PDCCH per component carrier			
For Sub-Frames 0,4,5,9	OFDM symbols	3	3
For Sub-Frames 1,6	OFDM symbols	2	2
Target Coding Rate			
For Sub-Frames 4,9		0.84	0.83
For Sub-Frames 1,6		0.81	0.80
For Sub-Frames 5		N/A	N/A
For Sub-Frames 0		0.87	0.86
Information Bit Payload			
For Sub-Frames 0, 4, 9	Bits	63776	46888
For Sub-Frame 1,6	Bits	55056	40576
For Sub-Frame 5	Bits	N/A	N/A
Number of Code Blocks per Sub-Frame (Note 2)			
For Sub-Frames 0, 4, 9	Code Blocks	11	8
For Sub-Frame 1,6	Code Blocks	9	7
For Sub-Frame 5	Code Blocks	N/A	N/A
Binary Channel Bits Per Sub-Frame			
For Sub-Frames 4,9	Bits	75600	56700
For Sub-Frame 1,6	Bits	67968	50868
For Sub-Frame 5	Bits	N/A	N/A
For Sub-Frame 0	Bits	73512	54612
Max. Throughput averaged over 1 frame	Mbps	30.144	22.182
UE Category		≥5	≥ 3
Note 1: Reference signal, synchronization signals and PBC allocated as per TS 36.211 [4].			
Note 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).			

A.3.4.2 Multi-antenna transmission (Common Reference Symbols)

A.3.4.2.1 Two antenna ports

Table A.3.4.2.1-1: Fixed Reference Channel two antenna ports

Parameter	Unit	Value										
Reference channel		R.10 TDD	R.11 TDD	R.11-1 TDD	R.11-2 TDD	R.11-3 TDD (Note 6)	R.11-4 TDD	R.30 TDD	R.30-1 TDD	R.30-2 TDD	R.35 TDD	R.35-1 TDD
Channel bandwidth	MHz	10	10	10	5	10	10	20	20	20	10	20
Allocated resource blocks		50	50	50	25	40	50	100	100	100	50	100
Uplink-Downlink Configuration (Note 3)		1	1	1	1	1	1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3+2	3+2	2+2	3+2	3+2	2	3+2	+2	2	2+2	2
Modulation		QPSK	16QAM	16QAM	16QAM	16QAM	QPSK	16QAM	16QAM	16QAM	64QAM	64QAM
Target Coding Rate		1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	0.39
Information Bit Payload (Note 5)												
For Sub-Frames 4,9	Bits	4392	12960	12960	5736	10296	6968	25456	25456	25456	19848	30576
For Sub-Frames 1,6		3240	9528	9528	5160	9144	n/a	22920	21384	n/a	15840	n/a
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	4392	12960	n/a	4968	10296	n/a	25456	n/a	n/a	n/a	n/a
Number of Code Blocks per Sub-Frame (Note 4 and 5)												
For Sub-Frames 4,9		1	3	3	1	2	2	5	5	5	4	5
For Sub-Frames 1,6		1	2	2	1	2	n/a	4	4	n/a	3	n/a
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		1	3	n/a	1	2	n/a	5	n/a	n/a	n/a	n/a
Binary Channel Bits Per Sub-Frame(Note 5)												
For Sub-Frames 4,9	Bits	13200	26400	26400	12000	21120	13200	52800	52800	52800	39600	79200
For Sub-Frames 1,6		10656	21312	21312	10512	16992	10656	42912	42912	n/a	31968	n/a
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	12528	25056	n/a	10656	19776	12528	51456	n/a	n/a	n/a	n/a
Max. Throughput averaged over 1 frame (Note 5)	Mbps	1.966	5.794	4.498	2.676	4.918	1.39	12.221	9.368	5.091	7.138	6.115
UE Category		≥ 1	≥ 2	≥ 2	≥ 1	≥ 1	≥ 1	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: As per Table 4.2-2 in TS 36.211 [8].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: Given per component carrier per codeword.
Note 6: For R.11-3 resource blocks of RB6–RB45 are allocated.

Table A.3.4.2.1-2: Fixed Reference Channel two antenna ports

Parameter	Unit	Value										
Reference channel		R.46 TDD	R.47 TDD	R.35-2 TDD	R.11-5 TDD	R.11-6 TDD	R.11-7 TDD	R.11-8 TDD	R.11-9 TDD	R.11-10 TDD	R.11-11 TDD	R.11-12 TDD
Channel bandwidth	MHz	10	10	10	1.4	3	5	10	15	10	10	10
Allocated resource blocks (Note 5)		50	50	50	6	15	25	50	75	50	50	50
Uplink-Downlink Configuration (Note 3)		1	1	1	1	1	1	1	1	1	1	1
Allocated number of PDCCH symbols in normal subframes		2	2	2	4	3	3	2	2	2	3	3
Allocated number of PDCCH symbols in special subframes		2	2	2	2	2	2	2	2	2	2	2
Allocated subframes per Radio Frame (D+S)		3+2	3+2	2+2	2+2	2+2	2+2	2+2	2+2	3+2	2+2	2+2
Modulation		QPSK	16QAM	64QAM	16QAM	16QAM	16QAM	16QAM	16QAM	QPSK	QPSK	QPSK
Target Coding Rate				0.47	1/2	1/2	1/2	1/2	1/2	3/5		
For Sub-Frames 4,9											0.58	0.66
For Sub-Frames 1,6											0.48	0.54
Information Bit Payload (Note 5)												
For Sub-Frames 4,9	Bits	5160	8760	18336	1352	3368	5736	12960	19080	7992	6968	7992
For Sub-Frames 1,6		3880	7480	14688	1128	3112	5160	10680	15840	5736	5160	5736
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	5160	8760	N/A	N/A	N/A	N/A	N/A	N/A	7992	N/A	N/A
Number of Code Blocks (Notes 4 and 5)												
For Sub-Frames 4,9		1	2	3	1	1	1	3	4	2	2	2
For Sub-Frames 1,6		1	2	3	1	1	1	2	3	1	1	1
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		1	2	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A
Binary Channel Bits (Note 5)												
For Sub-Frames 4,9	Bits	13200	26400	39600	2592	7200	12000	26400	39600	13200	12000	12000
For Sub-Frames 1,6		10656	21312	31968	2304	6192	10512	21312	32112	10656	10656	10656
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	12528	25056	N/A	N/A	N/A	N/A	N/A	N/A	12528	N/A	N/A
Max. Throughput averaged over 1 frame (Note 5)	Mbps	2.324	4.124	6.604	0.496	1.296	2.179	4.498	6.984	3.5448	2.4256	2.7456
UE Category		≥ 1	≥ 1	≥ 2	≥ 1	≥ 1	≥ 1	≥ 2	≥ 2	≥ 2	≥ 1	≥ 1

Note 1: Void.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: As per Table 4.2-2 in TS 36.211 [8].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: Given per component carrier per codeword.

Table A.3.4.2.1-3: Fixed Reference Channel two antenna ports for UE category 0

Parameter	Unit	Value	
Reference channel		R.62 TDD	R.63 TDD
Channel bandwidth	MHz	10	10
Allocated resource blocks (Note 4)		3	1
Uplink-Downlink Configuration (Note 3)		1	1
Allocated subframes per Radio Frame (D+S)		4+2	4+2
Modulation		16QAM	64QAM
Target Coding Rate		1/2	1/2
Information Bit Payload			
For Sub-Frames 0,4,5,9	Bits	744	408
For Sub-Frames 1,6	Bits	440	280
Number of Code Blocks			
For Sub-Frames 0,4,5,9	Code blocks	1	1
For Sub-Frames 1,6	Code blocks	1	1
Binary Channel Bits			
For Sub-Frames 0,4,5,9	Bits	1584	792
For Sub-Frames 1,6		1296	648
Max. Throughput averaged over 1 frame	Mbps	0.3856	0.2192
UE DL Category		0	0
Note 1: 2 symbols allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 3: As per Table 4.2-2 in TS 36.211 [8]. Note 4: Allocated PRB positions start from {9, 10, …, 9+N-1}, where N is the number of allocated resource blocks.			

Table A.3.4.2.1-4: Fixed Reference Channel two antenna ports

Parameter	Unit	Value	
Reference channel		R.65 TDD	
Channel bandwidth	MHz	20	
Allocated resource blocks (Note 5)		100	
Uplink-Downlink Configuration (Note 3)		1	
Allocated subframes per Radio Frame (D+S)		2+2	
Modulation		256QAM	
Target Coding Rate			
Information Bit Payload (Note 5)			
For Sub-Frames 4,9	Bits	63776	
For Sub-Frames 1,6		46888	
For Sub-Frame 5	Bits	N/A	
For Sub-Frame 0	Bits	N/A	
Number of Code Blocks (Notes 4 and 5)			
For Sub-Frames 4,9		11	
For Sub-Frames 1,6		9	
For Sub-Frame 5		N/A	
For Sub-Frame 0		N/A	
Binary Channel Bits (Note 5)			
For Sub-Frames 4,9	Bits	115200	
For Sub-Frames 1,6		95424	
For Sub-Frame 5	Bits	N/A	
For Sub-Frame 0	Bits	N/A	
Max. Throughput averaged over 1 frame (Note 5)	Mbps	22.133	
UE Category		11-12	
UE DL Category		≥ 11	

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH. For 256QAM reference channel 1 symbol is allocated.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: As per Table 4.2-2 in TS 36.211 [4].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: Given per component carrier per codeword

Table A.3.4.2.1-5: Fixed Reference Channel two antenna ports when *EIMTA-MainConfigServCell-r12* is configured

Parameter	Unit	Value						
Reference channel		R.67 TDD						
Channel bandwidth	MHz	10						
Allocated resource blocks (Note 5)		50						
Modulation		16QAM						
Target Coding Rate		0.4						
Dynamic Uplink-Downlink Configuration (Note 3)		0	1	2	3	4	5	6
Allocated subframes per Radio Frame (D+S)		1+2	3+2	5+2	5+1	6+1	7+1	2+2
Information Bit Payload (Note 5)								
For Sub-Frame 0	Bits	9912	9912	9912	9912	9912	9912	9912
For Sub-Frame 1	Bits	7480	7480	7480	7480	7480	7480	7480
For Sub-Frame 2	Bits	NA	NA	NA	NA	NA	NA	NA
For Sub-Frame 3	Bits	NA	NA	9912	NA	NA	9912	NA
For Sub-Frame 4	Bits	NA	9912	9912	NA	9912	9912	NA
For Sub-Frame 5	Bits	NA	NA	NA	NA	NA	NA	NA
For Sub-Frame 6	Bits	7480	7480	7480	9912	9912	9912	7480
For Sub-Frame 7	Bits	NA	NA	NA	9912	9912	9912	NA
For Sub-Frame 8	Bits	NA	NA	9912	9912	9912	9912	NA
For Sub-Frame 9	Bits	NA	9912	9912	9912	9912	9912	9912

Number of Code Blocks (Notes 4 and 5)								
For Sub-Frame 0		2	2	2	2	2	2	2
For Sub-Frame 1		2	2	2	2	2	2	2
For Sub-Frame 2		NA	NA	NA	NA	NA	NA	NA
For Sub-Frame 3		NA	NA	2	NA	NA	2	NA
For Sub-Frame 4		NA	2	2	NA	2	2	NA
For Sub-Frame 5		NA	NA	NA	NA	NA	NA	NA
For Sub-Frame 6		2	2	2	2	2	2	2
For Sub-Frame 7		NA	NA	NA	2	2	2	NA
For Sub-Frame 8		NA	NA	2	2	2	2	NA
For Sub-Frame 9		NA	2	2	2	2	2	2
Binary Channel Bits (Note 5)								
For Sub-Frame 0	Bits	25056	25056	25056	25056	25056	25056	25056
For Sub-Frame 1	Bits	21312	21312	21312	21312	21312	21312	21312
For Sub-Frame 2	Bits	NA	NA	NA	NA	NA	NA	NA
For Sub-Frame 3	Bits	NA	NA	26400	NA	NA	26400	NA
For Sub-Frame 4	Bits	NA	26400	26400	NA	26400	26400	NA
For Sub-Frame 5	Bits	NA	NA	NA	NA	NA	NA	NA
For Sub-Frame 6	Bits	21312	21312	21312	26112	26112	26112	21312
For Sub-Frame 7	Bits	NA	NA	NA	26400	26400	26400	NA
For Sub-Frame 8	Bits	NA	NA	26400	26400	26400	26400	NA
For Sub-Frame 9	Bits	NA	26400	26400	26400	26400	26400	26400
Max. Throughput averaged over 1 frame (Note 5)	Mbps	2.49	4.47	6.45	5.70	6.70	7.69	3.48
Max. Throughput averaged over 1 frame and over all dynamic UL-DL configurations (Note 5)	Mbps	5.28						
UE Category		≥ 1						

Note 1: 2 OFDM symbols are allocated to PDCCH in all subframes
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: As per Table 4.2-2 in TS 36.211 [4].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: Given per component carrier per codeword.

Table A.3.4.2.1-6: Fixed Reference Channel two antenna ports

Parameter	Unit	Values
Reference channel		R.79 TDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		3
Allocated subframes per Radio Frame (D+S)		4+2
Modulation		16QAM
Target Coding Rate		1/2
Information Bit Payload		
For Sub-Frames 0,4,5,9	Bits	744
For Sub-Frames 1,6	Bits	440
Number of Code Blocks		
For Sub-Frames 0,4,5,9	Code blocks	1
For Sub-Frames 0,4,5,9	Code blocks	1
Binary Channel Bits		
For Sub-Frames 0,4,5,9	Bits	1584
For Sub-Frames 1,6	Bits	1296
Max. Throughput averaged over 1 frames	Mbps	0.3856
UE DL Category		M1, ≥ 0

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: As per Table 4.2-2 in TS 36.211 [4].
Note 4: Allocated PRB positions for PDSCH are {3, 4, 5} within the assigned narrowband. Allocated PRB positions for MPDCCH are {0, 1} within the assigned narrowband.

Table A.3.4.2.1-7: Fixed Reference Channel two antenna ports for UE category M1

Parameter	Unit	Value
Reference channel		R.81 TDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		6
Uplink-Downlink Configuration (Note 3)		1
Allocated subframes per Radio Frame (D+S)		4+2
Modulation		QPSK
Target Coding Rate		1/10
Information Bit Payload		
For Sub-Frames 0,4,5,9	Bits	152
For Sub-Frames 1,6	Bits	N/A
Number of Code Blocks		
For Sub-Frames 0,4,5,9	Code blocks	1
For Sub-Frames 1,6	Code blocs	N/A
Binary Channel Bits		
For Sub-Frames 0,4,5,9	Bits	1584
For Sub-Frames 1,6		N/A
Max. Throughput averaged over 384 sub-frame	kbps	0.396
UE DL Category		M1, ≥ 0

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: As per Table 4.2-2 in TS 36.211 [4].
Note 4: Allocated PRB positions are {0, 1, 2, 3, 4, 5} within the assigned narrowband.
Note 5: MPDCCH are scheduled at the 0th to 63rd BL/CE DL subframes with repetition every 384 ms. The allocated PRB positions are {0, 1, 2, 3, 4, 5} within the assigned narrowband. The associated PDSCH is scheduled at the 65th to 128th BL/CE DL subframes with repetition every 384ms. (starting from the 0th subframe). If it is not the BL/CE DL subframes, MPDCCH/PDSCH transmission is postponed until the next BL/CE DL subframe. Note the DL subframes in the TDD uplink-downlink configuration are considered as the BL/CE DL subframes.

Table A.3.4.2.1-8: Fixed Reference Channel two antenna ports

Parameter	Unit	Values
Reference channel		R.87 TDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		50
Uplink-Downlink Configuration (Note 2)		1
Allocated number of PDCCH symbols		2
Allocated subframes per Radio Frame (D+S)		2+2
Modulation		64QAM
Target Coding Rate		
For Sub-Frames 4,9		0.39
For Sub-Frames 1,6		0.36
Information Bit Payload (Note 4)		
For Sub-Frames 4,9	Bits	15264
For Sub-Frames 1,6	Bits	11448
For Sub-Frames 0,5	Bits	N/A
Number of Code Blocks(Notes 3 and 4)		
For Sub-Frames 4,9		3
For Sub-Frames 1,6		2
For Sub-Frames 0,5		N/A
Binary Channel Bits (Note 4)		
For Sub-Frames 4,9	Bits	39600
For Sub-Frames 1,6		31968
For Sub-Frames 0,5		N/A
Max. Throughput averaged over 1 frame (Note 4)	Mbps	5.342
UE Category		≥ 1
NOTE 1: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]. NOTE 2: As per Table 4.2-2 in TS 36.211 [4]. NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 4: Given per component carrier per codeword.		

A.3.4.2.2 Four antenna ports

Table A.3.4.2.2-1: Fixed Reference Channel four antenna ports

neter	Unit	Value													
channel		R.12 TDD	R.13 TDD	R.14 TDD	R.14-1 TDD	R.14-2 TDD	R.43 TDD	R.36 TDD	R.43-1 TDD	R.43-2 TDD	R.43-3 TDD	R.43-4 TDD	R.43-5 TDD	R.72 TDD	R.73 TDD
ndwidth	MHz	1.4	10	10	10	10	20	10	1.4	3	5	10	15	10	10
esource e 6)		6	50	50	6	3	100	50	6	15	25	50	75	50	50
nlink on (Note		1	1	1	1	1	1	1	1	1	1	1	1	1	1
ubframes Frame		3	3+2	2+2	2	2	2+2	2+2	2	2+2	2+2	2+2	2+2	2+2	2+2
		QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	64QAM	16QAM	16QAM	16QAM	16QAM	16QAM	256QAM	64QAM
ing Rate		1/3	1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	½	½	0.62	0.44
Bit ote 6)															
rames 4,9	Bits	408	4392	12960	1544	744	25456	18336	1192	3368	5736	12960	19080	31704	16416 (CW0 32856 (CW1
rames 1,6	Bits	N/A	3240	9528	N/A	N/A	21384	15840	N/A	2856	5160	10680	15840	23688	12216 (CW0 24496 (CW1
rame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
rame 0	Bits	208	4392	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Code nd 6)															
rames 4,9		1	1	3	1	1	5	3	1	1	1	3	4	3	3 (CW0 6 (CW1
rames 1,6		N/A	1	2	N/A	N/A	4	3	N/A	1	1	2	3	3	2 (CW0 4 (CW1
rame 5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
rame 0		1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
nnel Bits															
rames 4,9	Bits	1248	12800	25600	3072	1536	51200	38400	2496	6960	11600	25600	38400	51200	38400 (CW0 76800 (CW1
rames 1,6		N/A	10256	20512	N/A	N/A	41312	30768	N/A	5952	10112	20512	30912	41024	30768 (CW0 61536 (CW1
rame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
rame 0	Bits	624	12176	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ghput ver 1 e 6)	Mbps	0.102	1.966	4.498	0.309	0.149	9.368	6.835	0.238	1.245	2.179	4.728	6.984	18.445	5.726 (CW0 11.470 (CW1
ry		≥ 1	≥ 1	≥ 2	≥ 1	≥ 1	≥ 2	≥ 2	≥ 1	≥ 1	≥ 1	≥ 2	≥ 2	≥ 11	≥ 5

2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols o PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.

For BW=1.4 MHz, the information bit payloads of special subframes are set to zero (no scheduling) to avoid problems with insufficient PDCCH performance at the test point.

Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].

As per Table 4.2-2 in TS 36.211 [4].

f more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Given per component carrier per codeword.

A.3.4.3 Reference Measurement Channels for UE-Specific Reference Symbols

A.3.4.3.1 Single antenna port (Cell Specific)

The reference measurement channels in Table A.3.4.3.1-1 apply for verifying demodulation performance for UE-specific reference symbols with one cell-specific antenna port.

Table A.3.4.3.1-1: Fixed Reference Channel for DRS

Parameter	Unit	Value					
Reference channel		R.25 TDD	R.26 TDD	R.26-1 TDD	R.27 TDD	R.27-1 TDD	R.28 TDD
Channel bandwidth	MHz	10	10	5	10	10	10
Allocated resource blocks		50 [4]	50 [4]	25 [4]	50 [4]	18 [6]	1
Uplink-Downlink Configuration (Note 3)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3+2	3+2	3+2	3+2	3+2	3+2
Modulation		QPSK	16QAM	16QAM	64QAM	64QAM	16QAM
Target Coding Rate		1/3	1/2	1/2	3/4	3/4	1/2
Information Bit Payload							
For Sub-Frames 4,9	Bits	4392	12960	5736	28336	10296	224
For Sub-Frames 1,6	Bits	3240	9528	4584	22920	8248	176
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	2984	9528	3880	22152	10296	224
Number of Code Blocks per Sub-Frame (see Note 5)							
For Sub-Frames 4,9		1	3	1	5	2	1
For Sub-Frames 1,6		1	2	1	4	2	1
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		1	2	1	4	2	1
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits	12600	25200	11400	37800	13608	504
For Sub-Frames 1,6	Bits	10356	20712	10212	31068	11340	420
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	10332	20664	7752	30996	13608	504
Max. Throughput averaged over 1 frame	Mbps	1.825	5.450	2.452	12.466	4.738	0.102
UE Category		≥ 1	≥ 2	≥ 1	≥ 2	≥ 1	≥ 1

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: as per Table 4.2-2 in TS 36.211 [8].
Note 4: For R.25, R.26 and R.27, 50 resource blocks are allocated in sub-frames 1, 4, 6, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0. For R.26-1, 25 resource blocks are allocated in sub-frames 1, 4, 6, 9 and 17 resource blocks (RB0–RB7 and RB16–RB24) are allocated in sub-frame 0.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 6: Localized allocation started from RB #0 is applied.

Table A.3.4.3.1-2: Fixed Reference Channel for DRS for UE category M1

Parameter	Unit	Value
Reference channel		R.80 TDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		6
Uplink-Downlink Configuration (Note 3)		1
Allocated subframes per Radio Frame (D+S)		4+2
Modulation		QPSK
Target Coding Rate		1/3
Information Bit Payload		
For Sub-Frames 4,9	Bits	504
For Sub-Frames 1,6		N/A
For Sub-Frames 0,5	Bits	504
Number of Code Blocks per Sub-Frame		
For Sub-Frames 4,9	Code blocks	1
For Sub-Frames 1,6	Code blocks	N/A
For Sub-Frames 0,5	Code blocks	1
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 4,9	Bits	1440
For Sub-Frames 1,6		N/A
For Sub-Frames 0,5	Bits	1440
Max. Throughput averaged over 48 sub-frame	kbps	10.50
UE DL Category		M1, ≥ 0

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: as per Table 4.2-2 in TS 36.211 [4].
Note 4: Allocated PRB positions are {0, 1, 2, 3, 4, 5} within the assigned narrowband.
Note 5: MPDCCH are scheduled at the 0th to 7th BL/CE DL subframes with repetition every 48ms. The allocated PRB positions are {0, 1, 2, 3, 4, 5} within the assigned narrowband. The associated PDSCH is scheduled at the 9th to 16th BL/CE DL subframes every 48ms. (starting from the 0th subframe). If it is not BL/CE DL subframes, MPDCCH/PDSCH transmission is postponed until the next BL/CE DL subframe. Note the DL subframes in the TDD uplink-downlink configuration are considered as the BL/CE DL subframes.

A.3.4.3.2 Two antenna ports (Cell Specific)

The reference measurement channels in Table A.3.4.3.2-1 apply for verifying demodulation performance for CDM-multiplexed UE specific reference symbols with two cell-specific antenna ports.

Table A.3.4.3.2-1: Fixed Reference Channel for CDM-multiplexed DM RS

Parameter	Unit	Value					
Reference channel		R.31 TDD	R.32 TDD	R.32-1 TDD	R.33 TDD	R.33-1 TDD	R.34 TDD
Channel bandwidth	MHz	10	10	5	10	10	10
Allocated resource blocks		50[4]	50[4]	25[4]	50[4]	18[6]	50[4]
Uplink-Downlink Configuration (Note 3)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3+2	3+2	3+2	3+2	3+2	3+2
Modulation		QPSK	16QAM	16QAM	64QAM	64QAM	64QAM
Target Coding Rate		1/3	1/2	1/2	3/4	3/4	1/2
Information Bit Payload							
For Sub-Frames 4,9	Bits	3624	11448	5736	27376	9528	18336
For Sub-Frames 1,6		2664	7736	3112	16992	7480	11832
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	2984	9528	3496	22152	9528	14688
Number of Code Blocks per Sub-Frame (Note 5)							
For Sub-Frames 4,9		1	2	1	5	2	3
For Sub-Frames 1,6		1	2	1	3	2	2
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		1	2	1	4	2	3
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits	12000	24000	10800	36000	12960	36000
For Sub-Frames 1,6		7872	15744	6528	23616	10368	23616
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	9840	19680	7344	29520	12960	29520
Max. Throughput averaged over 1 frame	Mbps	1.556	4.79	2.119	11.089	4.354	7.502
UE Category		≥ 1	≥ 2	≥ 1	≥ 2	≥ 1	≥ 2

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: as per Table 4.2-2 in TS 36.211 [8].
Note 4: For R.31, R.32, R.33 and R.34, 50 resource blocks are allocated in sub-frames 4, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1, 6. For R.32-1, 25 resource blocks are allocated in sub-frames 4, 9 and 17 resource blocks (RB0–RB7 and RB16–RB24) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1, 6.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 6: Localized allocation started from RB#0 is applied.

The reference measurement channels in Table A.3.4.3.2-2 apply with two CRS antenna ports.

Table A.3.4.3.2-2: Fixed Reference Channel for CDM-multiplexed DM RS

Parameter	Unit	Value	
Reference channel		R.70 TDD	R.71 TDD
Channel bandwidth	MHz	10	10
Allocated resource blocks		50 (Note 4)	50 (Note 4)
Uplink-Downlink Configuration (Note 3)		1	1
Allocated subframes per Radio Frame (D+S)		2+2	2+2
Modulation		QPSK	16QAM
Target Coding Rate			
For Sub-Frames 4,9		0.65	0.6
For Sub-Frames 1,6		0.54	0.5
Information Bit Payload			
For Sub-Frames 4,9	Bits	6968	12960
For Sub-Frames 1,6	Bits	4264	7736
For Sub-Frame 5	Bits	N/A	N/A
For Sub-Frame 0	Bits	N/A	N/A
Number of Code Blocks per Sub-Frame (Note 5)			
For Sub-Frames 4,9		2	3
For Sub-Frames 1,6		1	2
For Sub-Frame 5		N/A	N/A
For Sub-Frame 0		N/A	N/A
Binary Channel Bits Per Sub-Frame			
For Sub-Frames 4,9	Bits	10800	21600
For Sub-Frames 1,6	Bits	7872	15744
For Sub-Frame 5	Bits	N/A	N/A
For Sub-Frame 0	Bits	N/A	N/A
Max. Throughput averaged over 1 frame	Mbps	2.2464	4.1392
UE Category		≥ 1	≥ 2

Note 1: 3 symbols allocated to PDCCH in normal subframes and 2 symbols allocated to PDCCH in special subframes.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: As per Table 4.2-2 in TS 36.211 [8].
Note 4: For R.63, and R.64, 50 resource blocks are allocated in sub-frames 4,9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in the DwPTS portion of sub-frames 1,6.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

A.3.4.3.3 Two antenna ports (CSI-RS)

The reference measurement channels in Table A.3.4.3.3-1 apply for verifying demodulation performance for CDM-multiplexed UE specific reference symbols with two cell-specific antenna ports and two CSI-RS antenna ports.

Table A.3.4.3.3-1: Fixed Reference Channel for CDM-multiplexed DM RS with two CSI-RS antenna ports

Parameter	Unit	Value					
Reference channel		R.51 TDD	R.51-1 TDD	R.76 TDD	R.51-2 TDD	R.51-3 TDD	R.51-4 TDD
Channel bandwidth	MHz	10	10	10	5	15	20
Allocated resource blocks		50 (Note 5)	50 (Note 5)	50 (Note 5)	25 (Note 6)	75 (Note 7)	100 (Note 8)
Uplink-Downlink Configuration (Note 3)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3+2	3+2	3+2	3+2	3+2	3+2
Modulation		16QAM	16QAM	QPSK	16QAM	16QAM	16QAM
Target Coding Rate		1/2	0.57		1/2	1/2	1/2
Information Bit Payload							
For Sub-Frames 4,9 (non CSI-RS subframe)	Bits	11448	N/A	6200	NA	NA	NA
For Sub-Frame 4,9	Bits	11448	12960	6200	4968	16992	22920
For Sub-Frames 1,6	Bits	7736	9144	4264	3112	12216	16992
For Sub-Frame 5	Bits	N/A	N/A	n/a	N/A	N/A	N/A
For Sub-Frame 0	Bits	9528	10680	4968	3496	14112	19848
Number of Code Blocks (Note 4)							
For Sub-Frames 4, 9 (non CSI-RS subframe)	Code blocks	2	N/A	2	N/A	N/A	N/A
For Sub-Frames 4,9	Code blocks	2	3	2	1	3	4
For Sub-Frames 1,6	Code blocks	2	2	1	1	3	3
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Code blocks	2	2	1	1	3	4
Binary Channel Bits							
For Sub-Frames 4, 9 (non CSI-RS subframe)	Bits	24000	N/A	11800	NA	NA	NA
For Sub-Frames 4,9		22800	22800	11800	10200	34200	45600
For Sub-Frames 1,6		15744	15744	7872	6144	24192	33792
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	19680	19680	9840	6912	30240	42240
Max. Throughput averaged over 1 frame	Mbps	4.7896	5.4888	2.5896	1.9656	7.2528	99.672
UE Category		≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: as per Table 4.2-2 in TS 36.211 [4].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: 50 resource blocks are allocated in sub-frames 4,9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1,6.

The reference measurement channels in Table A3.4.3.3-2 apply for verifying demodulation performance for UE-specific reference symbols with two cell specific antenna ports and two CSI-RS antenna ports with ZP CSI-RS and NZP CSI-RS in same subframe.

Table A.3.4.3.3-2: Fixed Reference Channel for CDM-multiplexed DM RS with two CSI-RS antenna ports with ZP CSI-RS and NZP CSI-RS

Parameter	Unit	Value		
Reference channel		R.52 TDD	R.53 TDD	R.54 TDD
Channel bandwidth	MHz	10	10	10
Allocated resource blocks		50 (Note 5)	50 (Note 5)	50 (Note 5)
Uplink-Downlink Configuration (Note 3)		1	1	1
Allocated subframes per Radio Frame (D+S)		3+2	3+2	3+2
Modulation		64QAM	64QAM	16QAM
Target Coding Rate		1/2	1/2	1/2
Information Bit Payload				
For Sub-Frame 4,9	Bits	16416	16416	11448
For Sub-Frames 1,6	Bits	11832	11832	7736
For Sub-Frame 5	Bits	n/a	n/a	n/a
For Sub-Frame 0	Bits	14688	14688	9528
Number of Code Blocks (Note 4)				
For Sub-Frames 4,9	Code blocks	3	3	2
For Sub-Frames 1,6	Code blocks	2	2	2
For Sub-Frame 5		n/a	n/a	n/a
For Sub-Frame 0	Code blocks	3	3	2
Binary Channel Bits				
For Sub-Frames 4,9		34200	33600	22800
For Sub-Frames 1,6		23616	23616	15744
For Sub-Frame 5	Bits	n/a	n/a	n/a
For Sub-Frame 0	Bits	29520	29520	19680
Max. Throughput averaged over 1 frame	Mbps	7.1184	7.1184	4.7896
UE Category		≥ 2	≥ 2	≥ 2

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: as per Table 4.2-2 in TS 36.211 [8].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: 50 resource blocks are allocated in sub-frames 4, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1, 6.

A.3.4.3.4 Four antenna ports (CSI-RS)

The reference measurement channels in Table A.3.4.3.4-1 apply for verifying demodulation performance for CDM-multiplexed UE specific reference symbols with two cell-specific antenna ports and four CSI-RS antenna ports.

Table A.3.4.3.4-1: Fixed Reference Channel for CDM-multiplexed DM RS with four CSI-RS antenna ports

Parameter	Unit	Value			
Reference channel		R.44 TDD	R.48 TDD	R.66 TDD	R.75 TDD
Channel bandwidth	MHz	10	10	20	10
Allocated resource blocks		50 (Note 4)	50 (Note 4)	100	50 (Note 4)
Uplink-Downlink Configuration (Note 3)		1	1	1	
Allocated subframes per Radio Frame (D+S)		3+2	3+2	3+2	3+2
Modulation		64QAM	QPSK	256QAM	16QAM
Target Coding Rate		½			0.57
Information Bit Payload					
For Sub-Frames 4,9 (non CSI-RS subframe)	Bits	18336	N/A	N/A	N/A
For Sub-Frames 4,9 (CSI-RS subframe)	Bits	16416	6200	71112	25456
For Sub-Frames 1,6		11832	4264	48936	15264
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	14688	4968	66592	21384
Number of Code Blocks per Sub-Frame (Note 5)					
For Sub-Frames 4,9 (non CSI-RS subframe)		3	2	N/A	N/A
For Sub-Frames 4,9 (CSI-RS subframe)		3	2	12	5
For Sub-Frames 1,6		2	1	8	3
For Sub-Frame 5		N/A	N/A	N/A	N/A
For Sub-Frame 0		3	1	11	4
Binary Channel Bits Per Sub-Frame					
For Sub-Frames 4,9 (non CSI-RS subframe)	Bits	36000	12000	N/A	N/A
For Sub-Frames 4,9 (CSI-RS subframe)	Bits	33600	11600	89600	40000
For Sub-Frames 1,6		23616	7872	67584	27552
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	29520	9840	84480	35424
Max. Throughput averaged over 1 frame	Mbps	7.1184	2.5896	30.669	10.628
UE Category		≥ 2	≥ 1	11-12	≥ 5
UE DL Category		≥ 6	≥ 6	≥ 11	≥ 6

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: as per Table 4.2-2 in TS 36.211 [4].
Note 4: For R.44,R.48 and R.75, 50 resource blocks are allocated in sub-frames 4,9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1,6. For R.66, 100 resource blocks are allocated in sub-frames 4, 9 and 88 resource blocks (RB0–RB43 and RB56–RB99) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1,6.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

The reference measurement channels in Table A.3.4.3.4-2 apply for verifying TDD PMI accuracy measurement with two CRS antenna ports and four CSI-RS antenna ports.

Table A.3.4.3.4-2: Fixed Reference Channel for four antenna ports (CSI-RS)

Parameter	Unit	Value		
Reference channel		R.60 TDD	R.61 TDD	R.61-1 TDD
Channel bandwidth	MHz	10	10	10
Allocated resource blocks		50[4]	50[4]	39[5]
Uplink-Downlink Configuration (Note 3)		1	1	1
Allocated subframes per Radio Frame (D+S)		4+2	4+2	4+2
Allocated subframes per Radio Frame		10	10	10
Modulation		QPSK	16QAM	16QAM
Target Coding Rate		1/2	1/2	1/2
Information Bit Payload				
For Sub-Frames 4 and 9 (Non CSI-RS subframe)	Bits	N/A	N/A	N/A
For Sub-Frames 4 and 9 (CSI-RS subframe)	Bits	6200	11448	8760
For Sub-Frames 1,6	Bits	N/A	7736	7480
For Sub-Frame 5	Bits	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	9528	8760
Number of Code Blocks per Sub-Frame (Note 6)				
For Sub-Frames 4 and 9 (Non CSI-RS subframe)		N/A	N/A	N/A
For Sub-Frames 4 and 9 (CSI-RS subframe)		2	2	2
For Sub-Frames 1,6		N/A	2	2
For Sub-Frame 5		N/A	N/A	N/A
For Sub-Frame 0		N/A	2	2
Binary Channel Bits Per Sub-Frame				
For Sub-Frames 4 and 9 (Non CSI-RS subframe)	Bits	N/A	N/A	N/A
For Sub-Frames 4 and 9 (CSI-RS subframe)	Bits	11600	23200	18096
For Sub-Frames 1,6	Bits	N/A	15744	14976
For Sub-Frame 5	Bits	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	19680	18720
Max. Throughput averaged over 1 frame	Mbps	1.24	4.7896	4.1240
UE Category		≥ 1	≥ 2	≥ 1
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]. Note 3: As per Table 4.2-2 in TS 36.211 [4]. Note 4: For R. 60 and R.61, 50 resource blocks are allocated in sub-frames 4,9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1,6. Note 5: For R. 61-1, 39 resource blocks (RB0–RB20 and RB30–RB47) are allocated in sub-frame 0, 1, 4, 6 and 9. Note 6: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). Note 7: Localized allocation started from RB #0 is applied.				

The reference measurement channels in Table A.3.4.3.4-3 apply for verifying demodulation performance for CDM-multiplexed UE specific reference symbols with two cell-specific antenna ports and four CSI-RS antenna ports.

Table A.3.4.3.4-3: Fixed Reference Channel for CDM-multiplexed DM RS with four CSI-RS antenna ports

Parameter	Unit	Value
Reference channel		R.64 TDD
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		6
Uplink-Downlink Configuration (Note 3)		1
Allocated subframes per Radio Frame (D+S)		4+2
Modulation		QPSK
Target Coding Rate		1/3
Information Bit Payload		
For Sub-Frames 4,9 (non CSI-RS subframe)	Bits	504
For Sub-Frames 4,9 (CSI-RS subframe)	Bits	504
For Sub-Frames 1,6		256
For Sub-Frames 0,5	Bits	504
Number of Code Blocks per Sub-Frame		
For Sub-Frames 4,9 (non CSI-RS subframe)	Code blocks	1
For Sub-Frames 4,9 (CSI-RS subframe)	Code blocks	1
For Sub-Frames 1,6	Code blocks	1
For Sub-Frames 0,5	Code blocks	1
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 4,9 (non CSI-RS subframe)	Bits	1440
For Sub-Frames 4,9 (CSI-RS subframe)	Bits	1352
For Sub-Frames 1,6		1152
For Sub-Frames 0,5	Bits	1440
Max. Throughput averaged over 1 frame	Mbps	0.2528
UE DL Category		0
Note 1: 2 symbols allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 3: as per Table 4.2-2 in TS 36.211 [8]. Note 4: Allocated PRB positions start from {9, 10, …, 9+N-1}, where N is the number of allocated resource blocks.		

The reference measurement channels in Table A.3.4.3.4-4 apply for verifying demodulation performance for CDM-multiplexed UE specific reference symbols with two cell-specific antenna ports and four CSI-RS antenna ports.

Table A.3.4.3.4-4: Fixed Reference Channel for CDM-multiplexed DM RS with four CSI-RS antenna ports

Parameter	Unit	Value
Reference channel		R.69
Channel bandwidth	MHz	10
Allocated resource blocks		50 (Note 4)
Uplink-Downlink Configuration (Note 3)		1
Allocated subframes per Radio Frame (D+S)		2+2
Modulation		QPSK
Target Coding Rate		
For Sub-Frame 4(CSI-RS subframe)		0.8
For Sub-Frame 9 (non CSI-RS subframe)		0.74
For Sub-Frames 1,6		0.61
Information Bit Payload		
For Sub-Frame 4(CSI-RS subframe)	Bits	7992
For Sub-Frame 9 (non CSI-RS subframe)	Bits	7992
For Sub-Frames 1,6	Bits	4776
For Sub-Frame 5	Bits	N/A
For Sub-Frame 0	Bits	N/A
Number of Code Blocks per Sub-Frame (Note 5)		
For Sub-Frame 4(CSI-RS subframe)		2
For Sub-Frame 9 (non CSI-RS subframe)		2
For Sub-Frames 1,6		1
For Sub-Frame 5		N/A
For Sub-Frame 0		N/A
Binary Channel Bits Per Sub-Frame		
For Sub-Frame 4(CSI-RS subframe)	Bits	10000
For Sub-Frame 9 (non CSI-RS subframe)	Bits	10800
For Sub-Frames 1,6	Bits	7872
For Sub-Frame 5	Bits	N/A
For Sub-Frame 0	Bits	N/A
Max. Throughput averaged over 1 frame	Mbps	2.5536
UE Category		≥ 1

Note 1: 3 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: As per Table 4.2-2 in TS 36.211 [8].
Note 4: 50 resource blocks are allocated in sub-frames 4,9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in the DwPTS portion of sub-frames 1,6.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

A.3.4.3.5 Eight antenna ports (CSI-RS)

The reference measurement channels in Table A.3.4.3.5-1 apply for verifying demodulation performance for CDM-multiplexed UE specific reference symbols with two cell-specific antenna ports and eight CSI-RS antenna ports.

Table A.3.4.3.5-1: Fixed Reference Channel for CDM-multiplexed DM RS with eight CSI-RS antenna ports

Parameter	Unit	Value
Reference channel		R.50 TDD
Channel bandwidth	MHz	10
Allocated resource blocks		50 (Note 4)
Uplink-Downlink Configuration (Note 3)		1
Allocated subframes per Radio Frame (D+S)		3+2
Modulation		QPSK
Target Coding Rate		1/3
Information Bit Payload		
For Sub-Frames 4,9 (non CSI-RS subframe)	Bits	3624
For Sub-Frames 4,9 (CSI-RS subframe)	Bits	3624
For Sub-Frames 1,6		2664
For Sub-Frame 5	Bits	n/a
For Sub-Frame 0	Bits	2984
Number of Code Blocks per Sub-Frame (Note 5)		
For Sub-Frames 4,9 (non CSI-RS subframe)		1
For Sub-Frames 4,9 (CSI-RS subframe)		1
For Sub-Frames 1,6		1
For Sub-Frame 5		n/a
For Sub-Frame 0		1
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 4,9 (non CSI-RS subframe)	Bits	12000
For Sub-Frames 4,9 (CSI-RS subframe)	Bits	10400
For Sub-Frames 1,6		7872
For Sub-Frame 5	Bits	n/a
For Sub-Frame 0	Bits	9840
Max. Throughput averaged over 1 frame	Mbps	1.556
UE Category		≥ 1

Note 1: 2 symbols allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: as per Table 4.2-2 in TS 36.211 [8].
Note 4: 50 resource blocks are allocated in sub-frames 4, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1, 6.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

The reference measurement channels in Table A.3.4.3.5-2 apply for verifying TDD PMI accuracy measurement with two CRS antenna ports and eight CSI-RS antenna ports.

Table A.3.4.3.5-2: Fixed Reference Channel for eight antenna ports (CSI-RS)

Parameter	Unit	Value		
Reference channel		R.45 TDD	R.45-1 TDD	R.45-2 TDD
Channel bandwidth	MHz	10	10	10
Allocated resource blocks		50[4]	39	50[4]
Uplink-Downlink Configuration (Note 3)		1	1	1
Allocated subframes per Radio Frame (D+S)		4+2	4+2	4+2
Allocated subframes per Radio Frame		5	5	10
Modulation		16QAM	16QAM	64QAM
Target Coding Rate		1/2	1/2	
Information Bit Payload				
For Sub-Frames 4 and 9 (Non CSI-RS subframe)	Bits	N/A	N/A	N/A
For Sub-Frames 4 and 9 (CSI-RS subframe)	Bits	11448	8760	[18336]
For Sub-Frames 1,6	Bits	7736	7480	[11832]
For Sub-Frame 5	Bits	N/A	N/A	N/A
For Sub-Frame 0	Bits	9528	8760	[14688]
Number of Code Blocks per Sub-Frame (Note 5)				
For Sub-Frames 4 and 9 (Non CSI-RS subframe)		N/A	N/A	N/A
For Sub-Frames 4 and 9 (CSI-RS subframe)		2	2	
For Sub-Frames 1,6		2	2	
For Sub-Frame 5		N/A	N/A	
For Sub-Frame 0		2	2	
Binary Channel Bits Per Sub-Frame				
For Sub-Frames 4 and 9 (Non CSI-RS subframe)	Bits	N/A	N/A	
For Sub-Frames 4 and 9 (CSI-RS subframe)	Bits	22400	17472	[33600]
For Sub-Frames 1,6	Bits	15744	14976	[23616]
For Sub-Frame 5	Bits	N/A	N/A	N/A
For Sub-Frame 0	Bits	19680	18720	[29520]
Max. Throughput averaged over 1 frame	Mbps	4.7896	4.1240	7.3296
UE Category		≥ 2	≥ 1	≥ 2

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: As per Table 4.2-2 in TS 36.211 [4].
Note 4: For R.45 and R.45-2, 50 resource blocks are allocated in sub-frames 4,9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0 and the DwPTS portion of sub-frames 1,6. For R.45-1, 39 resource blocks are allocated in sub-frames 0,4,9 and the DwPTS portion of sub-frames 1,6 (RB0–RB20 and RB30–RB47).
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 6: Localized allocation started from RB #0 is applied.

A.3.5 Reference measurement channels for PDCCH/PCFICH performance requirements

A.3.5.1 FDD

Table A.3.5.1-1: Reference Channel FDD

Parameter	Unit	Value				
Reference channel		R.15 FDD	R.15-1 FDD	R.15-2 FDD	R.16 FDD	R.17 FDD
Number of transmitter antennas		1	2	2	2	4
Channel bandwidth	MHz	10	10	10	1.4	10
Number of OFDM symbols for PDCCH	symbols	2	3	2	2	2
Aggregation level	CCE	8	8	8	2	4
DCI Format		Format 1	Format 1	Format 1	Format 2	Format 2
Cell ID		0	0	0	0	0
Payload (without CRC)	Bits	31	31	31	31	46

Table A.3.5.1-1A: Reference Channel FDD

Parameter	Unit	Value	
Reference channel		R.16_1 FDD	R.17_1 FDD
Number of transmitter antennas		2	4
Channel bandwidth	MHz	10	5
Number of OFDM symbols for PDCCH	symbols	2	2
Aggregation level	CCE	4	2
DCI Format		Format 2	Format 2
Cell ID		0	0
Payload (without CRC)	Bits	43	42

Table A.3.5.1-2: Additional PDSCH Reference Channel FDD

Parameter	Unit	Value				
Number of transmitter antennas		1	2	2	4	4
Channel bandwidth	MHz	10	1.4	10	10	5
Allocated Resource Blocks		50	6	50	50	25
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3
Information Bit Payload						
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4392	504	4392	4392	2216
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	4392	256	4392	3624	1800
Number of Code Blocks per Sub-Frame						
For Sub-Frames 1,2,3,4,6,7,8,9		1	1	1	1	1
For Sub-Frame 5		n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		1	1	1	1	1
Binary Channel Bits Per Sub-Frame						
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	13800	1584	13200	12800	6400
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		12960	768	12384	12032	5632
Max. Throughput averaged over 1 frame	Mbps	3.953	0.429	3.953	3.876	1.953
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1
Note 1: 2 symbols allocated to PDCCH for all BW.						

Table A.3.5.1-2A: Additional PDSCH Reference Channel FDD

Parameter	Unit	Value
Number of transmitter antennas		2
Channel bandwidth	MHz	10
Allocated Resource Blocks		50
Modulation		QPSK
Target Coding Rate		1/3
Information Bit Payload		
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	3624
For Sub-Frame 5		n/a
For Sub-Frame0	Bits	3624
Number of Code Blocks per Sub-Frame		
For Sub-Frames 1,2,3,4,6,7,8,9		1
For Sub-Frame 5		n/a
For Sub-Frame 0		1
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	12000
For Sub-Frame 5	Bits	n/a
For Sub-Frame 0		11184
Max. Throughput averaged over 1 frame	Mbps	3.262
UE Category		≥ 1
Note 1: 3 symbols allocated to PDCCH for all BW.		

A.3.5.2 TDD

Table A.3.5.2-1: Reference Channel TDD

Parameter	Unit	Value				
Reference channel		R.15 TDD	R.15-1 TDD	R.15-2 TDD	R.16 TDD	R.17 TDD
Number of transmitter antennas		1	2	2	2	4
Channel bandwidth	MHz	10	10	10	1.4	10
Number of OFDM symbols for PDCCH	symbols	2	3	2	2	2
Aggregation level	CCE	8	8	8	2	4
DCI Format		Format 1	Format 1	Format 1	Format 2	Format 2
Cell ID		0	0	0	0	0
Payload (without CRC)	Bits	34	34	34	34	49

Table A.3.5.2-1A: Reference Channel TDD

Parameter	Unit	Value	
Reference channel		R.16_1 TDD	R.17_1 TDD
Number if transmitter antennas		2	4
Channel bandwidth	MHz	10	5
Number of OFDM symbols for PDCCH	symbols	2	2
Aggregation level	CCE	4	2
DCI Format		Format 2	Format 2
Cell ID		0	0
Payload (without CRC)	Bits	46	45

Table A.3.5.2-2: Additional PDSCH Reference Channel TDD

Parameter	Unit	Value				
Number of transmitter antennas		1	2	2	4	4
Channel bandwidth	MHz	10	1.4	10	10	5
Uplink-Downlink Configuration (Note 2)		0	0	0	0	0
Allocated Resource Blocks		50	6	50	50	25
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3
Information Bit Payload						
For Sub-Frame 1,6	Bits	3240	328	3240	3240	1544
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	4392	256	4392	4392	1800
Number of Code Blocks per Sub-Frame						
For Sub-Frame 1,6		1	1	1	1	1
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0		1	1	1	1	1
Binary Channel Bits Per Sub-Frame						
For Sub-Frame 1,6	Bits	11256	1152	10656	10256	5056
For Sub-Frame 5	Bits	n/a	n/a	n/a	n/a	n/a
For Sub-Frame 0	Bits	13104	936	12528	12176	5776
Max. Throughput averaged over 1 frame	Mbps	1.087	0.091	1.087	1.164	0.489
UE Category		≥ 1	≥ 1	≥ 1	≥ 1	≥ 1
Note 1: 2 symbols allocated to PDCCH for all BW. Note 2: As per Table 4.2-2 in TS 36.211 [8].						

Table A.3.5.2-2A: Additional PDSCH Reference Channel TDD

Parameter	Unit	Value	
Number of transmitter antennas		2	2
Channel bandwidth	MHz	10 (Note 1)	10 (Note 2)
Uplink-Downlink Configuration (Note 3)		1	1
Special subframe configuration		4	4
Allocated Resource Blocks		50	50
Modulation		QPSK	QPSK
Target Coding Rate		1/3	1/3
Information Bit Payload			
For Sub-Frame 4,9	Bits	4392	3624
For Sub-Frame 1,6	Bits	3240	3240
For Sub-Frame 5	Bits	n/a	n/a
For Sub-Frame 0	Bits	4392	3624
Number of Code Blocks per Sub-Frame			
For Sub-Frame 4,9		1	1
For Sub-Frame 1,6		1	1
For Sub-Frame 5		n/a	n/a
For Sub-Frame 0		1	1
Binary Channel Bits Per Sub-Frame			
For Sub-Frame 4,9	Bits	13200	12000
For Sub-Frame 1,6	Bits	10656	10656
For Sub-Frame 5	Bits	n/a	n/a
For Sub-Frame 0	Bits	12528	11328
Max. Throughput averaged over 1 frame	Mbps	1.9656	1.7352
UE Category		≥ 1	≥ 1
Note 1: 2 symbols allocated to PDCCH. Note 2: 3 symbols allocated to PDCCH. Note 3: As per Table 4.2-2 in TS 36.211 [8].			

A.3.5.3 LAA

Table A.3.5.3-1: Reference Channel for FS3 with FDD primary cell

Parameter	Unit	Value
Reference channel		R.3 FS3
Number of transmitter antennas		2
Channel bandwidth	MHz	20
Number of OFDM symbols for PDCCH	symbols	2
Aggregation level	CCE	4
DCI Format		Format 2A
Cell ID		0
Payload (without CRC)	Bits	48

Table A.3.5.3-2: Reference Channel for FS3 with TDD primary cell

Parameter	Unit	Value
Reference channel		R.4 FS3
Number of transmitter antennas		2
Channel bandwidth	MHz	20
Number of OFDM symbols for PDCCH	symbols	2
Aggregation level	CCE	4
DCI Format		Format 2A
Cell ID		0
Payload (without CRC)	Bits	51

Table A.3.5.3-3: Additional PDSCH Reference Channel for FS3

Parameter	Unit	Value
Number of transmitter antennas		2
Channel bandwidth	MHz	20
Allocated Resource Blocks		100
Modulation		QPSK
Target Coding Rate		1/3
Information Bit Payload (Note 2)		
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	{8760,2664,5352,6712,3624}
For Sub-Frame 5	Bits	{8760,2664,5352,6712,3624}
For Sub-Frame 0	Bits	{8760,2664,5352,6712,3624}
Number of Code Blocks (Note 2)		
For Sub-Frames 1,2,3,4,6,7,8,9		{2,1,1,2,1}
For Sub-Frame 5		{2,1,1,2,1}
For Sub-Frame 0		{2,1,1,2,1}
Binary Channel Bits (Note 2)		
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	{26400,8800,15200,21600,11200}
For Sub-Frame 5	Bits	{26112,8800,15200,21312,11200}
For Sub-Frame 0	Bits	{26112,8800,15200,21312,11200}
UE Category		≥ 1
Note 1: 2 symbols allocated to PDCCH. Note 2: For {a1,a2,a3,a4,a5}, a1, a2, a3, a4 and a5 stand for the setup when the number of OFDM sybmols is 14, 6, 9, 12, 7, respectively.		

A.3.6 Reference measurement channels for PHICH performance requirements

Table A.3.6-1: Reference Channel FDD/TDD

Parameter	Unit		Value			
Reference channel		R.18	R.19	R.19-1	R.20	R.24
Number of transmitter antennas		1	2	2	4	1
Channel bandwidth	MHz	10	1.4	5	10	10
User roles (Note 1)		[W I1 I2]	[W I1 I2]	W I1 I2	[W I1 I2]	[W I1]
Resource allocation (Note 2)		[(0,0) (0,1) (0,4)]	[(0,0) (0,1) (0,4)]	(0,0) (0,1) (0,4)	[(0,0) (0,1) (0,4)]	[(0,0) (0,1)]
Power offsets (Note 3)	dB	[-4 0 -3]	[-4 0 -3]	-4 0 -3	[-4 0 -3]	[+3 0]
Payload (Note 4)		[A R R]	[A R R]	A R R	[A R R]	[A R]

Note 1: W=wanted user, I1=interfering user 1, I2=interfering user 2.
Note 2: The resource allocation per user is given as (N_group_PHICH, N_seq_PHICH).
Note 3: The power offsets (per user) represent the difference of the power of BPSK modulated symbol per PHICH relative to the first interfering user.
Note 4: A=fixed ACK, R=random ACK/NACK.

Table A.3.6-1A: Reference Channel FDD/TDD

Parameter	Unit	Value	
Reference channel		R.19_1	R.20_1
Number of transmitter antennas		2	4
Channel bandwidth	MHz	10	5
User roles (Note 1)		[W I1 I2]	[W I1 I2]
Resource allocation (Note 2)		[(0,0) (0,1) (0,4)]	[(0,0) (0,1) (0,4)]
Power offsets (Note 3)	dB	[-4 0 -3]	[-4 0 -3]
Payload (Note 4)		[A R R]	[A R R]

Note 1: W=wanted user, I1=interfering user 1, I2=interfering user 2.
Note 2: The resource allocation per user is given as (N_group_PHICH, N_seq_PHICH).
Note 3: The power offsets (per user) represent the difference of the power of BPSK modulated symbol per PHICH relative to the first interfering user.
Note 4: A=fixed ACK, R=random ACK/NACK.

A.3.7 [FFS]

A.3.8 Reference measurement channels for MBMS performance requirements

A.3.8.1 FDD

Table A.3.8.1-1: Fixed Reference Channel QPSK R=1/3

Parameter	PMCH						
	Unit	Value					
Reference channel		R.40 FDD			R.37 FDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6			50		
Allocated subframes per Radio Frame (Note 1)		6			6		
Modulation		QPSK			QPSK		
Target Coding Rate		1/3			1/3		
Information Bit Payload (Note 2)							
For Sub-Frames 1,2,3,6,7,8	Bits	408			3624		
For Sub-Frames 0,4,5,9	Bits	n/a			n/a		
Number of Code Blocks per Subframe (Note 3)		1			1		
Binary Channel Bits Per Subframe							
For Sub-Frames 1,2,3,6,7,8	Bits	1224			10200		
For Sub-Frames 0,4,5,9	Bits	n/a			n/a		
MBMS UE Category		≥ 1			≥ 1		
Note 1: For FDD mode, up to 6 subframes (#1/2/3/6/7/8) are available for MBMS, in line with TS 36.331. Note 2: 2 OFDM symbols are reserved for PDCCH; and reference signal allocated as per TS 36.211. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

Table A.3.8.1-2: Fixed Reference Channel 16QAM R=1/2

Parameter	PMCH						
	Unit	Value					
Reference channel					R.38 FDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks					50		
Allocated subframes per Radio Frame (Note 1)					6		
Modulation					16QAM		
Target Coding Rate					1/2		
Information Bit Payload (Note 2)							
For Sub-Frames 1,2,3,6,7,8	Bits				9912		
For Sub-Frames 0,4,5,9	Bits				n/a		
Number of Code Blocks per Subframe (Note 3)					2		
Binary Channel Bits Per Subframe							
For Sub-Frames 1,2,3,6,7,8	Bits				20400		
For Sub-Frames 0,4,5,9	Bits				n/a		
MBMS UE Category					≥ 1		
Note 1: For FDD mode, up to 6 subframes (#1/2/3/6/7/8) are available for MBMS, in line with TS 36.331. Note 2: 2 OFDM symbols are reserved for PDCCH; and reference signal allocated as per TS 36.211. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

Table A.3.8.1-3: Fixed Reference Channel 64QAM R=2/3

Parameter	PMCH						
	Unit	Value					
Reference channel				R.39-1 FDD	R.39 FDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	50		
Allocated subframes per Radio Frame(Note1)				6	6		
Modulation				64QAM	64QAM		
Target Coding Rate				2/3	2/3		
Information Bit Payload (Note 2)							
For Sub-Frames 1,2,3,6,7,8	Bits			9912	19848		
For Sub-Frames 0,4,5,9	Bits			n/a	n/a		
Number of Code Blocks per Sub-Frame (Note 3)				2	4		
Binary Channel Bits Per Subframe							
For Sub-Frames 1,2,3,6,7,8	Bits			15300	30600		
For Sub-Frames 0,4,5,9	Bits			n/a	n/a		
MBMS UE Category				≥ 1	≥ 2		
Note 1: For FDD mode, up to 6 subframes (#1/2/3/6/7/8) are available for MBMS, in line with TS 36.331. Note 2: 2 OFDM symbols are reserved for PDCCH; and reference signal allocated as per TS 36.211. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

A.3.8.2 TDD

Table A.3.8.2-1: Fixed Reference Channel QPSK R=1/3

Parameter	PMCH						
	Unit	Value					
Reference channel		R.40 TDD			R.37 TDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6			50		
Uplink-Downlink Configuration(Note 1)		5			5		
Allocated subframes per Radio Frame		5			5		
Modulation		QPSK			QPSK		
Target Coding Rate		1/3			1/3		
Information Bit Payload (Note 2)							
For Sub-Frames 3,4,7,8,9	Bits	408			3624		
For Sub-Frames 0,1,2,5,6	Bits	n/a			n/a		
Number of Code Blocks per Subframe (Note 3)		1			1		
Binary Channel Bits Per Subframe							
For Sub-Frames 3,4,7,8,9	Bits	1224			10200		
For Sub-Frames 0,1,2,5,6	Bits	n/a			n/a		
MBMS UE Category		≥ 1			≥ 1		
Note 1: For TDD mode, in line with TS 36.331, Uplink-Downlink Configuration 5 is proposed, up to 5 subframes (#3/4/7/8/9) are available for MBMS. Note 2: 2 OFDM symbols are reserved for PDCCH; reference signal allocated as per TS 36.211. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

Table A.3.8.2-2: Fixed Reference Channel 16QAM R=1/2

Parameter	PMCH						
	Unit	Value					
Reference channel					R.38 TDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks					50		
Uplink-Downlink Configuration(Note 1)					5		
Allocated subframes per Radio Frame					5		
Modulation					16QAM		
Target Coding Rate					1/2		
Information Bit Payload (Note 2)							
For Sub-Frames 3,4,7,8,9	Bits				9912		
For Sub-Frames 0,1,2,5,6	Bits				n/a		
Number of Code Blocks per Subframe (Note 3)					2		
Binary Channel Bits Per Subframe							
For Sub-Frames 3,4,7,8,9	Bits				20400		
For Sub-Frames 0,1,2,5,6	Bits				n/a		
MBMS UE Category					≥ 1		
Note 1: For TDD mode, in line with TS 36.331, Uplink-Downlink Configuration 5 is proposed, up to 5 subframes (#3/4/7/8/9) are available for MBMS. Note 2: 2 OFDM symbols are reserved for PDCCH; reference signal allocated as per TS 36.211. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

Table A.3.8.2-3: Fixed Reference Channel 64QAM R=2/3

Parameter	PMCH						
	Unit	Value					
Reference channel				R.39-1 TDD	R.39 TDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	50		
Uplink-Downlink Configuration(Note 1)				5	5		
Allocated subframes per Radio Frame				5	5		
Modulation				64QAM	64QAM		
Target Coding Rate				2/3	2/3		
Information Bit Payload (Note 2)							
For Sub-Frames 3,4,7,8,9	Bits			9912	19848		
For Sub-Frames 0,1,2,5,6	Bits			n/a	n/a		
Number of Code Blocks per Sub-Frame (Note 3)				2	4		
Binary Channel Bits Per Subframe							
For Sub-Frames 3,4,7,8,9	Bits			15300	30600		
For Sub-Frames 0,1,2,5,6	Bits			n/a	n/a		
MBMS UE Category				≥ 1	≥ 2		
Note 1: For TDD mode, in line with TS 36.331, Uplink-Downlink Configuration 5 is proposed, up to 5 subframes (#3/4/7/8/9) are available for MBMS. Note 2: 2 OFDM symbols are reserved for PDCCH; reference signal allocated as per TS 36.211. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

A.3.9 Reference measurement channels for sustained downlink data rate provided by lower layers

A.3.9.1 FDD

Table A.3.9.1-1: Fixed Reference Channel for sustained data-rate test (FDD 64QAM)

Parameter	Unit	Value							
Reference channel		R.31-1 FDD	R.31-2 FDD	R.31-3 FDD	R.31-3A FDD	R.31-3C FDD	R.31-4 FDD	R.31-4B FDD	R.31-5 FDD
Channel bandwidth	MHz	10	10	20	10	15	20	15	15
Allocated resource blocks (Note 8)		Note 5	Note 6	Note 7	Note 6	Note 10	Note 7	Note 11	Note 9
Allocated subframes per Radio Frame		10	10	10	10	10	10	10	10
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Coding Rate									
For Sub-Frame 1,2,3,4,6,7,8,9,		0.40	0.59	0.59	0.85	0.87	0.88	0.85	0.85
For Sub-Frame 5		0.40	0.64	0.62	0.89	0.88	0.87	0.87	0.91
For Sub-Frame 0		0.40	0.63	0.61	0.90	0.91	0.90	0.88	0.88
Information Bit Payload (Note 8)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	10296	25456	51024	36696	51024	75376	55056	55056
For Sub-Frame 5	Bits	10296	25456	51024	35160	51024	71112	52752	52752
For Sub-Frame 0	Bits	10296	25456	51024	36696	51024	75376	55056	55056
Number of Code Blocks (Notes 3 and 8)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2	5	9	6	9	13	9	9
For Sub-Frame 5	Bits	2	5	9	6	9	12	9	9
For Sub-Frame 0	Bits	2	5	9	6	9	13	9	9
Binary Channel Bits (Note 8)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	26100	43200	86400	43200	58752	86400	64800	64800
For Sub-Frame 5	Bits	26100	39744	82080	39744	57888	82080	60480	60480
For Sub-Frame 0	Bits	26100	40752	83952	40752	56304	83952	62352	62352
Number of layers		1	2	2	2	2	2	2	2
Max. Throughput averaged over 1 frame (Note 8)	Mbps	10.296	25.456	51.024	36.542	51.024	74.950	54.826	54.826
UE Categories		≥ 1	≥ 2	≥ 2	≥ 2	≥ 3	≥ 3	≥ 4	≥ 3

Note 1: 1 symbol allocated to PDCCH for all tests.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 4: Resource blocks n_{PRB} = 0..2 are allocated for SIB transmissions in sub-frame 5 for all bandwidths.
Note 5: Resource blocks n_{PRB} = 6..14,30..49 are allocated for the user data in all sub-frames.
Note 6: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 7: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 8: Given per component carrier per codeword.
Note 9: Resource blocks nPRB = 4..74 are allocated for the user data in sub-frame 5, and resource blocks nPRB = 0..74 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 10: Resource blocks n_{PRB} = 4..71 are allocated for the user data in sub-frames 0,1,2,3,4,5,6,7,8,9.
Note 11: Resource blocks n_{PRB} = 4..74 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..74 in sub-frames 0,1,2,3,4,6,7,8,9.

Table A.3.9.1-2: Fixed Reference Channel for sustained data-rate test (FDD 64QAM)

Parameter	Unit	Value							
Reference channel		R.31-6 FDD	R.31-7 FDD	R.31-8 FDD	R.31-9 FDD	R.31-10 FDD	R.31-1A FDD		
Channel bandwidth	MHz	5	10	15	20	5	20		
Allocated resource blocks (Note 5)		Note 4	Note 7	Note 8	Note 9	Note 4	Note 10		
Allocated subframes per Radio Frame		9/10	10	10	10	9	10		
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM		
Coding Rate									
For Sub-Frame 1,2,3,4,6,7,8,9,		0.85	0.78	0.77	0.79	0.78	0.41		
For Sub-Frame 5		N/A/0.83	0.80	0.79	0.81	N/A	0.41		
For Sub-Frame 0		0.83	0.83	0.8	0.81	0.85	0.41		
Information Bit Payload (Note 5)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	18336	63776	93800	128496	31704	10296		
For Sub-Frame 5	Bits	N/A	59256	90816	124464	N/A	10296		
For Sub-Frame 0	Bits	15840	63776	93800	128496	30576	10296		
Number of Code Blocks (Notes 3 and 5)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	3	11	16	21	6	2		
For Sub-Frame 5	Bits	N/A/3	10	15	21	N/A	2		
For Sub-Frame 0	Bits	3	11	16	21	5	2		
Binary Channel Bits (Note 5)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	21600	81600	122400	163200	40800	25200		
For Sub-Frame 5	Bits	N/A/19008	74976	114144	154944	N/A	25200		
For Sub-Frame 0	Bits	19152	76992	117792	158592	36192	25200		
Number of layers		2	4	4	4	4	1		
Max. Throughput averaged over 1 frame (Note 5)	Mbps	17.837	63.324	93.502	128.093	28.421	10.296		
UE Categories		≥ 2	≥ 6	≥ 6	≥ 6	≥ 6	≥ 1		

Note 1: 1 symbol allocated to PDCCH for all tests.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 4: Resource blocks n_{PRB} = 0..24 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 5: Given per component carrier per codeword.
Note 6: Ng=1/6.
Note 7: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 8: Resource blocks n_{PRB} = 4..74 are allocated for the user data in sub-frame 5, and resource blocks nPRB = 0..74 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 9: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in sub-frames 0,1,2,3,4,6,7,8,9.

Table A.3.9.1-3: Fixed Reference Channel for sustained data-rate test (FDD 256QAM)

Parameter	Unit	Value							
Reference channel		R.68 FDD	R.68-1 FDD	R.68-2 FDD	R.68-3 FDD	R.68-4 FDD	R.68-5 FDD	R.68-6 FDD	R.68-7 FDD
Channel bandwidth	MHz	20	15	10	5	10	15	20	5
Allocated resource blocks (Note 4)		Note 5	Note 6	Note 7	Note 8	Note 7	Note 6	Note 5	Note 8
Allocated subframes per Radio Frame		10	10	10	10	10	10	10	10
Modulation		256QAM	256QAM	256QAM	256QAM	256QAM	256QAM	256QAM	256QAM
Coding Rate									
For Sub-Frames 3,4,8,9		0.85	0.88	0.85	0.85	0.78	0.79	0.78	0.85
For Sub-Frames 1,2,6,7		0.74	0.74	0.74	0.77	0.78	0.79	0.78	0.77
For Sub-Frame 5		0.75	0.77	0.77	0.79	0.82	0.82	0.786	0.79
For Sub-Frame 0		0.76	0.77	0.78	0.84	0.83	0.82	0.80	0.84
Information Bit Payload (Note 4)									
For Sub-Frames 3,4,8,9	Bits	97896	75376	48936	24496	84760	128496	169544	42368
For Sub-Frames 1,2,6,7		84760	63776	42368	21384	84760	128496	169544	42368
For Sub-Frame 5	Bits	81176	61664	40576	19848	81176	124464	161760	39232
For Sub-Frame 0	Bits	84760	63776	42368	21384	84760	128496	169544	39232
Number of Code Blocks (Notes 3 and 4)									
For Sub-Frames 3,4,8,9	Bits	16	13	8	4	14	21	28	7
For Sub-Frames 1,2,6,7		14	11	7	4	14	21	28	7
For Sub-Frame 5	Bits	14	11	7	4	14	21	27	7
For Sub-Frame 0	Bits	14	11	7	4	14	21	28	7
Binary Channel Bits (Note 4)									
For Sub-Frames 3,4,8,9	Bits	115200	86400	57600	28800	108800	163200	217600	54400
For Sub-Frames 1,2,6,7		115200	86400	57600	28800	108800	163200	217600	54400
For Sub-Frame 5	Bits	109440	80640	52992	25344	99968	152192	206592	47744
For Sub-Frame 0	Bits	111936	83136	54336	25536	102656	157056	211456	48256
Number of layers		2	2	2	2	4	4	4	4
Max. Throughput averaged over 1 frame (Note 4)	Mbps	89.656	68.205	44.816	22.475	84.4016	128.093	168.766	41.741
UE Categories		11-12	11-12	11-12	11-12	11-12	11-12	11-12	11-12
UE DL Categories		≥ 11	≥ 11	≥ 11	≥ 11	13-14	13-14	13-14	13-14

Note 1: 1 symbol allocated to PDCCH for all tests.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 4: Given per component carrier per codeword.
Note 5: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 6: Resource blocks nPRB = 4..74 are allocated for the user data in sub-frame 5, and resource blocks nPRB = 0..74 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 7: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 8: Resource blocks n_{PRB} = 2..24 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..24 in sub-frames 0,1,2,3,4,6,7,8,9.

A.3.9.2 TDD

Table A.3.9.2-1: Fixed Reference Channel for sustained data-rate test (TDD 64QAM)

Parameter	Unit	Value								
Reference channel		R.31-1 TDD	R.31-2 TDD	R.31-3 TDD	R.31-3A TDD	R.31-4 TDD	R.31-4A TDD	R.31-5 TDD	R.31-5A TDD	R.31-6 TDD
Channel bandwidth	MHz	10	10	20	15	20	20	15	15	10
Allocated resource blocks		Note 6	Note 7	Note 8	Note 9	Note 8	Note 8	Note 11	Note 11	Note 7
Uplink-Downlink Configuration (Note 3)		5	5	5	1	1	2	1	2	1
Number of HARQ Processes per component carrier	Processes	15	15	15	7	7	10	7	10	7
Allocated subframes per Radio Frame (D+S)		8+1	8+1	8+1	4	4	6+2	4	6+2	4
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate										
For Sub-Frames 4,9		0.40	0.59	0.59	0.87	0.88	0.88	0.85	0.85	0.85
For Sub-Frames 3,8		0.40	0.59	0.59	N/A	N/A	0.88	N/A	0.85	N/A
For Sub-Frame 7		0.40	0.59	0.59	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frames 0		0.40	0.62	0.61	0.90	0.90	0.90	0.88	0.88	0.90
For Sub-Frames 1		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frames 5		0.40	0.64	0.62	0.88	0.87	0.87	0.87	0.87	0.88
For Sub-Frames 6		0.40	0.60	0.60	N/A	N/A	N/A	N/A	N/A	N/A
Information Bit Payload										
For Sub-Frames 4,9	Bits	10296	25456	51024	51024	75376	75376	55056	55056	36696
For Sub-Frames 3,8	Bits	10296	25456	51024	0	0	75376	0	55056	0
For Sub-Frame 7	Bits	10296	25456	51024	0	0	N/A	0	N/A	0
For Sub-Frame 0	Bits	10296	25456	51024	51024	75376	75376	55056	55056	36696
For Sub-Frame 1	Bits	0	0	0	0	0	0	0	0	0
For Sub-Frame 5	Bits	10296	25456	51024	51024	71112	71112	52752	52752	35160
For Sub-Frame 6	Bits	10296	25456	51024	0	0	0	0	0	0
Number of Code Blocks per Sub-Frame (Note 4)										
For Sub-Frames 4,9		2	5	9	9	13	13	9	9	6
For Sub-Frames 3,8		2	5	9	N/A	N/A	13	N/A	9	N/A
For Sub-Frame 7		2	5	9	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		2	5	9	9	13	13	9	9	6
For Sub-Frame 1		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5		2	5	9	9	12	12	9	9	6
For Sub-Frame 6	Bits	2	5	9	n/a	N/A	N/A	N/A	N/A	N/A
Binary Channel Bits Per Sub-Frame										
For Sub-Frames 4,9	Bits	26100	43200	86400	58752	86400	86400	64800	64800	43200
For Sub-Frames 3,8	Bits	26100	43200	86400	0	0	86400	0	64800	0
For Sub-Frame 7	Bits	26100	43200	86400	0	0	86400	0	64800	0
For Sub-Frame 0	Bits	26100	41184	84384	56736	84384	84384	62784	62784	41184
For Sub-Frame 1	Bits	0	0	0	0	0	0	0	0	0
For Sub-Frame 5	Bits	26100	40176	82512	58320	82512	82512	60912	60912	40176
For Sub-Frame 6	Bits	26100	42768	85968	N/A	N/A	0	N/A	0	N/A
Number of layers		1	2	2	2	2	2	2	2	2
Max. Throughput averaged over 1 frame (Note 10)	Mbps	8.237	20.365	40.819	20.409	29.724	52.337	25.330	38.309	14.525
UE Category		≥ 1	≥ 2	≥ 2	≥ 2	≥ 3	≥ 3	≥ 3	≥ 3	≥ 2

Note 1: 1 symbol allocated to PDCCH for all tests.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: As per Table 4.2-2 in TS 36.211 [8].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: Resource blocks n_{PRB} = 0..2 are allocated for SIB transmissions in sub-frame 5 for all bandwidths.
Note 6: Resource blocks n_{PRB} = 6..14,30..49 are allocated for the user data in all subframes.
Note 7: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in the available downlink sub-frames according to uplink downlink configurations used .

Note 8: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in sub-frames 0,3,4,6,7,8,9.
Note 9: Resource blocks n_{PRB} = 4..71 are allocated for the user data in all sub-frames
Note10: Given per component carrier per codeword.
Note11: Resource blocks n_{PRB} = 4..74 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..74 in other downlink sub-frames.

Table A.3.9.2-1A: Fixed Reference Channel for sustained data-rate test (TDD 64QAM)

Parameter	Unit	Value							
Reference channel		R.31-7 TDD	R.31-8 TDD	R.31-9 TDD	R.31-1A TDD				
Channel bandwidth	MHz	10	15	20	20				
Allocated resource blocks		Note 7	Note 11	Note 12	Note 13				
Uplink-Downlink Configuration (Note 3)		1	1	1	5				
Number of HARQ Processes per component carrier	Processes	7	7	7	15				
Allocated subframes per Radio Frame (D+S)		4	4	4	8+1				
Modulation		64QAM	64QAM	64QAM	64QAM				
Target Coding Rate									
For Sub-Frames 4,9		0.78	0.77	0.79	0.41				
For Sub-Frames 3,8		N/A	N/A	N/A	0.41				
For Sub-Frame 7		N/A	N/A	N/A	0.41				
For Sub-Frames 0		0.82	0.79	0.81	0.41				
For Sub-Frames 1		N/A	N/A	N/A	N/A				
For Sub-Frames 5		0.79	0.79	0.80	0.41				
For Sub-Frames 6		N/A	N/A	N/A	0.41				
Information Bit Payload									
For Sub-Frames 4,9	Bits	63776	93800	128496	10296				
For Sub-Frames 3,8	Bits	0	0	0	10296				
For Sub-Frame 7	Bits	0	0	0	10296				
For Sub-Frame 0	Bits	63776	93800	128496	10296				
For Sub-Frame 1	Bits	0	0	0	0				
For Sub-Frame 5	Bits	59256	90816	124464	10296				
For Sub-Frame 6	Bits	0	0	0	10296				
Number of Code Blocks per Sub-Frame (Note 4)									
For Sub-Frames 4,9		11	16	21	2				
For Sub-Frames 3,8		N/A	N/A	N/A	2				
For Sub-Frame 7		N/A	N/A	N/A	2				
For Sub-Frame 0		11	16	21	2				
For Sub-Frame 1		N/A	N/A	N/A	N/A				
For Sub-Frame 5		10	15	21	2				
For Sub-Frame 6	Bits	N/A	N/A	N/A	2				
Binary Channel Bits Per Sub-Frame									
For Sub-Frames 4,9	Bits	81600	122400	163200	25200				
For Sub-Frames 3,8	Bits	0	0	0	25200				
For Sub-Frame 7	Bits	0	0	0	25200				
For Sub-Frame 0	Bits	77856	118656	159456	25200				
For Sub-Frame 1	Bits	0	0	0	0				
For Sub-Frame 5	Bits	75840	115008	155808	25200				
For Sub-Frame 6	Bits	0	0	0	25200				
Number of layers		4	4	4	1				
Max. Throughput averaged over 1 frame (Note 10)	Mbps	25.058	37.222	50.996	8.237				
UE Category		≥ 6	≥ 6	≥ 6	≥ 1				

Table A.3.9.2-2: Fixed Reference Channel for sustained data-rate test (TDD 256QAM)

Parameter	Unit	Value					
Reference channel		R.68 TDD	R.68-1 TDD	R.68-2 TDD	R.68-3 TDD	R.68-4 TDD	
Channel bandwidth	MHz	20	15	10	20	15	
Allocated resource blocks	PRB	Note 6	Note 7	Note 8	Note 6	Note 7	
Uplink-Downlink Configuration (Note 3)		1	1	1	[2]	[2]	
Number of HARQ Processes per component carrier	Processes	7	7	7	[10]	[10]	
Allocated subframes per Radio Frame (D+S)		4+2	4+2	4+2	[6+2]	[6+2]	
Modulation		256QAM	256QAM	256QAM	256QAM	256QAM	
Target Coding Rate							
For Sub-Frame 0		0.76	0.77	0.78	0.76	0.77	
For Sub-Frame 1		N/A	N/A	N/A	N/A	N/A	
For Sub-Frames 3		N/A	N/A	N/A	0.74	0.79	
For Sub-Frames 4		0.74	0.79	0.74	0.74	0.79	
For Sub-Frame 5		0.74	0.76	0.76	0.74	0.76	
For Sub-Frame 6		N/A	N/A	N/A	[N/A]	[N/A]	
For Sub-Frame 7		N/A	N/A	N/A	[N/A]	[N/A]	
For Sub-Frames 8		N/A	N/A	N/A	0.85	0.88	
For Sub-Frames 9		0.85	0.88	0.85	0.85	0.88	
Information Bit Payload							
For Sub-Frame 0	Bits	84760	63776	42368	84760	63776	
For Sub-Frame 1	Bits	0	0	0	0	0	
For Sub-Frames 3	Bits	N/A	N/A	N/A	84760	63776	
For Sub-Frames 4	Bits	84760	63776	42368	84760	63776	
For Sub-Frame 5	Bits	81176	61664	40576	81176	61664	
For Sub-Frame 6	Bits	0	0	0	[0]	[0]	
For Sub-Frame 7		N/A	N/A	N/A	[N/A]	[N/A]	
For Sub-Frames 8	Bits	N/A	N/A	N/A	97896	75376	
For Sub-Frames 9	Bits	97896	75376	48936	97896	75376	
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frame 0		14	11	7	14	11	
For Sub-Frame 1		N/A	N/A	N/A	N/A	N/A	
For Sub-Frames 3		N/A	N/A	N/A	14	11	
For Sub-Frames 4		14	11	7	14	11	
For Sub-Frame 5		14	11	7	14	11	
For Sub-Frame 6		N/A	N/A	N/A	[N/A]	[11]	
For Sub-Frame 7		N/A	N/A	N/A	[N/A]	[11]	
For Sub-Frames 8		N/A	N/A	N/A	16	13	
For Sub-Frames 9		16	13	8	16	13	
Binary Channel Bits Per Sub-Frame							
For Sub-Frame 0	Bits	112512	83712	54912	112512	83712	
For Sub-Frame 1	Bits	0	0	0	0	0	
For Sub-Frames 3	Bits	N/A	N/A	N/A	115200	86400	
For Sub-Frames 4	Bits	115200	86400	57600	115200	86400	
For Sub-Frame 5		110016	81216	53568	110016	81216	
For Sub-Frame 6	Bits	0	0	0	[0]	[0]	
For Sub-Frame 7		N/A	N/A	N/A	[N/A]	[N/A]	
For Sub-Frames 8	Bits	N/A	N/A	N/A	115200	86400	
For Sub-Frames 9	Bits	115200	86400	57600	115200	86400	
Number of layers		2	2	2	2	2	
Max. Throughput averaged over 1 frame (Note 5)	Mbps	34.859	26.459	17.425	[53.125]	[40.374]	
UE Categories		11-12	11-12	11-12	11-12	11-12	
UE DL Categories		≥ 11	≥ 11	≥ 11	≥ 11	≥ 11	

Note 1: 1 symbol allocated to PDCCH for all tests.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: As per Table 4.2-2 in TS 36.211 [4].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: Given per component carrier per codeword.
Note 6: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in other

downlink sub-frames.

Note 7: Resource blocks n_{PRB} = 4..74 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..74 in other downlink sub-frames.

Note 8: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in the available downlink sub-frames according to uplink downlink configurations used.

Table A.3.9.2-3: Fixed Reference Channel for sustained data-rate test (TDD 256QAM)

Parameter	Unit	Value					
Reference channel		R.68-5 TDD	R.68-6 TDD	R.68-7 TDD			
Channel bandwidth	MHz	10	15	20			
Allocated resource blocks	PRB	Note 8	Note 7	Note 6			
Uplink-Downlink Configuration (Note 3)		1	1	1			
Number of HARQ Processes per component carrier	Processes	7	7	7			
Allocated subframes per Radio Frame (D+S)		4+2	4+2	4+2			
Modulation		256QAM	256QAM	256QAM			
Target Coding Rate							
For Sub-Frame 0		0.82	0.82	0.80			
For Sub-Frame 1		N/A	N/A	N/A			
For Sub-Frames 3		N/A	N/A	N/A			
For Sub-Frames 4		0.78	0.79	0.78			
For Sub-Frame 5		0.81	0.82	0.78			
For Sub-Frame 6		N/A	N/A	N/A			
For Sub-Frame 7		N/A	N/A	N/A			
For Sub-Frames 8		N/A	N/A	N/A			
For Sub-Frames 9		0.78	0.79	0.78			
Information Bit Payload							
For Sub-Frame 0	Bits	84760	128496	169544			
For Sub-Frame 1	Bits	0	0	0			
For Sub-Frames 3	Bits	N/A	N/A	N/A			
For Sub-Frames 4	Bits	84760	128496	169544			
For Sub-Frame 5	Bits	81176	124464	161760			
For Sub-Frame 6	Bits	0	0	0			
For Sub-Frame 7		N/A	N/A	N/A			
For Sub-Frames 8	Bits	N/A	N/A	N/A			
For Sub-Frames 9	Bits	84760	128496	169544			
Number of Code Blocks per Sub-Frame (Note 4)							
For Sub-Frame 0		14	21	28			
For Sub-Frame 1		0	0	0			
For Sub-Frames 3		N/A	N/A	N/A			
For Sub-Frames 4		14	21	28			
For Sub-Frame 5		14	21	27			
For Sub-Frame 6		0	0	0			
For Sub-Frame 7		N/A	N/A	N/A			
For Sub-Frames 8		N/A	N/A	N/A			
For Sub-Frames 9		14	21	28			
Binary Channel Bits Per Sub-Frame							
For Sub-Frame 0	Bits	103808	158208	212608			
For Sub-Frame 1	Bits	0	0	0			
For Sub-Frames 3	Bits	N/A	N/A	N/A			
For Sub-Frames 4	Bits	108800	163200	217600			
For Sub-Frame 5		101120	153344	207744			
For Sub-Frame 6	Bits	0	0	0			
For Sub-Frame 7		N/A	N/A	N/A			
For Sub-Frames 8	Bits	N/A	N/A	N/A			
For Sub-Frames 9	Bits	108800	163200	217600			
Number of layers		4	4	4			
Max. Throughput averaged over 1 frame (Note 5)	Mbps	33.546	50.995	67.039			
UE Categories		11-12	11-12	11-12			
UE DL Categories		13-14	13-14	13-14			

Note 1: 1 symbol allocated to PDCCH for all tests.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: As per Table 4.2-2 in TS 36.211 [4].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: Given per component carrier per codeword.
Note 6: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in other

downlink sub-frames.
Note 7: Resource blocks n_{PRB} = 4..74 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..74 in other downlink sub-frames.
Note 8: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in the available downlink sub-frames according to uplink downlink configurations used.

A.3.9.3 FDD (EPDCCH scheduling)

Table A.3.9.3-1: Fixed Reference Channel for sustained data-rate test with EPDCCH scheduling (FDD)

Parameter	Unit	Value						
Reference channel		R.31E-1 FDD	R.31E-2 FDD	R.31E-3 FDD	R.31E-3A FDD	R.31E-3C FDD	R.31E-4 FDD	R.31E-4B FDD
Channel bandwidth	MHz	10	10	20	10	15	20	15
Allocated resource blocks (Note 8)		Note 5	Note 6	Note 7	Note 6	Note 9	Note 7	Note 10
Allocated subframes per Radio Frame		10	10	10	10	10	10	10
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Coding Rate (subframes with PDCCH USS monitoring)								
For Sub-Frame 1,2,3,4,6,7,8,9,		0.3972	0.5926	0.5933	0.8533	0.8725	0.8763	0.8533
For Sub-Frame 5		0.3972	0.6441	0.6246	0.8889	0.8855	0.8702	0.8762
For Sub-Frame 0		0.3972	0.6282	0.6106	0.9046	0.9105	0.9018	0.8868
Coding Rate (subframes with EPDCCH USS monitoring)								
For Sub-Frame 1,2,3,4,6,7,8,9,		0.4114	0.6047	0.5993	0.8707	0.8855	0.8851	0.8649
For Sub-Frame 5		0.4114	0.6584	0.6312	0.9086	0.8990	0.8794	0.8889
For Sub-Frame 0		0.4114	0.6418	0.6170	0.9242	0.9246	0.9112	0.8993
Information Bit Payload (Note 8)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	10296	25456	51024	36696	51024	75376	55056
For Sub-Frame 5	Bits	10296	25456	51024	35160	51024	71112	52752
For Sub-Frame 0	Bits	10296	25456	51024	36696	51024	75376	55056
Number of Code Blocks (Notes 3 and 8)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2	5	9	6	9	13	9
For Sub-Frame 5	Bits	2	5	9	6	9	12	9
For Sub-Frame 0	Bits	2	5	9	6	9	13	9
Binary Channel Bits (Note 8) (subframes with PDCCH USS monitoring)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	26100	43200	86400	43200	58752	86400	64800
For Sub-Frame 5	Bits	26100	39744	82080	39744	57888	82080	60480
For Sub-Frame 0	Bits	26100	40752	83952	40752	56304	83952	62352
Binary Channel Bits (Note 8) (subframes with EPDCCH USS monitoring)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	25200	42336	85536	42336	57888	85536	63936
For Sub-Frame 5	Bits	25200	38880	81216	38880	57024	81216	59616
For Sub-Frame 0	Bits	25200	39888	83088	39888	55440	83088	61488
Number of layers		1	2	2	2	2	2	2
Max. Throughput averaged over 1 frame (Note 8)	Mbps	10.296	25.456	51.024	36.542	51.024	74.950	54.826
UE Categories		≥ 1	≥ 2	≥ 2	≥ 2	≥ 3	≥ 3	≥ 4

Note 1: 1 symbol allocated to PDCCH for all tests.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211.
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 4: Resource blocks n_{PRB} = 0..2 are allocated for SIB transmissions in sub-frame 5 for all bandwidths.
Note 5: Resource blocks n_{PRB} = 6..14,30..49 are allocated for the user data in all sub-frames.
Note 6: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 7: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in sub-frames 0,1,2,3,4,6,7,8,9.
Note 8: Given per component carrier per codeword.
Note 9: Resource blocks n_{PRB} = 4..71 are allocated for the user data in sub-frames 0,1,2,3,4,5,6,7,8,9.
Note 10: Resource blocks n_{PRB} = 4..74 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..74 in sub-frames 0,1,2,3,4,6,7,8,9.

A.3.9.4 TDD (EPDCCH scheduling)

Table A.3.9.4-1: Fixed Reference Channel for sustained data-rate with EPDCCH scheduling (TDD)

Parameter	Unit	Value				
Reference channel		R.31E-1 TDD	R.31E-2 TDD	R.31E-3 TDD	R.31E-3A TDD	R.31E-4 TDD
Channel bandwidth	MHz	10	10	20	15	20
Allocated resource blocks		Note 6	Note 7	Note 8	Note 9	Note 8
Uplink-Downlink Configuration (Note 3)		5	5	5	1	1
Number of HARQ Processes per component carrier	Processes	15	15	15	7	7
Allocated subframes per Radio Frame (D+S)		8+1	8+1	8+1	4	4
Coding Rate (subframes with PDCCH USS monitoring)						
For Sub-Frames 4,9		0.3972	0.5926	0.5933	0.8725	0.8763
For Sub-Frames 3,7,8		0.3972	0.5926	0.5933	N/A	N/A
For Sub-Frames 1		N/A	N/A	N/A	N/A	N/A
For Sub-Frames 5		0.3972	0.6372	0.6213	0.8790	0.8656
For Sub-Frames 6		0.3972	0.5986	0.5963	N/A	N/A
For Sub-Frames 0		0.3972	0.6216	0.6075	0.9036	0.8972
Coding Rate (subframes with EPDCCH USS monitoring)						
For Sub-Frames 4,9		0.4114	0.6047	0.5993	0.8856	0.8851
For Sub-Frames 3,7,8		0.4114	0.6047	0.5993	N/A	N/A
For Sub-Frames 1		N/A	N/A	N/A	N/A	N/A
For Sub-Frames 5		0.4114	0.6512	0.6279	0.8922	0.8748
For Sub-Frames 6		0.4114	0.6109	0.6024	N/A	N/A
For Sub-Frames 0		0.4114	0.6349	0.6138	0.9175	0.9065
Information Bit Payload						
For Sub-Frames 4,9	Bits	10296	25456	51024	51024	75376
For Sub-Frames 3,7,8	Bits	10296	25456	51024	N/A	N/A
For Sub-Frame 1	Bits	0	0	0	N/A	N/A
For Sub-Frame 5	Bits	10296	25456	51024	51024	71112
For Sub-Frame 6	Bits	10296	25456	51024	N/A	N/A
For Sub-Frame 0	Bits	10296	25456	51024	51024	75376
Number of Code Blocks per Sub-Frame (Note 4)						
For Sub-Frames 4,9		2	5	9	9	13
For Sub-Frames 3,7,8		2	5	9	N/A	N/A
For Sub-Frame 1		N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5		2	5	9	9	12
For Sub-Frame 6	Bits	2	5	9	N/A	N/A
For Sub-Frame 0		2	5	9	9	13
Binary Channel Bits per Sub-Frame						

(subframes with PDCCH USS monitoring)						
For Sub-Frames 4,9	Bits	26100	43200	86400	58752	86400
For Sub-Frames 3,7,8	Bits	26100	43200	86400	N/A	N/A
For Sub-Frame 1	Bits	0	0	0	N/A	N/A
For Sub-Frame 5	Bits	26100	40176	82512	58320	82512
For Sub-Frame 6	Bits	26100	42768	85968	N/A	N/A
For Sub-Frame 0	Bits	26100	41184	84384	56736	84384
Binary Channel Bits per Sub-Frame (subframes with EPDCCH USS monitoring)						
For Sub-Frames 4,9	Bits	25200	42336	85536	57888	85536
For Sub-Frames 3,7,8	Bits	25200	42336	85536	N/A	N/A
For Sub-Frame 1	Bits	0	0	0	N/A	N/A
For Sub-Frame 5	Bits	25200	39312	81648	57456	81648
For Sub-Frame 6	Bits	25200	41904	85104	N/A	N/A
For Sub-Frame 0	Bits	25200	40320	83520	55872	83520
Number of layers		1	2	2	2	2
Max. Throughput averaged over 1 frame (Note 10)	Mbps	8.237	20.365	40.819	20.409	29.724
UE Category		≥ 1	≥ 2	≥ 2	≥ 2	≥ 3

Note 1: 1 symbol allocated to PDCCH for all tests.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: As per Table 4.2-2 in TS 36.211 [8].
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 5: Resource blocks n_{PRB} = 0..2 are allocated for SIB transmissions in sub-frame 5 for all bandwidths.
Note 6: Resource blocks n_{PRB} = 6..14,30..49 are allocated for the user data in all subframes.
Note 7: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in sub-frames 0,3,4,6,7,8,9.
Note 8: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in sub-frames 0,3,4,6,7,8,9.
Note 9: Resource blocks n_{PRB} = 4..71 are allocated for the user data in all sub-frames
Note10: Given per component carrier per codeword.

A.3.10 Reference Measurement Channels for EPDCCH performance requirements

A.3.10.1 FDD

Table A.3.10.1-1: Reference Channel FDD

Parameter	Unit	Value					
Reference channel		R.55 FDD	R.56 FDD	R.57 FDD	R.58 FDD	R.59 FDD	
Number of transmitter antennas		2	2	2	2	2	
Channel bandwidth	MHz	10	10	10	10	10	
Number of OFDM symbols for PDCCH	symbols	2	2	1	1	1	
Aggregation level	ECCE	4	16	2	8	2	
DCI Format		2A	2A	2C	2C	2D	

A.3.10.2 TDD

Table A.3.10.2-1: Reference Channel TDD

Parameter	Unit	Value					
Reference channel		R.55 TDD	R.56 TDD	R.57 TDD	R.58 TDD	R.59 TDD	
Number of transmitter antennas		2	2	2	2	2	
Channel bandwidth	MHz	10	10	10	10	10	
Number of OFDM symbols for PDCCH	symbols	2	2	1	1	1	
Aggregation level	CCE	4	16	2	8	2	
DCI Format		2A	2A	2C	2C	2D	

A.3.11 Reference Measurement Channels for MPDCCH performance requirements

A.3.11.1 FDD and half-duplex FDD

Table A.3.11.1-1: Reference Channel FDD and half-duplex FDD

Parameter	Unit	Value	Value
Reference channel		R.82FDD	R.83 FDD
Number of transmitter antennas		2	2
Channel bandwidth	MHz	10	10
OFDM starting symbol (startSymbolLC)	symbols	2	2
Aggregation level	ECCE	16	24
DCI Format		6-1A	6-1B
Payload (without CRC)	Bits	29	18
PRB allocation		8-th ~11-th PRB	As specified in Test

Table A.3.11.1-2: Additional PDSCH Reference Channel FDD and half-duplex FDD

Parameter	Unit	Values
Channel bandwidth	MHz	10
Allocated resource blocks (Note 4)		4
Allocated DL subframes per 96 subframes (Note 3)		32
Modulation		QPSK
Target Coding Rate		1/2
Information Bit Payload		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	472
Number of Code Blocks		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Code blocks	1
Binary Channel Bits		
For Sub-Frames 0,1,2,3,4,5,6,7,8,9	Bits	1056
Max. Throughput	kbps	4.92
UE DL Category		M1, ≥ 0

Note 1: 2 symbols allocated to PDCCH
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]
Note 3: The downlink subframes are scheduled at the 33th to 64th subframes every 96ms. Information bit payload is available at the 33th to 64th subframes with repetition. (Starting from the 0th subframe)
Note 4: Allocated PRB positions are {1, 2, 3, 4} within the assigned narrowband.
Note 5: MPDCCH are scheduled at the 0th to 31th subframes with repetition. The allocated PRB positions are {1, 2, 3, 4} within the assigned narrowband. (Starting from the 0th subframe)

A.3.11.2 TDD

Table A.3.11.2-1: Reference Channel TDD

Parameter	Unit	Value	Value
Reference channel		R.82 TDD	R.83 TDD
Number of transmitter antennas		2	2
Channel bandwidth	MHz	10	10
OFDM starting symbol (startSymbolLC)	symbols	2	2
Aggregation level	ECCE	16	24
DCI Format		6-1A	6-1B
Payload (without CRC)	Bits	32	18
PRB allocation		8-th ~11-th PRB	As specified in Test

A.3.12 Reference measurement channels for NPDSCH performance requirements

Editor's note: The note 2 in Table A.3.12.1.2-1 and note 1 in Table A.3.12.2.1-1 are still under discussion with RAN4.

A.3.12.1 In-band

A.3.12.1.2 Two-antenna transmission

Table A.3.12.1.2-1: NPDSCH Reference Channel with 2 TX Antennas

Parameter	Unit	Value	Value
Reference channel		R.NB.5 FDD	R.NB.5-1 FDD
Carrier Type		Anchor	Non-anchor
Channel bandwidth	KHz	200	200
Allocated subframes per Radio Frame		Note 2	10
Modulation		QPSK	QPSK
I_{TBS}/I_{SF}		4/0	4/0
Target Coding Rate		1/3	1/3
Coding Rate		0.4	0.4
Information Bit Payload			
For Sub-Frames 1,2,3,6,7,8	Bits	56	56
For Sub-Frame 0,5	Bits	N/A	56
For Sub-Frame 4,9	Bits	Note 3	56
Number of Code Blocks			
For Sub-Frames 1,2,3,6,7,8 and 9(if NB-SSS is not present)		1	1
For Sub-Frame 0,5	Bits	N/A	1
For Sub-Frame 4,9	Bits	Note 4	1
Binary Channel Bits			
For Sub-Frames 1,2,3,6,7,8 and 9(if NB-SSS is not present)	Bits	200	200
For Sub-Frame 0,5	Bits	N/A	200
For Sub-Frame 4,9	Bits	Note 5	200
Max. Throughput averaged over 2 frame for 1 repetition (Note 6)	Mbps	36.4kb/s	56kb/s
UE Category		NB1	NB1

Note 1: For in-band, the first 3 symbols are used for LTE PDCCH and the number of LTE CRS ports is 4

Note 2: 6 when n_f mod 2 = 0, otherwise 8. n_f is specified in TS36.211 [4].

Note 3: N/A when n_f mod 2 = 0, otherwise 56.

Note 4: N/A when n_f mod 2 = 0, otherwise 1.

Note 5: N/A when n_f mod 2 = 0, otherwise 200.

Note 6: For repetition number N, the maximum throughput averaged over 1 frame equals to (Max. Throughput averaged over 1 frame for 1 repetition) / N.

A.3.12.2 Standalone/Guard-band

A.3.12.2.1 Single-antenna transmission

Table A.3.12.2.1-1: NPDSCH Reference Channel with 1Tx Antenna

Parameter	Unit	Value	Value
Reference channel		R.NB.6 FDD	R.NB.6-1 FDD
Carrier Type		Anchor	Non-Anchor
Channel bandwidth	KHz	200	200
Allocated subframes per Radio Frame		Note 1	10
Modulation		QPSK	QPSK
I_{TBS}/I_{SF}		9/3	6/3
Target Coding Rate		1/2	1/3
Coding Rate		0.5	0.33
Information Bit Payload			
For a four continuous sub-frame group made up of Sub-Frames 1,2,3,6,7,8 and 9 (if NB-SSS is not present)	Bits	616	N/A
For a four continuous sub-frame group made up of Sub-Frames 0,1,2,3,4,5,6,7,8 and 9		N/A	392
Transport block CRC	Bits	24	24
Number of Code Blocks			
For a four continuous sub-frame group made up of Sub-Frames 1,2,3,6,7,8 and 9 (if NB-SSS is not present)		1	N/A
For a four continuous sub-frame group made up of Sub-Frames 0,1,2,3,4,5,6,7,8 and 9	Bits	N/A	1
Available Binary Channel Bits per Sub-frame			
For Sub-Frames 1,2,3,6,7,8 and 9(if NB-SSS is not present)	Bits	320	320
For Sub-Frame 0,5	Bits	N/A	320
For Sub-Frame 4,9	Bits	Note 2	320
Max. Throughput averaged over 1 frame for 1 repetition (Note 3)	Mbps	100kbit/s	98kbit/s
UE Category		NB1	NB1
Note 1: 6 when n_f mod 2 = 0, otherwise 8. n_f is specified in TS36.211 [4].			
Note 2: N/A when n_f mod 2 = 0, otherwise 320.			
Note 3: For repetition number N, the maximum throughput averaged over 1 frame equals to (Max. Throughput averaged over 1 frame for 1 repetition) / N.			

A.3.13 Reference measurement channels for NPDCCH performance requirements

A.3.13.1 Half-duplex FDD

Table A.3.13.1-1 Reference Channel for Category NB1 UE

Parameter	Unit	Value	
Reference channel		R.NB.3 FDD	R.NB.4 FDD
Number of NRS ports		1	2
Channel bandwidth	MHz	0.2	0.2
Aggregation level	NCCE	2	2
DCI Format		N1	N1
Payload (without CRC)	Bits	23	23

A.3.14 Reference measurement channels for NPBCH performance requirements for Cat NB1 UEs

Table A.3.14-1: Reference Channel for Category NB1 UE

Parameter	Unit	Value	
Reference channel		R.NB.1	R.NB.2
Number of transmitter antennas		1	2
Channel bandwidth	KHz	200	200
Modulation		QPSK	QPSK
Target coding rate		50/1600	50/1600
Payload (without CRC)	Bits	34	34

A.3.15 Reference Measurement Channels for LAA SCell with frame structure Type-3

A.3.15.1 Multi-antenna transmission (Common Reference Symbols)

A.3.15.1.1 Four antenna ports

Table A.3.15.1.1-1: Reference Channel with four CRS ports

Parameter	Unit	Value
Reference channel		R.1 FS3
Channel bandwidth	MHz	20
Allocated resource blocks (Note 4)		100
Allocated subframes per Radio Frame		10
Modulation		64QAM
Target Coding Rate		0.6
Information Bit Payload (Note 4)		
For Sub-Frames 1,4,6,9	Bits	{46888,15840,24496,37888,19848}
For Sub-Frames 2, 7		{46888,15840,24496,37888,19848}
For Sub-Frames 3, 8		{46888,15840,24496,37888,19848}
For Sub-Frame 5	Bits	{46888,15840,24496,37888,19848}
For Sub-Frame 0	Bits	{46888,15840,24496,37888,19848}
Number of Code Blocks		
(Notes 3 and 4)		
For Sub-Frames 1,4,6,,9		{8,3,4,7,4}
For Sub-Frames 2,7		{8,3,4,7,4}
For Sub-Frames 3, 8		{8,3,4,7,4}
For Sub-Frame 5		{8,3,4,7,4}
For Sub-Frame 0		{8,3,4,7,4}
Binary Channel Bits (Note 4)		
For Sub-Frames 1,4,6,9	Bits	{76800,26400,43200,62400,33600}
For Sub-Frames 2, 7		{76800,26400,43200,62400,33600}
For Sub-Frames 3, 8		{76800,26400,43200,62400,33600}
For Sub-Frame 5	Bits	{75936,26400,43200,61536,33600}
For Sub-Frame 0 (Note 5)	Bits	{75936,26400,43200,61536,33600}
UE Category		≥ 5

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 4: Given per component carrier per codeword.
Note 5: For {a1,a2,a3,a4,a5}, a1, a2, a3, a4 and a5 stand for the setup when the number of OFDM symbols is 14, 6, 9, 12, 7, respectively.

A.3.15.2 Reference Measurement Channel for UE-Specific Reference Symbols

A.3.15.2.1 Two antenna ports (CSI-RS)

The reference measurement channels in Table A.3.15.2.1-1 apply for verifying demodulation performance for UE-specific reference symbols with two cell-specific antenna ports and two CSI-RS antenna ports for LAA SCell.

Table A.3.15.2.1-1: Reference Channel with two CRS ports

Parameter	Unit	Value
Reference channel		R.2 FS3
Channel bandwidth	MHz	20
Allocated resource blocks (Note 4)		100
Allocated subframes per Radio Frame		10
Modulation		16QAM
Target Coding Rate		1/2
Information Bit Payload (Note 4)		
For Sub-Frames 1,4,6,9	Bits	{22920,7480,12960,19080,10296}
For Sub-Frames 2, 7		{22920,7480,12960,19080,10296}
For Sub-Frames 3, 8		{22920,7480,12960,19080,10296}
For Sub-Frame 5	Bits	{19848, 6712, 11448, 16992, 9144}
For Sub-Frame 0	Bits	{19848, 6712, 11448, 16992, 9144}
Number of Code Blocks		
(Notes 3 and 4)		
For Sub-Frames 1,4,6,,9		{4,2,3,4,2}
For Sub-Frames 2,7		{4,2,3,4,2}
For Sub-Frames 3, 8		{4, 2, 3, 4, 2}
For Sub-Frame 5		{4, 2, 2, 3, 2}
For Sub-Frame 0		{4, 2, 2, 3, 2}
Binary Channel Bits (Note 4)		
For Sub-Frames 1,4,6,9	Bits	{48000,15200,25600,38400,20000}
For Sub-Frames 2, 7		{47200,15200,25600,38400,20000}
For Sub-Frames 3, 8		{46400,15200,25600,38400,20000}
For Sub-Frame 5	Bits	{42240,13376,22528,33792,17600}
For Sub-Frame 0 (Note 5) (Note 6)	Bits	{42240,13376,22528,33792,17600}
UE Category		≥ 5

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz.
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
Note 4: Given per component carrier per codeword.
Note 5: For TM9, **100** resource blocks are allocated in sub-frames 1, 2, 3, 4, 6, 7, 8, 9 and 88 resource blocks (RB0-RB43,RB52-RB99) are allocated in subframe 0 and subframe 5
Note 6: For {a1,a2,a3,a4,a5}, a1, a2, a3, a4 and a5 stand for the setup when the number of OFDM symbols is 14, 6, 9, 12, 7, respectively

Table A.3.15-2: Void

A.4 CQI reference measurement channels

This section defines the DL signal applicable to the reporting of channel quality information (Clause 9.2, 9.3 and 9.5).

In Table A.4-1 are specified the reference channels. Table A.4-13 specifies the mapping of CQI index to modulation coding scheme, which complies with the CQI definition specified in Section 7.2.3 of [10].

Table A.4-0: Void

Table A.4-1: CSI reference measurement channels

RMC Name	Duplex	CH-BW	Alloc. RB-s	UL/DL Config	Alloc. SF-s	MCS Scheme	Nr. HARQ Proc.	Max. nr HARQ Trans.	Notes
1 CRS Port									
RC.1 FDD	FDD	10	50	-		MCS.1	8	1	
RC.1A FDD	FDD	10	50			MCS.1A	8	1	
RC.1 TDD	TDD	10	50	Note 3		MCS.1	10	1	
RC.1A TDD	TDD	20	100	Note 3		MCS.1B	10	1	
RC.3 FDD	FDD	10	6	-		MCS.10	8	1	
RC.3 TDD	TDD	10	6	Note 3		MCS.10	10 or 7 (Note 9)	1	
RC.4 FDD	FDD	10	15	-		MCS.15	8	1	Note 6
RC.4 TDD	TDD	10	15	Note 3		MCS.15	10	1	Note 6
RC.5 FDD	FDD	10	3	-		MCS.17	8	1	
RC.5 TDD	TDD	10	3	Note 3		MCS.17	10	1	
RC.14 FDD	FDD	5	25	-		MCS.14	8	1	
RC.15 FDD	FDD	5	15	-		MCS.15	8	1	Note 6
RC.16 FDD	FDD/HD-FDD	10	2			MCS.20	8	1	Note 8,10
RC.16 TDD	TDD	10	2	Note 3		MCS.20	10	1	Note 8
RC.23 FDD	FDD/HD-FDD	10	3			MCS.28	8	1	Note 12, 13
RC.23 TDD	TDD	10	3			MCS.28	10	1	Note 12
RC.25 FDD	FDD/HD-FDD	10	3			MCS.28	8	1	Note 12, 14
RC.25 TDD	TDD	10	3			MCS.28	10	1	Note 12, 15
2 CRS Ports									
RC.2 FDD	FDD	10	50	-		MCS.2	8	1	
RC.2 TDD	TDD	10	50	Note 3		MCS.2	10 or 7 (Note 9)	1	
RC.6 FDD	FDD	10	15	-		MCS.16	8	1	Note 6
RC.6 TDD	TDD	10	15	Note 3		MCS.16	7	1	Note 6
4 CRS Ports									
RC.17 FDD	FDD	10	50	-		MCS.18	8	1	
RC.17 TDD	TDD	10	50	Note 3		MCS.18	7	1	
RC.21 FDD	FDD	10	50	-		MCS.26	8	1	
RC.21 TDD	TDD	10	50	Note 3		MCS.26	7	1	
1 CRS Port + CSI-RS									
RC.8 FDD	FDD	10	6	-	Non CSI-RS	MCS.11	8	1	
					2 CSI-RS	MCS.12			
RC.8A FDD	FDD	10	6	-	Non CSI-RS	MCS.11A	8	1	
					2 CSI-RS	MCS.12A			
RC.8 TDD	TDD	10	6	Note 3	Non CSI-RS	MCS.11	10	1	
					2 CSI-RS	MCS.12			
RC.8A	TDD	20	8	Note 3	Non	MCS.11B	10	1	

TDD					CSI-RS				
					2 CSI-RS	MCS.12B			
RC.9 FDD	FDD	10	50	-	Non CSI-RS	MCS.3	8	1	
					2 CSI-RS	MCS.4			
RC.9 TDD	TDD	10	50	Note 3	Non CSI-RS	MCS.3	7	1	
					2 CSI-RS	MCS.4			
2 CRS Port + CSI-RS									
RC.7 FDD	FDD	10	50	-	Non CSI-RS	MCS.5	8	1	
					4 CSI-RS	MCS.7			
RC.7 TDD	TDD	10	50	Note 3	Non CSI-RS	MCS.5	10	1	
					8 CSI-RS	MCS.8			
RC.11 FDD	FDD	10	50	-	Non CSI-RS	MCS.5	8	1	
					2 CSI-RS	MCS.6			
RC.11 TDD	TDD	10	50	Note 3	Non CSI-RS	MCS.5	10	1	
					2 CSI-RS	MCS.6			
RC.18 FDD	FDD	10	6	-	Non CSI-RS	MCS.13	8	1	
					4 CSI-RS	MCS.19			
RC.18 TDD	TDD	10	6	Note 3	Non CSI-RS	MCS.13	7	1	
					4 CSI-RS	MCS.19			
RC.17 TDD	TDD	10	6	Note 3	4 ZP-CSI-RS	MCS.21	10	1	
RC.18 TDD	TDD	10	6	Note 3	4 ZP-CSI-RS	MCS.22	10	1	
RC.19 TDD	TDD	10	41	Note 3	4 ZP-CSI-RS	MCS.23	10	1	Note 11
RC.20 TDD	TDD	10	50	Note 3	Non CSI-RS	MCS.24	10	1	
					2 CSI-RS, 4 ZP-CSI-RS	MCS.25			
RC.22 FDD	FDD	10	50	-	Non CSI-RS	MCS.5	8	1	
					4 CSI-RS	MCS.27			
RC.22 TDD	TDD	10	50	Note 3	Non CSI-RS	MCS.5	10	1	
					4 CSI-RS	MCS.27			
1 CRS Port + CSI-RS + CSI-IM									
RC.13 FDD	FDD	10	50	-	Non CSI-RS/IM	MCS.3	8	1	
					CSI-RS/IM	N/A			
RC.13 TDD	TDD	10	50	Note 3	Non CSI-RS/IM	MCS.3	10	1	
					CSI-RS/IM	N/A			
2 CRS Port + CSI-RS + CSI-IM									
RC.10 FDD	FDD	10	50	-	Non CSI-RS	MCS.5	8	1	
					4 CSI-	MCS.8			

					RS, 1 CSI process				
RC.10 TDD	TDD	10	50	Note 3	Non CSI-RS	MCS.5	10	1	
					8 CSI-RS, 1 CSI process	MCS.9			
RC.12 FDD	FDD	10	6	-	Non CSI-RS/IM	MCS.13	8	1	
					CSI-RS/IM	N/A			
RC.12 TDD	TDD	10	6	Note 3	Non CSI-RS/IM	MCS.13	10	1	
					CSI-RS/IM	N/A			

Note 1: 3 symbols allocated to PDCCH.
Note 2: For FDD only subframes 1, 2, 3, 4, 6, 7, 8 and 9 are allocated to avoid PBCH and synchronization signal overhead.
Note 3: TDD UL-DL configuration as specified in the individual tests.
Note 4: For TDD when UL-DL configuration 1 is used only subframes 4 and 9 are allocated to avoid PBCH and synchronization signal overhead.
Note 5: For TDD when UL-DL configuration 2 is used only subframes 3, 4, 8, and 9 are allocated to avoid PBCH and synchronization signal overhead.
Note 6: Centred within the Transmission Bandwidth Configuration (Figure 5.4.2-1).
Note 7: Only subframes 2, 3, 4, 7, 8 and 9 are allocated to avoid PBCH and synchronization signal overhead.
Note 8: Allocate PDSCH on 5th and 6th PRBs within a subband.
Note 9: The number of HARQ processes is 10 for TDD UL/DL configuration 2 and 7 for TDD UL/DL configuration 1.
Note 10: The downlink subframes are scheduled at the 1st, 2nd, 8th, 9th, 16th, 17th, 18th, 24th, 26th, 32nd, 33rd, 34th subframes every 40ms. Information bit payload is available if downlink subframe is scheduled (starting from 0th subframe).
Note 11: 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in subframe 0 and 5 in RC.19 TDD.
Note 12: Allocate PDSCH on 3th, 4th and 5th PRBs within a narrowband. Allocate MPDCCH on the 0th and 1st PRBs within a narrowband.
Note 13: The PDSCH subframes are scheduled at the 0th and 1st subframes every 10ms. Information bit payload is available if downlink subframe is scheduled (starting from 0th subframe). MPDCCH subframes are scheduled at the 8th and 9th subframes every 10ms.
Note 14: The downlink subframes are scheduled at the 2nd, 10th, 18th, 26th, 34th subframes every 40ms. Information bit payload is available if downlink subframe is scheduled (starting from 0th subframe).
Note 15: Information bit payload is scheduled at the 8th subframe every 20ms (starting from 0th subframe).

Table A.4-1a to Table A.4-1d: Void

Table A.4-2a to Table A.4-2d: Void

Table A.4-3a to Table A.4-3k: Void

Table A.4-4a: Void

Table A.4-5a: Void

Table A.4-6a: Void

Table A.4-6b: Void

Table A.4-2 to Table A.4.12: Void

Table A.4-13: Mapping of CQI Index to Modulation coding scheme (MCS)

CQI Index			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Note
Target Coding Rate			OOR	0.0762	0.1172	0.1885	0.3008	0.4385	0.5879	0.3691	0.4785	0.6016	0.4551	0.5537	0.6504	0.7539	0.8525	0.9258	
Modulation			OOR	QPSK						16QAM			64QAM						
MCS Scheme	PRB	Available RE-s	Imcs																
MCS.1	50	6300	DTX	0	0	2	4	6	8	11	13	16	18	21	23	25	27	27	
MCS.2	50	6000	DTX	0	0	2	4	6	8	11	13	15	18	20	22	24	26	27	
MCS.3	50	5700	DTX	0	0	2	4	6	8	10	13	15	17	19	21	23	25	26	
MCS.4	50	5600	DTX	0	0	2	4	6	7	10	12	14	17	19	21	23	25	26	
MCS.5	50	5400	DTX	0	0	2	3	5	7	10	12	14	17	19	21	23	24	25	
MCS.6	50	5300	DTX	0	0	1	3	5	7	10	12	14	17	19	21	22	24	25	
MCS.7	50	5200	DTX	0	0	1	3	5	7	10	12	14	17	18	20	22	24	25	
MCS.8	50	5000	DTX	0	0	1	3	5	7	10	12	13	17	18	20	22	23	24	
MCS.9	50	4800	DTX	0	0	1	3	5	7	10	12	13	17	18	20	22	23	24	
MCS.10	6	756	DTX	0	0	2	4	6	8	11	13	16	19	21	23	25	27	27	
MCS.11	6	684	DTX	0	0	2	4	6	8	11	13	14	17	20	21	23	25	27	
MCS.12	6	672	DTX	0	0	1	4	6	8	10	12	14	17	19	21	23	25	26	
MCS.13	6	648	DTX	0	0	2	4	6	8	11	13	15	18	20	22	24	26	27	
MCS.14	25	3150	DTX	0	0	2	4	6	8	11	13	16	18	21	23	25	27	27	
MCS.15	15	1890	DTX	0	0	2	4	6	8	11	13	16	18	21	23	25	27	27	
MCS.16	15	1800	DTX	0	0	2	4	6	8	11	13	15	18	20	22	24	26	27	
MCS.17	3	378	DTX	0	1	2	5	7	9	12	13	16	19	21	23	25	27	27	
MCS.18	50	5800	DTX	0	0	2	4	6	8	11	13	15	17	20	22	23	26	27	
MCS.19	6	624	DTX	0	0	1	3	5	7	10	12	14	17	18	20	22	24	25	
MCS.20	2	252	DTX	0	0	2	4	6	8	11	13	16	19	21	23	23	23	23	
MCS.21	6	696	DTX	0	0	2	4	6	8	11	13	15	18	20	21	24	25	27	
MCS.22	6	624	DTX	0	0	1	3	5	7	10	12	14	15	19	20	22	24	24	
MCS.23	41	4264	DTX	0	0	1	3	5	7	10	12	14	15	18	20	22	24	24	
MCS.24	50	5400	DTX	0	0	2	3	5	7	10	12	14	15	19	21	23	24	25	
MCS.25	50	5100	DTX	0	0	1	3	5	7	8	12	13	15	18	20	22	23	24	
MCS.26	50	5800	DTX	0	0	2	4	6	8	11	13	15	18	20	22	24	26	27	

MCS.27	CW0	50	4600	DTX	0	0	1	3	5	6	10	11	13	17	18	19	21	23	23
	CW1	50	4600	DTX	0	0	1	3	5	6	10	11	13	17	18	19	21	22	23

Note 1: Mapping between Imcs and TBS according to Tables 7.1.7.1-1 and 7.1.7.2.1-1 in TS 36.213 [6].
Note 2: 3 symbols allocated to PDCCH.
Note 3: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall b used for potential retransmissions.

Table A.4-14: Mapping of CQI Index to Modulation coding scheme (Modulation and TBS index Table 2 and 4-bit CQI Table 2 are used)

CQI Index			0	1	2	3	4	5	6	7	8	9	10	11	12	13	
Target Coding Rate			OOR	0.0762	0.1885	0.4385	0.3691	0.4785	0.6016	0.4551	0.5537	0.6504	0.7539	0.6394	0.6943	0.7783	
Modulation			OOR	QPSK			16QAM			64QAM				256QAM			
MCS Scheme	PRB	Available RE-s	Imcs														
MCS.1A	50	6300	DTX	0	1	3	5	7	10	11	14	16	18	20	22	24	
MCS.1B	100	12600	DTX	0	1	3	5	7	10	11	14	15	18	20	22	24	

Note 1: Mapping between Imcs and TBS according to Tables 7.1.7.1-1 and 7.1.7.2.1-1 in TS 36.213 [6].
Note 2: 3 symbols allocated to PDCCH.
Note 3: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for poten

Table A.4-15: Mapping of CQI Index to Modulation coding scheme (Modulation and TBS index Table 2 and 4-bit CQI Table 2 are used)

CQI Index			0	1	2	3	4	5	6	7	8	9	10	11	12	13	
Target Coding Rate			OOR	0.0762	0.1885	0.4385	0.3691	0.4785	0.6016	0.6826	0.5537	0.6504	0.7539	0.8525	0.6943	0.7783	
Modulation			OOR	QPSK			16QAM				64QAM				256QA		
MCS Scheme	PRB	Available RE-s	Imcs														
MCS.11A	6	684	DTX	0	1	3	5	7	8	10	13	14	16	18	20	22	
MCS.12A	6	672	DTX	0	1	3	5	6	8	10	12	14	16	18	20	22	
MCS.11B	8	912	DTX	0	1	3	5	7	9	10	13	14	16	18	19	22	
MCS.12B	8	896	DTX	0	1	3	5	6	8	10	12	14	16	18	19	22	

Note 1: Mapping between Imcs and TBS according to Tables 7.1.7.1-1 and 7.1.7.2.1-1 in TS 36.213 [6].
Note 2: 3 symbols allocated to PDCCH.
Note 3: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for poten

Table A.4-16: Mapping of CQI Index to Modulation coding scheme (Modulation and TBS index Table 3)

CQI Index			0	1	2	3	4	5	6	7	8	9	10	11	12	13
Target Coding Rate			OOR	0.0391	0.0762	0.1172	0.1885	0.3008	0.4385	0.5879	0.3691	0.4785	0.6015	Reserved	Reserved	
Modulation			OOR	QPSK							16QAM					
MCS Scheme	PRB	Available RE-s	Imcs													
MCS.28	3	378	DTX	0	0	0	2	4	6	8	11	13	15	N/A	N/A	N/A
Note 1: Mapping between Imcs and TBS according to Tables 7.1.7.1-1 and 7.1.7.2.1-1 in TS 36.213 [6].																
Note 2: startSymbolBR = 3																

A.4.1 Additional CSI reference measurement channels

This section defines additional reference measurement channels for CSI testing, required to run the test properly according to the test parameters.

Table A.4.1-1: Uplink reference channels for transmitting CSI reports on PUSCH when being in a PUCCH reporting mode (FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	10					
Allocated resource blocks		6					
DFT-OFDM Symbols per Sub-Frame		12					
Modulation		QPSK					
Target Coding rate		1/3					
Allocated Sub-Frames		Note 1					
Payload size	Bits	600					
Transport block CRC	Bits	24					
Number of code blocks per Sub-Frame (Note 2)		1					
Total number of bits per Sub-Frame	Bits	1728					
Total symbols per Sub-Frame		864					
UE Category		≥ 1					
Note 1: All subframes, if not other specified. In case of allocation of only certain subframes, as specified in the test case, the remaining subframes are not allocated with data. All the allocation details specified in the reference channel are valid only for the allocated subframes.							
Note 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)							

Table A.4.1-1a: Uplink reference channels for transmitting CSI reports on PUSCH when being in a PUCCH reporting mode for UE category M1 (FDD/HD-FDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	10					
Allocated resource blocks		6					
DFT-OFDM Symbols per Sub-Frame		12					
Modulation		QPSK					
Target Coding rate		1/3					
Allocated Sub-Frames		Note 1					
Payload size	Bits	600					
Transport block CRC	Bits	24					
Number of code blocks per Sub-Frame (Note 2)		1					
Total number of bits per Sub-Frame	Bits	1728					
Total symbols per Sub-Frame		864					
UE Category		M1					

Note 1: All subframes, if not other specified. In case of allocation of only certain subframes, as specified in the test case, the remaining subframes are not allocated with data. All the allocation details specified in the reference channel are valid only for the allocated subframes.

Note 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

Table A.4.1-2: Uplink reference channels for transmitting CSI reports on PUSCH when being in a PUCCH reporting mode (TDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	10	10				
Allocated resource blocks		6	6				
Uplink-Downlink Configuration (Note 1)		1	2				
DFT-OFDM Symbols per Sub-Frame		12	12				
Modulation		QPSK	QPSK				
Target Coding rate		1/3	1/3				
Allocated Sub-Frames		Note 2	Note 2				
Payload size	Bits	600	600				
Transport block CRC	Bits	24	24				
Number of code blocks per Sub-Frame (Note 3)		1	1				
Total number of bits per Sub-Frame	Bits	1728	1728				
Total symbols per Sub-Frame		864	864				
UE Category		≥ 1	≥ 1				

Note 1: As per Table 4.2-2 in TS 36.211 [4].

Note 2: All uplink subframes, if not other specified. In case of allocation of only certain uplink subframes, as specified in the test case, the remaining uplink subframes are not allocated with data. All the allocation details specified in the reference channel are valid only for the allocated uplink subframes.

Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Table A.4.1-2a: Uplink reference channels for transmitting CSI reports on PUSCH when being in a PUCCH reporting mode for UE category M1 (TDD)

Parameter	Unit	Value					
Channel bandwidth	MHz	10	10				
Allocated resource blocks		6	6				
Uplink-Downlink Configuration (Note 1)		1	2				
DFT-OFDM Symbols per Sub-Frame		12	12				
Modulation		QPSK	QPSK				
Target Coding rate		1/3	1/3				
Allocated Sub-Frames		Note 2	Note 2				
Payload size	Bits	600	600				
Transport block CRC	Bits	24	24				
Number of code blocks per Sub-Frame (Note 3)		1	1				
Total number of bits per Sub-Frame	Bits	1728	1728				
Total symbols per Sub-Frame		864	864				
UE Category		≥ 1	≥ 1				
Note 1: As per Table 4.2-2 in TS 36.211 [4]. Note 2: All uplink subframes, if not other specified. In case of allocation of only certain uplink subframes, as specified in the test case, the remaining uplink subframes are not allocated with data. All the allocation details specified in the reference channel are valid only for the allocated uplink subframes. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

A.5 OFDMA Channel Noise Generator (OCNG)

A.5.1 OCNG Patterns for FDD

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test). The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level (γ) specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols with and without reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:

$$\gamma_i = PDSCH_i_RA / OCNG_RA = PDSCH_i_RB / OCNG_RB,$$

where γ_i denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG_RA, OCNG_RB, and the set of relative power levels γ are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PCFICH/PDCCH/PHICH reference channel which specifies the control region. For any aggregation and PHICH allocation, the PDCCH and any unused PHICH groups are padded with resource element groups with a power level given respectively by PDCCH_RA/RB and PHICH_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

A.5.1.1 OCNG FDD pattern 1: One sided dynamic OCNG FDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided).

Table A.5.1.1-1: OP.1 FDD: One sided dynamic OCNG FDD Pattern

Relative power level γ_{PRB} [dB]			PDSCH Data
Subframe			
0	5	1 – 4, 6 – 9	
Allocation			
First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	
0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

A.5.1.2 OCNG FDD pattern 2: Two sided dynamic OCNG FDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is discontinuous in frequency domain (divided in two parts by the allocated area – two sided), starts with PRB 0 and ends with PRB $N_{RB}-1$.

Table A.5.1.2-1: OP.2 FDD: Two sided dynamic OCNG FDD Pattern

Relative power level γ_{PRB} [dB]			PDSCH Data
Subframe			
0	5	1 – 4, 6 – 9	
Allocation			
0 – (First allocated PRB-1) and (Last allocated PRB+1) – ($N_{RB}-1$)	0 – (First allocated PRB-1) and (Last allocated PRB+1) – ($N_{RB}-1$)	0 – (First allocated PRB-1) and (Last allocated PRB+1) – ($N_{RB}-1$)	
0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

A.5.1.3 OCNG FDD pattern 3: 49 RB OCNG allocation with MBSFN in 10 MHz

Table A.5.1.3-1: OP.3 FDD: OCNG FDD Pattern 3

Allocation n_{PRB}	Relative power level γ_{PRB} [dB]				PDSCH Data	PMCH Data
	Subframe					
	0	5	4, 9	1 – 3, 6 – 8		
1 – 49	0	0 (Allocation: all empty PRB-s)	0	N/A	Note 1	N/A
0 – 49	N/A	N/A	N/A	0	N/A	Note 2

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter γ_{PRB} is used to scale the power of PMCH.

Note 3: If two or more transmit antennas are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode 2. The transmit power shall be equally split between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

N/A: Not Applicable

A.5.1.4 OCNG FDD pattern 4: One sided dynamic OCNG FDD pattern for MBMS transmission

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided) and MBMS performance is tested.

Table A.5.1.4-1: OP.4 FDD: One sided dynamic OCNG FDD Pattern for MBMS transmission

Allocation n_{PRB}	Relative power level γ_{PRB} [dB]			PDSCH Data	PMCH Data
	Subframe				
	0, 4, 9	5	1 – 3, 6 – 8		

First unallocated PRB – Last unallocated PRB	0	0 (Allocation: all empty PRB-s)	N/A	Note 1	N/A
First unallocated PRB – Last unallocated PRB	N/A	N/A	N/A	N/A	Note 2

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter γ_{PRB} is used to scale the power of PMCH.

Note 3: If two or more transmit antennas are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode 2. The transmit power shall be equally split between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

N/A: Not Applicable

A.5.1.5 OCNG FDD pattern 5: One sided dynamic 16QAM modulated OCNG FDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of DL sub-frames, when the unallocated area is continuous in the frequency domain (one sided).

Table A.5.1.5-1: OP.5 FDD: One sided dynamic 16QAM modulated OCNG FDD Pattern

Relative power level γ_{PRB} [dB]			**PDSCH Data**
Subframe			
0	5	1 – 4, 6 – 9	
Allocation			
First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	
0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is 16QAM modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 3 (Large Delay CDD). The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

A.5.1.6 OCNG FDD pattern 6: dynamic OCNG FDD pattern when user data is in 2 non-contiguous blocks

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is discontinuous in frequency domain (divided in two parts by the first allocated block). The second allocated block ends with PRB $N_{RB}-1$.

Table A.5.1.6-1: OP.6 FDD: OCNG FDD Pattern when user data is in 2 non-contiguous blocks

Relative power level γ_{PRB} [dB]			**PDSCH Data**
Subframe			
0	5	1 – 4, 6 – 9	
Allocation			
0 – (First allocated PRB of first block -1) and (Last allocated PRB of first block +1) – (First allocated PRB of second block -1)	0 – (First allocated PRB of first block -1) and (Last allocated PRB of first block +1) – (First allocated PRB of second block -1)	0 – (First allocated PRB of first block -1) and (Last allocated PRB of first block +1) – (First allocated PRB of second block -1)	
0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

A.5.1.7 OCNG FDD pattern 7: dynamic OCNG FDD pattern when user data is in multiple non-contiguous blocks

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data, EPDCCH or system information) of the DL sub-frames, when the unallocated area is discontinuous in frequency domain (divided in multiple parts by the *M* allocated blocks for data transmission). The *m*-th allocated block starts with RPB $N_{Start,m}$ and ends with PRB $N_{End,m}-1$, where *m* = 1, …, *M*. The system bandwidth starts with RPB 0 and ends with $N_{RB}-1$.

Table A.5.1.7-1: OP.7 FDD: OCNG FDD Pattern when user data is in multiple non-contiguous blocks

Relative power level γ_{PRB} [dB]			PDSCH Data
Subframe			
0	5	1 – 4, 6 – 9	
Allocation			
0 – (PRB $N_{Start,1}-1$) … (PRB $N_{End,(m-1)}$) – (PRB $N_{Start,m}-1$) … (PRB $N_{End,M}$) – (PRB $N_{RB}-1$)	0 – (PRB $N_{Start,1}-1$) … (PRB $N_{End,(m-1)}$) – (PRB $N_{Start,m}-1$) … (PRB $N_{End,M}$) – (PRB $N_{RB}-1$)	0 – (PRB $N_{Start,1}-1$) … (PRB $N_{End,(m-1)}$) – (PRB $N_{Start,m}-1$) … (PRB $N_{End,M}$) – (PRB $N_{RB}-1$)	
0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213 [10].

A.5.1.8 OCNG FDD pattern 8: One sided dynamic OCNG FDD pattern for TM10 transmission

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided).

Table A.5.1.8-1: OP.8 FDD: One sided dynamic OCNG FDD Pattern

Relative power level γ_{PRB} [dB]			PDSCH Data
Subframe			
0	5	1 – 4, 6 – 9	
Allocation			
First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	
0	0	0	Note 1,2,3

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is 16QAM modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: The OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode10. The transmit power is equal between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213 [10].

Note 3: The detailed test set-up for TM10 transmission i.e. PMI configuration is specified to each test case.

A.5.2 OCNG Patterns for TDD

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test). The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level (γ) specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols with and without reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:

$$\gamma_i = PDSCH_i_RA / OCNG_RA = PDSCH_i_RB / OCNG_RB,$$

where γ_i denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG_RA, OCNG_RB, and the set of relative power levels γ are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PCFICH/PDCCH/PHICH reference channel which specifies the control region. For any aggregation and PHICH allocation, the PDCCH and any unused PHICH groups are padded with resource element groups with a power level given respectively by PDCCH_RA/RB and PHICH_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

A.5.2.1 OCNG TDD pattern 1: One sided dynamic OCNG TDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the subframes available for DL transmission (depending on TDD UL/DL configuration), when the unallocated area is continuous in frequency domain (one sided).

Table A.5.2.1-1: OP.1 TDD: One sided dynamic OCNG TDD Pattern

Relative power level γ_{PRB} [dB]				**PDSCH Data**
Subframe (only if available for DL)				
0	5	3, 4, 7, 8, 9 and 6 (as normal subframe) Note 2	1 and 6 (as special subframe) Note 2	
Allocation				
First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	
0	0	0	0	**Note 1**

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211.

Note 3: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

A.5.2.2 OCNG TDD pattern 2: Two sided dynamic OCNG TDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the subframes available for DL transmission (depending on TDD UL/DL configuration), when the unallocated area is discontinuous in frequency domain (divided in two parts by the allocated area – two sided), starts with PRB 0 and ends with PRB $N_{RB} - 1$.

Table A.5.2.2-1: OP.2 TDD: Two sided dynamic OCNG TDD Pattern

Relative power level γ_{PRB} [dB]				PDSCH Data
Subframe (only if available for DL)				
0	5	3, 4, 6, 7, 8, 9 (6 as normal subframe) Note 2	1,6 (6 as special subframe) Note 2	
Allocation				
0 – (First allocated PRB-1) and (Last allocated PRB+1) – ($N_{RB}-1$)	0 – (First allocated PRB-1) and (Last allocated PRB+1) – ($N_{RB}-1$)	0 – (First allocated PRB-1) and (Last allocated PRB+1) – ($N_{RB}-1$)	0 – (First allocated PRB-1) and (Last allocated PRB+1) – ($N_{RB}-1$)	
0	0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211.

Note 3: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

A.5.2.3 OCNG TDD pattern 3: 49 RB OCNG allocation with MBSFN in 10 MHz

Table A.5.2.3-1: OP.3 TDD: OCNG TDD Pattern 3 for 5ms downlink-to-uplink switch-point periodicity

Allocation n_{PRB}	Relative power level γ_{PRB} [dB]				PDSCH Data	PMCH Data
	Subframe					
	0	5	4, 9 Note 2	1, 6		
1 – 49	0	0 (Allocation: all empty PRB-s)	N/A	0	Note 1	N/A
0 – 49	N/A	N/A	0	N/A	N/A	Note 3

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211.

Note 3: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals

Note 4: If two or more transmit antennas are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode 2. The transmit power shall be equally split between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

N/A: Not Applicable

A.5.2.4 OCNG TDD pattern 4: One sided dynamic OCNG TDD pattern for MBMS transmission

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided) and MBMS performance is tested.

Table A.5.2.4-1: OP.4 TDD: One sided dynamic OCNG TDD Pattern for MBMS transmission

Allocation n_{PRB}	**Relative power level** γ_{PRB} **[dB]**				**PDSCH Data**	**PMCH Data**
	Subframe (only for DL)					
	0 and 6 (as normal subframe)	1 (as special subframe)	5	3, 4, 7 – 9		
First unallocated PRB – Last unallocated PRB	0	0 (Allocation: all empty PRB-s of DwPTS)	0 (Allocation: all empty PRB-s)	N/A	Note 1	N/A
First unallocated PRB – Last unallocated PRB	N/A	N/A	N/A	N/A	N/A	Note2

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals.

Note 3: If two or more transmit antennas are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode 2. The transmit power shall be equally split between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

N/A Not Applicable

A.5.2.5 OCNG TDD pattern 5: One sided dynamic 16QAM modulated OCNG TDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the sub-frames available for DL transmission (depending on TDD UL/DL configuration), when the unallocated area is continuous in frequency domain (one sided).

Table A.5.2.5-1: OP.5 TDD: One sided dynamic 16QAM modulated OCNG TDD Pattern

Relative power level γ_{PRB} [dB]				PDSCH Data
Subframe (only if available for DL)				
0	5	3, 4, 7, 8, 9 and 6 (as normal subframe) Note 2	1 and 6 (as special subframe) Note 2	
Allocation				
First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	
0	0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is 16QAM modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211

Note 3: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 3 (Large Delay CDD). The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

A.5.2.6 OCNG TDD pattern 6: dynamic OCNG TDD pattern when user data is in 2 non-contiguous blocks

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the subframes available for DL transmission (depending on TDD UL/DL configuration), when the unallocated area is discontinuous in frequency domain (divided in two parts by the first allocated block). The second allocated block ends with PRB $N_{RB}-1$.

Table A.5.2.6-1: OP.6 TDD: OCNG TDD Pattern when user data is in 2 non-contiguous blocks

Relative power level γ_{PRB} [dB]				PDSCH Data
Subframe (only if available for DL)				
0	5	3, 4, 6, 7, 8, 9 (6 as normal subframe) Note 2	1,6 (6 as special subframe) Note 2	
Allocation				
0 – (First allocated PRB of first block -1) and (Last allocated PRB of first block +1) – (First allocated PRB of second block -1)	0 – (First allocated PRB of first block -1) and (Last allocated PRB of first block +1) – (First allocated PRB of second block -1)	0 – (First allocated PRB of first block -1) and (Last allocated PRB of first block +1) – (First allocated PRB of second block -1)	0 – (First allocated PRB of first block -1) and (Last allocated PRB of first block +1) – (First allocated PRB of second block -1)	
0	0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211

Note 3: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

A.5.2.7 OCNG TDD pattern 7: dynamic OCNG TDD pattern when user data is in multiple non-contiguous blocks

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data, EPDCCH or system information) of the DL sub-frames, when the unallocated area is discontinuous in frequency domain (divided in multiple parts by the *M* allocated blocks for data transmission). The *m*-th allocated block starts with RPB $N_{Start,m}$ and ends with PRB $N_{End,m}-1$, where $m = 1, \ldots, M$. The system bandwidth starts with RPB 0 and ends with $N_{RB}-1$.

Table A.5.2.7-1: OP.7 TDD: OCNG TDD Pattern when user data is in multiple non-contiguous blocks

Relative power level γ_{PRB} [dB]				PDSCH Data
Subframe (only if available for DL)				
0	**5**	**3, 4, 6, 7, 8, 9 (6 as normal subframe)** Note 2	**1,6 (6 as special subframe)** Note 2	
Allocation				
0 – (PRB $N_{Start,1}-1$) … (PRB $N_{End,(m-1)}$) – (PRB $N_{Start,m}-1$) … (PRB $N_{End,M}$) – (PRB $N_{RB}-1$)	0 – (PRB $N_{Start,1}-1$) … (PRB $N_{End,(m-1)}$) – (PRB $N_{Start,m}-1$) … (PRB $N_{End,M}$) – (PRB $N_{RB}-1$)	0 – (PRB $N_{Start,1}-1$) … (PRB $N_{End,(m-1)}$) – (PRB $N_{Start,m}-1$) … (PRB $N_{End,M}$) – (PRB $N_{RB}-1$)	0 – (PRB $N_{Start,1}-1$) … (PRB $N_{End,(m-1)}$) – (PRB $N_{Start,m}-1$) … (PRB $N_{End,M}$) – (PRB $N_{RB}-1$)	
0	0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211 [8].

Note 3: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213 [10].

A.5.2.8 OCNG TDD pattern 8: One sided dynamic OCNG TDD pattern for TM10 transmission

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided).

Table A.5.2.8-1: OP.8 TDD: One sided dynamic OCNG TDD Pattern

Relative power level γ_{PRB} [dB]			PDSCH Data
Subframe			
0	5	1 – 4, 6 – 9	
Allocation			
First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	
0	0	0	Note 1,2,3

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is 16QAM modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: The OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode10. The transmit power is equal between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213 [10].

Note 3: The detailed test set-up for TM10 transmission i.e. PMI configuration is specified to each test case.

A.5.3 OCNG Patterns for Narrowband IoT

The following OCNG patterns are used for modelling allocations to virtual narrowband IoT UEs (which are not under test). The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level (γ) specifies the NPDSCH EPRE-to-NRS EPRE ratios in OFDM symbols with and without Narrowband reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:

$$\gamma_i = NPDSCH_i_RA / OCNG_RA = NPDSCH_i_RB / OCNG_RB,$$

where γ_i denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG_RA, OCNG_RB, and the set of relative power levels γ are chosen such that when also taking allocations to the UE under test into account, as given by a NPDSCH or NPDCCH reference channel, a transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

A.5.3.1 Narrowband IoT OCNG pattern 1

Table A.5.3.1-1: NB.OP.1 FDD: OCNG FDD Pattern 1

Bandwidth	Relative power level γ [dB]	NPDCCH and corresponding NPDSCH Data
	Subframe	
	Unused subframes	

200KHz	0	Note 2

Note 1: These subframes are assigned to an arbitrary number of virtual UEs with one NPDSCH per virtual UE with corresponding NPDCCH; the data transmitted over the OCNG NPDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ is used to scale the power of NPDSCH and NPDCCH.

Note 2: Subframes and/or REs available for narrowband IOT DL transmission depend on the in-band, guard band or standalone mode indicated in MIB, and scheduling delay between NPDCCH, NPDSCH, NPUSCH format 2 and NPDCCH specified in test cases.

Note 3: If two or more transmit antennas with NRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with NRS according to transmit diversity scheme. The parameter γ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with NRS used in the test.

A.5.34 OCNG Patterns for frame structure type

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test). The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level (γ) specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols with and without reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:

$$\gamma_i = PDSCH_i_RA / OCNG_RA = PDSCH_i_RB / OCNG_RB,$$

where γ_i denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG_RA, OCNG_RB, and the set of relative power levels γ are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a constant transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PDCCH reference channel which specifies the control region. For any aggregation the PDCCH are padded with resource element groups with a power level given respectively by PDCCH_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

For the performance requirements of UE with the CA capability, the OCNG patterns apply for each LAA Scell.

A.5.4.1 OCNG FS3 pattern 1: One sided dynamic OCNG frame structure type 3 pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided).

Table A.5.4.1-1: OP.1 FS3: One sided dynamic OCNG frame structure type 3 Pattern

Relative power level γ_{PRB} [dB]			PDSCH Data
Subframe			
0	5	1 – 4, 6 – 9	
Allocation			
First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	First unallocated PRB – Last unallocated PRB	
0	0	0	Note 1

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.

Note 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213[10].

Note 3: Subframes available for DL transmission and Occupied OFDM symbols in each subframe depend on the downlink burst transmission pattern and its corresponding configuration

A.6 Sidelink reference measurement channels

A.6.1 General

The algorithm for determining the payload size *A* is as follows; given a desired coding rate *R* and radio block allocation N_{RB}

1. Calculate the number of channel bits N_{ch} that can be transmitted during the first transmission of a given sub-frame.

2. Find *A* such that the resulting coding rate is as close to *R* as possible, that is,

$$\min\left|R-(A+24*(N_{CB}+1))/N_{ch}\right|, \textit{ where } N_{CB}=\begin{cases}0, \textit{if } C=1\\ C, \textit{if } C>1\end{cases},$$

subject to

a) A is a valid TB size according to section 7.1.7 of TS 36.213 [10] assuming an allocation of N_{RB} resource blocks.

b) *C* is the number of Code Blocks calculated according to section 5.1.2 of TS 36.212 [9].

3. If there is more than one *A* that minimizes the equation above, then the larger value is chosen per default and the chosen code rate should not exceed 0.93.

A.6.2 Reference measurement channel for receiver characteristics

For ProSe Direct Discovery, Table A.6.2-1 is applicable for measurements on the Receiver Characteristics (clause 7) including the requirements of subclause 7.4D (Maximum input level).

For ProSe Direct Communication, Table A.6.2-2 is applicable for measurements on the Receiver Characteristics (clause 7) with the exception of subclause 7.4D (Maximum input level). Tables A.6.2-3, A.6.2-4, are applicable for subclause 7.4D (Maximum input level).

Table A.6.2-1: Fixed Reference measurement channel for ProSe Direct Discovery receiver requirements and maximum input level

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				2	2	2	2
Subcarriers per resource block				12	12	12	12
Allocated subframes per Discovery period				1	1	1	1
DFT-OFDM Symbols per subframe (see note)				11	11	11	11
Modulation				QPSK	QPSK	QPSK	QPSK
Transport Block Size				232	232	232	232
Transport block CRC	Bits			24	24	24	24
Maximum number of HARQ transmissions				1	1	1	1
Binary Channel Bits (see note)	Bits			528	528	528	528
Max. Throughput averaged over 1 Discovery period of 320ms	kbps			0.725	0.725	0.725	0.725
UE Category				≥ 1	≥ 1	≥ 1	≥ 1
NOTE1: PSDCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. NOTE2: Throughput is 232 bits per Discovery period. The discovery period is configured as 320ms in the test.							

Table A.6.2-2: Fixed Reference measurement channel for ProSe Direct Communication receiver requirements

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	50		
Subcarriers per resource block				12	12		
Packets per SA period				1	1		
Modulation				QPSK	QPSK		
Transport Block Size				2216	4392		
Transport block CRC	Bits			24	24		
Maximum number of HARQ transmissions				4	4		
Binary Channel Bits	Bits			7200	14400		
Max. Throughput averaged over 1 SA period of 40ms	kbps			55.4	109.8		
UE Category				≥ 1	≥ 1		
NOTE 1: For PSSCH transmission, the last symbol shall be punctured as per TS 36.211. NOTE 2: Throughput (in kbps) will depend on SA period configuration							

Table A.6.2-3: Fixed Reference measurement channel for ProSe Direct Communication for maximum input power for UE categories 2-8

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	50		
Subcarriers per resource block				12	12		
Packets per SA period				1	1		
Modulation				16QAM	16QAM		
Transport Block Size				9912	18336		
Transport block CRC	Bits			24	24		
Maximum number of HARQ transmissions				4	4		
Binary Channel Bits	Bits			14400	28800		
Max. Throughput averaged over 1 SA period of 40ms	kbps			247.8	458.4		
NOTE 1: For PSSCH transmission, the last symbol shall be punctured as per TS 36.211. NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 3: Throughput (in kbps) will depend on SA period configuration							

Table A.6.2-4: Fixed Reference measurement channel for ProSe Direct Communication for maximum input power for UE category 1

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	24		
Subcarriers per resource block				12	12		
Packets per SA period				1	1		
Modulation				16QAM	16QAM		
Transport Block Size				9912	10296		
Transport block CRC	Bits			24	24		
Maximum number of HARQ transmissions				4	4		
Binary Channel Bits	Bits			14400	13824		
Max. Throughput averaged over 1 SA period of 40ms	kbps			247.8	257.4		
NOTE 1: For PSSCH transmission, the last symbol shall be punctured as per TS 36.211. NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 3: Throughput (in kbps) will depend on SA period configuration							

A.6.3 Reference measurement channels for PSDCH performance requirements

Table A.6.3-1: Fixed Reference measurement channel for PSDCH performance requirement

Parameter	Unit	Value					
Reference channel		D.1 FDD / D.1 TDD					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				2	2	2	2
Subcarriers per resource block				12	12	12	12
DFT-OFDM Symbols per subframe (see note)				11	11	11	11
Modulation				QPSK	QPSK	QPSK	QPSK
Transport Block Size				232	232	232	232
Transport block CRC	Bits			24	24	24	24
Binary Channel Bits (see note)	Bits			528	528	528	528
Max. Throughput averaged over 1 Discovery period of 320ms	kbps			0.725	0.725	0.725	0.725
UE Category				≥ 1	≥ 1	≥ 1	≥ 1
NOTE1: PSDCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.							

A.6.4 Reference measurement channels for PSCCH performance requirements

Table A.6.4-1: Fixed reference measurement channel for PSCCH performance requirement

Parameter		Unit	Value					
Reference channel			CC.1 FDD	CC.2 FDD	CC.3 FDD	CC.4 FDD	CC.5 FDD	CC.6 FDD
Channel bandwidth		MHz	5	10	5	10	5	10
Allocated resource blocks			1	1	1	1	1	1
Subcarriers per resource block			12	12	12	12	12	12
DFT-OFDM Symbols per subframe (see NOTE 1)			11	11	11	11	11	11
Modulation			QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Transport Block Size		Bits	41	43	41	43	41	43
Information bits	Frequency hopping flag		0	0	1	1	1	1
	RB assignment		Set as per PSSCH RB allocation specific in the test					
	Hopping bits		N/A	N/A	1 Type 2 Hopping	(1,1) Type 2 Hopping	0 Type 1 Hopping	(1,0) Type 1 Hopping
	Time resource pattern (I_{TRP})		8 (unless specified otherwise in the test) (NOTE 3)					
	Modulation and coding scheme		Set as the PSSCH MCS specified in the test					
	Timing advance indication		0 (unless specified otherwise in the test)					
	Group destination ID		As set by higher layers					
Transport block CRC		Bits	16	16	16	16	16	16
Maximum number of HARQ transmissions			2	2	2	2	2	2
Binary Channel Bits (see NOTE 1,2)		Bits	264	264	264	264	264	264
Max. Throughput averaged over one sc-period (bits/sc-period)			41	43	41	43	41	43
NOTE 1: PSCCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. NOTE 2: Binary channel bits per HARQ transmission. NOTE 3: For N_{TRP} = 8 (FDD) and *trpt-Subset* = 010, I_{TRP} = 8 corresponds to a time repetition pattern of (1,1,0,0,0,0,0,0) as per TS 36.213.								

A.6.5 Reference measurement channels for PSSCH performance requirements

Table A.6.5-1: Fixed reference measurement channel for PSSCH performance requirement

Parameter	Unit	Value				
Reference channel		CD.1 FDD	CD.2 FDD	CD.3 FDD	CD.4 FDD	CD.5 FDD
Channel bandwidth	MHz	5 / 10	5 / 10	5	10	5 / 10
Allocated resource blocks		10	10	25	50	2
Subcarriers per resource block		12	12	12	12	12
DFT-OFDM Symbols per subframe (see NOTE 1)		11	11	11	11	11
Modulation		QPSK	16QAM	16QAM	16QAM	QPSK
Transport Block Size		872	2536	6546	12960	328
Transport block CRC	Bits	24	24	24	24	24
Maximum number of HARQ transmissions		4	4	4	4	4
Binary Channel Bits (see NOTE 1,2)	Bits	2640	5280	13200	26400	528
Max. Throughput averaged over one sc-period (bits/sc-period)		872	2536	6546	12960	328
NOTE 1: PSSCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. NOTE 2: Binary channel bits per HARQ transmission. NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).						

Table A.6.5-2: Fixed reference measurement channel for PSSCH for maximum Sidelink processes test

Parameter	Unit	Value	
Reference channel		CD.6 FDD	CD.7 FDD
Channel bandwidth	MHz	5	10
Allocated resource blocks		25	50
Subcarriers per resource block		12	12
DFT-OFDM Symbols per subframe (see NOTE 1)		11	11
Modulation		16QAM	16QAM
Transport Block Size		15840	25456
Transport block CRC	Bits	24	24
Maximum number of HARQ transmissions		4	4
Binary Channel Bits (see NOTE 1,2)	Bits	13200	26400
Max. Throughput averaged over one sc-period (bits/sc-period)		15840	25456
NOTE 1: PSSCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. NOTE 2: Binary channel bits per HARQ transmission. NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).			

A.6.6 Reference measurement channels for PSBCH performance requirements

Table A.6.6-1: Fixed reference measurement channel for PSBCH performance requirement

Parameter	Unit	Value
Reference channel		CP.1 FDD
Channel bandwidth	MHz	5 / 10
Allocated resource blocks		6
Subcarriers per resource block		12
DFT-OFDM Symbols per subframe (see NOTE 1)		7
Modulation		QPSK
Transport Block Size		40
Transport block CRC	Bits	16
Maximum number of HARQ transmissions		1
Binary Channel Bits (see NOTE 1,2)	Bits	1008
Max. Throughput averaged over 40ms	kbps	1
NOTE 1: PSBCH transmissions are rate-matched for 8 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.		

A.7 Sidelink reference resource pool configurations

A.7.1 Reference resource pool configurations for ProSe Direct Discovery demodulation tests

A.7.1.1 FDD

Table A.7.1.1-1: ProSe Direct Discovery configuration for E-UTRA FDD (Configuration #1-FDD)

Information Element			Value
discRxPool	cp-Len		Normal
	discPeriod		rf32
	numRetx		0
	numRepetition		1
	tf-ResourceConfig	prb-Num	12
		prb-Start	0
		prb-End	23
		offsetIndicator	160
		subframeBitmap	10000000 00000000 00000000 00000000 00000000
	txParameters		not present
	rxParameters		not present
discTxPoolCommon			not present
discTxPowerInfo			not present
SL-SyncConfig			not present
discInterFreqList			not present

Table A.7.1.1-2: ProSe Direct Discovery configuration for E-UTRA FDD (Configuration #2-FDD)

Information Element			Value
discRxPool(0)	cp-Len		Normal
	discPeriod		rf32
	numRetx		0
	numRepetition		1
	tf-ResourceConfig	prb-Num	12
		prb-Start	0
		prb-End	23
		offsetIndicator	150
		subframeBitmap	10000000 00000000 00000000 00000000 00000000
	txParameters		not present
	rxParameters		not present
discRxPool(1)	cp-Len		Normal
	discPeriod		rf32
	numRetx		0
	numRepetition		1
	tf-ResourceConfig	prb-Num	12
		prb-Start	0
		prb-End	23
		offsetIndicator	170
		subframeBitmap	10000000 00000000 00000000 00000000 00000000
	txParameters		not present
	rxParameters	*tdd-Config*	not present
		syncConfigIndex	0
discTxPoolCommon			not present
discTxPowerInfo			not present
SL-SyncConfig(0)	*syncCP-Len*		Normal
	syncOffsetIndicator		160
	slssid		30
	txParameters		not present
	rxParamsNCell	*physCellId*	1
		discSyncWindow	w1
discInterFreqList			not present

Table A.7.1.1-3: ProSe Direct Discovery configuration for E-UTRA FDD (Configuration #3-FDD)

Information Element			Value
discRxPool(iPool), iPool = 0…NPool-1	cp-Len		Normal
	discPeriod		rf32
	numRetx		3
	numRepetition		=2 if NPool > 10, =1 otherwise
	tf-ResourceConfig	prb-Num	5MHz: min{24, 2N-24*iPool} / 2 10MHz: 25 15MHz: min{74, 2N-74*iPool} / 2 20MHz: 50
		prb-Start	0
		prb-End	5 MHz: min{24, 2N-24*iPool} - 1 10 MHz: 49 15 MHz: min{74, 2N-74*iPool} - 1 20 MHz: 99
		offsetIndicator	160
		subframeBitmap	a(0), a(1), …, a(39), s.t. a(i * NPool + iPool) = 1, i = 0,..,K; a(k) = 0 otherwise where K = 1 is NPool > 10, K = 3 otherwise
	txParameters		not present
	rxParameters		not present
discTxPoolCommon			not present
discTxPowerInfo			not present
SL-SyncConfig			not present
discInterFreqList			not present
NOTE 1: The resource pool configuration description is parameterized using channel BW, number of configured resource pools (NPool), and maximum number of configured Sidelink UEs to be supported (N).			

A.7.1.2 TDD

Table A.7.1.2-1: ProSe Direct Discovery configuration for E-UTRA TDD Config 0 (Configuration #1-TDD)

Information Element			Value
discRxPool	cp-Len		Normal
	discPeriod		rf32
	numRetx		0
	numRepetition		1
	tf-ResourceConfig	prb-Num	12
		prb-Start	0
		prb-End	23
		offsetIndicator	163
		subframeBitmap	10000000 00000000 00000000 00000000 00000000 00
	txParameters		not present
	rxParameters		not present
discTxPoolCommon			not present
discTxPowerInfo			not present
SL-SyncConfig			not present
discInterFreqList			not present

Table A.7.1.2-2: ProSe Direct Discovery configuration for E-UTRA TDD (Configuration #2-TDD)

Information Element			Value
discRxPool(iPool), iPool = 0…NPool-1	cp-Len		Normal
	discPeriod		rf32
	numRetx		3
	numRepetition		=2 if NPool > 10, =1 otherwise
	tf-ResourceConfig	prb-Num	5MHz: min{24, 2N-24*iPool} / 2 10MHz: 25 15MHz: min{74, 2N-74*iPool} / 2 20MHz: 50
		prb-Start	0
		prb-End	5 MHz: min{24, 2N-24*iPool} - 1 10 MHz: 49 15 MHz: min{74, 2N-74*iPool} - 1 20 MHz: 99
		offsetIndicator	163
		subframeBitmap	a(0), a(1), …, a(39), s.t. a(i * NPool + iPool) = 1, i = 0,..,K; a(k) = 0 otherwise where K = 1 is NPool > 10, K = 3 otherwise
	txParameters		not present
	rxParameters		not present
discTxPoolCommon			not present
discTxPowerInfo			not present
SL-SyncConfig			not present
discInterFreqList			not present
NOTE 1: The resource pool configuration description is parameterized using channel BWs, number of configured resource pools (NPool), and maximum number of configured Sidelink UE to be supported (N).			

A.7.2 Reference resource pool configurations for ProSe Direct Communication demodulation tests

A.7.2.1 FDD

Table A.7.2.1-1: ProSe Direct Communication pre-configuration for E-UTRAN FDD for out-of-network coverage operation (Configuration #1-FDD)

Information Element / (BW configuration)				Value (5MHz)	Value (10MHz)
preconfigSync	syncCP-Len-r12			Normal	
	syncOffsetIndicator1			1	
	syncOffsetIndicator2			2	
	syncTxParameters			23	
	syncTxThreshOoC			0 (-110dBm / 15kHz)	
	filterCoefficient			fc0	
	syncRefMinHyst			dB0	
	syncRefDiffHyst			dB0	
preconfigComm	sc-CP-Len			Normal	
	sc-Period			sf40	
	sc-TF-ResourceConfig	prb-Num		13	25
		prb-Start		0	0
		prb-End		24	49
		offsetIndicator		0	
		subframeBitmap		00011000 00000000 00000000 00000000 00000000	
	data-CP-Len			Normal	
	dataHoppingConfig	hoppingParameter		504	
		numSubbands		ns2	
		rb-Offset		0	
	ue-SelectedResourceConfig	data-TF-ResourceConfig	prb-Num	13	25
			prb-Start	0	0
			prb-End	24	49
			offsetIndicator	0	
			subframeBitmap	00000000 11111111 11111111 00000000 00000000	
		trpt-Subset-r12		010	

Table A.7.2.1-2: ProSe Direct Communication configuration for E-UTRA FDD (Configuration #2-FDD)

Information Element / (BW configuration)				Value (5MHz)	Value (10MHz)
commRxPool	sc-CP-Len			Normal	
	sc-Period			sf40	
	sc-TF-ResourceConfig	prb-Num		13	25
		prb-Start		0	0
		prb-End		24	49
		offsetIndicator		0	
		subframeBitmap		00111100 00000000 00000000 00000000 00000000	
	data-CP-Len			Normal	
	dataHoppingConfig	hoppingParameter		504	
		numSubbands		ns2	
		rb-Offset		0	
	ue-SelectedResourceConfig	data-TF-ResourceConfig	prb-Num	13	25
			prb-Start	0	0
			prb-End	24	49
			offsetIndicator	0	
			subframeBitmap	00000000 11111111 11111111 00000000 00000000	
		trpt-Subset-r12		010	
	rxParametersNCell			not present	
	txParameters			not present	
commTxPoolNormalCommon				not present	
SL-SyncConfig				not present	

Table A.7.2.1-3: ProSe Direct Communication configuration for E-UTRA FDD (Configuration #3-FDD)

Information Element / (BW configuration)				Value (5MHz)	Value (10MHz)
commRxPool(0)	sc-CP-Len			Normal	
	sc-Period			sf40	
	sc-TF-ResourceConfig	prb-Num		13	25
		prb-Start		0	0
		prb-End		24	49
		offsetIndicator		0	
		subframeBitmap		00110000 00000000 00000000 00000000 00000000	
	data-CP-Len			Normal	
	dataHoppingConfig	hoppingParameter		504	
		numSubbands		ns2	
		rb-Offset		0	
	ue-SelectedResourceConfig	data-TF-ResourceConfig	prb-Num	13	25
			prb-Start	0	0
			prb-End	24	49
			offsetIndicator	0	
			subframeBitmap	00001111 11110000 00000000 11111111 00000000	
		trpt-Subset-r12		010	
	rxParametersNCell			not present	
	txParameters			not present	
commRxPool(1)	sc-CP-Len			Normal	
	sc-Period			sf40	
	sc-TF-ResourceConfig	prb-Num		13	25
		prb-Start		0	0
		prb-End		24	49
		offsetIndicator		0	
		subframeBitmap		00110000 00000000 00000000 00000000 00000000	
	data-CP-Len			Normal	
	dataHoppingConfig	hoppingParameter		504	
		numSubbands		ns2	
		rb-Offset		0	
	ue-SelectedResourceConfig	data-TF-ResourceConfig	prb-Num	13	25
			prb-Start	0	0
			prb-End	24	49
			offsetIndicator	0	
			subframeBitmap	00001111 11110000 00001111 11110000 00000000	
		trpt-Subset-r12		010	
	rxParametersNCell	tdd-Config		not present	
		syncConfigIndex		0	
	txParameters			not present	
commTxPoolNormalCommon				not present	
SL-SyncConfig(0)	syncCP-Len			Normal	
	syncOffsetIndicator			1	
	slssid			30	
	txParameters			not present	

	rxParamsNCell	physCellId		1
		discSyncWindow		w1

Table A.7.2.1-4: ProSe Direct Communication configuration for E-UTRA FDD (Configuration #4-FDD)

Information Element / (BW configuration)				Value (5MHz)	Value (10MHz)
commRxPool(0)	sc-CP-Len			Normal	
	sc-Period			sf80	
	sc-TF-ResourceConfig	prb-Num		13	25
		prb-Start		0	0
		prb-End		24	49
		offsetIndicator		0	
		subframeBitmap		11110000 00000000 00000000 00000000 00000000	
	data-CP-Len			Normal	
	dataHoppingConfig	hoppingParameter		504	
		numSubbands		ns2	
		rb-Offset		0	
	ue-SelectedResourceConfig	data-TF-ResourceConfig	prb-Num	13	25
			prb-Start	0	0
			prb-End	24	49
			offsetIndicator	0	
			subframeBitmap	00000000 11111111 00000000 11111111 00000000	
		trpt-Subset-r12		001	
	rxParametersNCell			not present	
	txParameters			not present	
commRxPool(1)	sc-CP-Len			Normal	
	sc-Period			sf80	
	sc-TF-ResourceConfig	prb-Num		13	25
		prb-Start		0	0
		prb-End		24	49
		offsetIndicator		0	
		subframeBitmap		00001111 00000000 00000000 00000000 00000000	
	data-CP-Len			Normal	
	dataHoppingConfig	hoppingParameter		504	
		numSubbands		ns2	
		rb-Offset		0	
	ue-SelectedResourceConfig	data-TF-ResourceConfig	prb-Num	13	25
			prb-Start	0	0
			prb-End	24	49
			offsetIndicator	0	
			subframeBitmap	00000000 00000000 11111111 00000000 11111111	
		trpt-Subset-r12		001	
	rxParametersNCell			not present	
	txParameters			not present	
commTxPoolNormalCommon				not present	
SL-SyncConfig				not present	

Table A.7.2.1-5: ProSe Direct Communication configuration for E-UTRA FDD (Configuration #5-FDD)

Information Element / (BW configuration)				Value (5MHz)	Value (10MHz)
commRxPool	sc-CP-Len			Normal	
	sc-Period			sf40	
	sc-TF-ResourceConfig	prb-Num		13	25
		prb-Start		0	0
		prb-End		24	49
		offsetIndicator		0	
		subframeBitmap		00011000 00000000 00000000 00000000 00000000	
	data-CP-Len			Normal	
	dataHoppingConfig	hoppingParameter		504	
		numSubbands		ns2	
		rb-Offset		0	
	ue-SelectedResourceConfig	data-TF-ResourceConfig	prb-Num	13	25
			prb-Start	0	0
			prb-End	24	49
			offsetIndicator	0	
			subframeBitmap	00000000 11111111 11111111 11111111 11111111	
		trpt-Subset-r12		001	
	rxParametersNCell			not present	
	txParameters			not present	
commTxPoolNormalCommon				not present	
SL-SyncConfig				not present	

A.8 V2X reference measurement channels

A.8.1 General

The algorithm for determining the payload size A is as follows; given a desired coding rate R and radio block allocation N_{RB}

1. Calculate the number of channel bits N_{ch} that can be transmitted during the first transmission of a given sub-frame.

2. Find A such that the resulting coding rate is as close to R as possible, that is,

$$\min\left|R-(A+24*(N_{CB}+1))/N_{ch}\right|, \textit{ where } N_{CB}=\begin{cases}0, \textit{if } C=1\\ C, \textit{if } C>1\end{cases},$$

subject to

a) A is a valid TB size according to section 7.1.7 of TS 36.213 [6] assuming an allocation of N_{RB} resource blocks.

b) C is the number of Code Blocks calculated according to section 5.1.2 of TS 36.212 [5].

3. If there is more than one A that minimizes the equation above, then the larger value is chosen per default and the chosen code rate should not exceed 0.93.

A.8.2 Reference measurement channel for receiver characteristics

For V2V side link transmission over PC5, Table A.8.2-1 is applicable for measurements on the Receiver Characteristics (clause 7) with the exception of Maximum input level (subclause 7.4G). Table A.8.2-2 and Table A.8.2-3, are applicable for Maximum input level (subclause 7.4G).

Table A.8.2-1: Fixed Reference measurement channel for V2V receiver requirements

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks					48		96
Subcarriers per resource block					12		12
Packets per period					1		1
Modulation					QPSK		QPSK
Target Coding Rate					1/3		1/3
Transport Block Size					3496		6968
Transport block CRC	Bits				24		24
Number of Code Blocks per Sub-Frame					1		2
Maximum number of HARQ transmissions					1		1
Binary Channel Bits per subframe	Bits				11520		23040
Max. Throughput averaged over 1 period of 100ms	kbps				34.96		69.68
UE Category					≥ 1		≥ 1
Note 1: 2RBs allocated to SA transmission and 4 symbols allocated to RS. Note 2: Throughput (in kbps) will depend on SA period configuration. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

Table A.8.2-2: Fixed Reference measurement channel for V2V maximum input level requirements for UE category 2-8

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks					48		96
Subcarriers per resource block					12		12
Packets per period					1		1
Modulation					16QAM		16QAM
Target Coding Rate					2/3		2/3
Transport Block Size					15840		31704
Transport block CRC	Bits				24		24
Number of Code Blocks per Sub-Frame					3		6
Maximum number of HARQ transmissions					1		1
Binary Channel Bits per subframe	Bits				23040		46080
Max. Throughput averaged over 1 period of 100ms	kbps				158.4		317.04
Note 1: 2RBs allocated to SA transmission and 4 symbols allocated to RS. Note 2: Throughput (in kbps) will depend on SA period configuration. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

Table A.8.2-3: Fixed Reference measurement channel for V2V maximum input level for UE category 1

Parameter	Unit	Value					
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks					32		32
Subcarriers per resource block					12		12
Packets per period					1		1
Modulation					16QAM		16QAM
Target Coding Rate					2/3		2/3
Transport Block Size					10296		10296
Transport block CRC	Bits				24		24
Number of Code Blocks per Sub-Frame					2		2
Maximum number of HARQ transmissions					1		1
Binary Channel Bits per subframe	Bits				15360		15360
Max. Throughput averaged over 1 period of 100ms	kbps				102.96		102.96
Note 1: 2RBs allocated to SA transmission and 4 symbols allocated to RS. Note 2: Throughput (in kbps) will depend on SA period configuration. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).							

A.8.3 Reference measurement channel for transmitter characteristics

For V2V side link transmission over PC5, Table A.8.3-1 and Table A.8.3-2 are applicable for measurements on the Transmitter Characteristics (clause 6).

Table A.8.3-1: Fixed Reference measurement channel for V2V Transmitter requirements for QPSK

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category
Unit	MHz					Bits	Bits		Bits		
	10, 20	3	10	QPSK	1/3	208	24	1	720	360	≥ 1
	10, 20	4	10	QPSK	1/3	256	24	1	960	480	≥ 1
	10, 20	5	10	QPSK	1/3	328	24	1	1200	600	≥ 1
	10, 20	6	10	QPSK	1/3	408	24	1	1440	720	≥ 1
	10, 20	8	10	QPSK	1/3	552	24	1	1920	960	≥ 1
	10, 20	9	10	QPSK	1/3	632	24	1	2160	1080	≥ 1
	10, 20	10	10	QPSK	1/3	696	24	1	2400	1200	≥ 1
	10, 20	12	10	QPSK	1/3	840	24	1	2880	1440	≥ 1
	10, 20	15	10	QPSK	1/3	1064	24	1	3600	1800	≥ 1
	10, 20	16	10	QPSK	1/3	1128	24	1	3840	1920	≥ 1
	10, 20	18	10	QPSK	1/3	1288	24	1	4320	2160	≥ 1
	10, 20	20	10	QPSK	1/3	1416	24	1	4800	2400	≥ 1
	10, 20	24	10	QPSK	1/3	1736	24	1	5760	2880	≥ 1
	10, 20	25	10	QPSK	1/3	1800	24	1	6000	3000	≥ 1
	10, 20	27	10	QPSK	1/3	1928	24	1	6480	3240	≥ 1
	10, 20	30	10	QPSK	1/3	2152	24	1	7200	3600	≥ 1
	10, 20	32	10	QPSK	1/3	2280	24	1	7680	3840	≥ 1
	10, 20	36	10	QPSK	1/3	2600	24	1	8640	4320	≥ 1
	10, 20	40	10	QPSK	1/3	2856	24	1	9600	4800	≥ 1
	10, 20	45	10	QPSK	1/3	3240	24	1	10800	5400	≥ 1
	10, 20	48	10	QPSK	1/3	3496	24	1	11520	5760	≥ 1
	20	50	10	QPSK	1/3	3624	24	1	24000	12000	≥ 1
	20	54	10	QPSK	1/3	4776	24	1	25920	12960	≥ 1
	20	60	10	QPSK	1/3	5352	24	1	28800	14400	≥ 1
	20	64	10	QPSK	1/3	4584	24	1	30720	15360	≥ 1
	20	72	10	QPSK	1/3	5160	24	1	34560	17280	≥ 1
	20	75	10	QPSK	1/3	5352	24	1	36000	18000	≥ 1
	20	80	10	QPSK	1/3	5736	24	1	38400	19200	≥ 1
	20	81	10	QPSK	1/3	5736	24	1	38880	19440	≥ 1
	20	90	10	QPSK	1/3	6456	24	2	43200	21600	≥ 1
	20	96	10	QPSK	1/3	6968	24	2	46080	23040	≥ 1

Table A.8.3-2: Fixed Reference measurement channel for V2V Transmitter requirements for 16QAM

Parameter	Ch BW	Allocated RBs	DFT-OFDM Symbols per Sub-Frame	Mod'n	Target Coding rate	Payload size	Transport block CRC	Number of code blocks per Sub-Frame (Note 1)	Total number of bits per Sub-Frame	Total symbols per Sub-Frame	UE Category
Unit	MHz					Bits	Bits		Bits		
	10, 20	3	10	16QAM	2/3	904	24	1	1440	360	≥ 1
	10, 20	4	10	16QAM	2/3	1224	24	1	1920	480	≥ 1
	10, 20	5	10	16QAM	2/3	1544	24	1	2400	600	≥ 1
	10, 20	6	10	16QAM	2/3	1800	24	1	2880	720	≥ 1
	10, 20	8	10	16QAM	2/3	2472	24	1	3840	960	≥ 1
	10, 20	9	10	16QAM	2/3	2728	24	1	4320	1080	≥ 1
	10, 20	10	10	16QAM	2/3	3112	24	1	4800	1200	≥ 1
	10, 20	12	10	16QAM	2/3	3624	24	1	5760	1440	≥ 1
	10, 20	15	10	16QAM	2/3	4584	24	1	7200	1800	≥ 1
	10, 20	16	10	16QAM	2/3	4968	24	1	7680	1920	≥ 1
	10, 20	18	10	16QAM	2/3	5544	24	1	8640	2160	≥ 1
	10, 20	20	10	16QAM	2/3	6200	24	2	9600	2400	≥ 1
	10, 20	24	10	16QAM	2/3	7736	24	2	11520	2880	≥ 1
	10, 20	25	10	16QAM	2/3	7992	24	2	12000	3000	≥ 1
	10, 20	27	10	16QAM	2/3	8760	24	2	12960	3240	≥ 1
	10, 20	30	10	16QAM	2/3	9912	24	2	14400	3600	≥ 1
	10, 20	32	10	16QAM	2/3	10296	24	2	15360	3840	≥ 1
	10, 20	36	10	16QAM	3/5	10296	24	2	17280	4320	≥ 1
	10, 20	40	10	16QAM	1/2	9144	24	2	19200	4800	≥ 1
	10, 20	45	10	16QAM	2/5	9144	24	2	21600	5400	≥ 1
	10, 20	48	10	16QAM	2/5	9528	24	2	23040	5760	≥ 1
	20	50	10	16QAM	2/5	9912	24	2	24000	6000	≥ 1
	20	54	10	16QAM	2/5	11064	24	2	25920	6480	≥ 2
	20	60	10	16QAM	2/5	12216	24	2	28800	7200	≥ 2
	20	64	10	16QAM	2/5	12960	24	3	30720	7680	≥ 2
	20	72	10	16QAM	2/5	14688	24	3	34560	8640	≥ 2
	20	75	10	16QAM	2/5	15264	24	3	36000	9000	≥ 2
	20	80	10	16QAM	2/5	16416	24	3	38400	9600	≥ 2
	20	81	10	16QAM	2/5	16416	24	3	38880	9720	≥ 2
	20	90	10	16QAM	2/5	18336	24	3	43200	10800	≥ 2
	20	96	10	16QAM	2/5	19080	24	4	46080	11520	≥ 2

A.8.4 Reference measurement for PSCCH performance requirements

Table A.8.4-1: Fixed reference measurement channel for PSCCH performance requirement

Parameter	Unit	Value
Reference channel		CC.8
Allocated resource blocks		2
DFT-OFDM Symbols per subframe (see Note 1)		9
Modulation		QPSK
Payload (without CRC)	Bits	32
CRC	Bits	16
SCI Format		1
Number of PSCCH transmissions		1
Binary Channel Bits (see Note 2)	Bits	432
Note 1: PSCCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. Note 2: Binary Channel Bits are calculated under assumption of 9 symbols. Note 3: Un-used or redundant bits/code-points in SCI format 1 are randomized.		

A.8.5 Reference measurement for PSSCH performance requirements

Table A.8.5-1: Fixed reference measurement channel for PSSCH performance requirement

Parameter	Unit	Value				
Reference channel		CD.8	CD.9	CD.10	CD.11	CD.12
Channel bandwidth	MHz	20	10	20	20	20
Allocated resource blocks		8	3	3	96	8
DFT-OFDM Symbols per subframe (see Note 1)		9	9	9	9	9
Modulation		16QAM	QPSK	QPSK	16QAM	QPSK
Transport Block Size		1800	208	504	31704	552
Transport block CRC	Bits	24	24	24	24	24
Number of PSSCH transmissions		1	2	1	2	1
Binary Channel Bits (see Note 2)	Bits	3456	648	648	41472	1728
Note 1: PSSCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. Note 2: Binary Channel Bits are calculated under assumption of 9 symbols. Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).						

A.8.6 Reference measurement for PSBCH performance requirements

Table A.8.6-1: Fixed reference measurement channel for PSBCH performance requirement

Parameter	Unit	Value
Reference channel		CP.2
Reference channel		CP.2
Channel bandwidth	MHz	20
Allocated resource blocks		6
DFT-OFDM Symbols per subframe (see Note 1)		6
Modulation		QPSK
Transport Block Size		48
Transport block CRC	Bits	16
Binary Channel Bits (see Note 2)	Bits	864
Note 1: PSBCH transmissions are rate-matched for 7 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. Note 2: Binary Channel Bits are calculated under assumption of 6 symbols.		

A.9 V2X reference resource pool configurations

Table A.9-1: V2X sidelink communication pre-configuration for PSSCH/PSCCH tests (Configuration #1-V2X)

Information Element			Value (10MHz)	Value (20MHz)
SL-V2X-PreconfigCommPool-r14	sl-OffsetIndicator-r14		0	
	sl-Subframe-r14	bs20-r14	0xFFFFF	
	adjacencyPSCCH-PSSCH-r14		TRUE	
	sizeSubchannel-r14		[n5]	[n10]
	numSubchannel-r14		[n1]	
	startRB-Subchannel-r14		0	
	startRB-PSCCH-Pool-r14		not present	
	dataTxParameters-r14	P0-SL-r12	[-126]	
	zoneID-r14		not present	
	threshS-RSSI-CBR-r14		not present	
	cbr-pssch-TxConfigList-r14		not present	
	resourceSelectionConfigP2X-r14		not present	
	syncAllowed-r14		not present	
	restrictResourceReservationPeriod-r14		not present	

Table A.9-2: V2X sidelink communication pre-configuration for power imbalance test (Configuration #2-V2X)

Information Element			Value (20MHz)
SL-V2X-PreconfigCommPool-r14	sl-OffsetIndicator-r14		0
	sl-Subframe-r14	bs20-r14	0xFFFFF
	adjacencyPSCCH-PSSCH-r14		TRUE
	sizeSubchannel-r14		[n5]
	numSubchannel-r14		[n10]
	startRB-Subchannel-r14		0
	startRB-PSCCH-Pool-r14		not present
	dataTxParameters-r14	P0-SL-r12	[-126]
	zoneID-r14		not present
	threshS-RSSI-CBR-r14		not present
	cbr-pssch-TxConfigList-r14		not present
	resourceSelectionConfigP2X-r14		not present
	syncAllowed-r14		not present
	restrictResourceReservationPeriod-r14		not present

Table A.9-3: V2X sidelink communication communication configuration for PSSCH with eNB based synchronization test (Configuration #3-V2X)

Information Element			Value (20MHz)
SL-CommResourcePoolV2X-r14	sl-OffsetIndicator-r14		0
	sl-Subframe-r14	bs20-r14	0xFFFFF
	adjacencyPSCCH-PSSCH-r14		TRUE
	sizeSubchannel-r14		[n10]
	numSubchannel-r14		[n1]
	startRB-Subchannel-r14		0
	startRB-PSCCH-Pool-r14		not present
	rxParametersNCell-r14		not present
	dataTxParameters-r14	P0-SL-r12	[-126]
	zoneID-r14		not present
	threshS-RSSI-CBR-r14		not present
	poolReportId-r14		not present
	cbr-pssch-TxConfigList-r14		not present
	resourceSelectionConfigP2X-r14		not present
	syncAllowed-r14		not present
	restrictResourceReservationPeriod-r14		not present
SL-TypeTxSync-r14			enb

Table A.9-4: V2X sidelink communication pre-configuration for soft buffer test (Configuration #4-V2X)

Information Element			Value (20MHz)
SL-V2X-PreconfigCommPool-r14	sl-OffsetIndicator-r14		0
	sl-Subframe-r14	bs20-r14	0xFFFFF
	adjacencyPSCCH-PSSCH-r14		TRUE
	sizeSubchannel-r14		[n100]
	numSubchannel-r14		[n1]
	startRB-Subchannel-r14		0
	startRB-PSCCH-Pool-r14		not present
	dataTxParameters-r14	P0-SL-r12	[-126]
	zoneID-r14		not present
	threshS-RSSI-CBR-r14		not present
	cbr-pssch-TxConfigList-r14		not present
	resourceSelectionConfigP2X-r14		not present
	syncAllowed-r14		not present
	restrictResourceReservationPeriod-r14		not present

Table A.9-5: V2X sidelink communication pre-configuration for PSCCH/PSSCH decoding capability test (Configuration #5-V2X)

Information Element			Value (20MHz)
SL-V2X-PreconfigCommPool-r14	sl-OffsetIndicator-r14		0
	sl-Subframe-r14	bs20-r14	0xFFFFF
	adjacencyPSCCH-PSSCH-r14		TRUE
	sizeSubchannel-r14		[n10] [n5]
	numSubchannel-r14		[n10] [n20]
	startRB-Subchannel-r14		0
	startRB-PSCCH-Pool-r14		not present
	dataTxParameters-r14	P0-SL-r12	[-126]
	zoneID-r14		not present
	threshS-RSSI-CBR-r14		not present
	cbr-pssch-TxConfigList-r14		not present
	resourceSelectionConfigP2X-r14		not present
	syncAllowed-r14		not present
	restrictResourceReservationPeriod-r14		not present

Annex B (normative): Propagation Conditions

The propagation conditions and channel models for various environments are specified. For each environment a propagation model is used to evaluate the propagation pathless due to the distance. Channel models are formed by combining delay profiles with a Doppler spectrum, with the addition of correlation properties in the case of a multi-antenna scenario.

B.0 No interference

The downlink connection between the System Simulator and the UE is without Additive White Gaussian Noise, and has no fading or multipath effects.

B.1 Static propagation condition

The downlink connection between the System Simulator and the UE is an Additive White Gaussian Noise (AWGN) environment (unless otherwise stated) with no fading or multipath effects.

For 1 port transmission to UE Receiver with 2Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}.$$

For 2 port transmission to UE Receiver with 2Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{pmatrix} 1 & j \\ 1 & -j \end{pmatrix}$$

For 4 port transmission to UE Receiver with 2Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & 1 & j & j \\ 1 & 1 & -j & -j \end{bmatrix}$$

For 8 port transmission to UE Receiver with 2Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & 1 & 1 & 1 & j & j & j & j \\ 1 & 1 & 1 & 1 & -j & -j & -j & -j \end{bmatrix}$$

For 1 port transmission to UE Receiver with 4Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}.$$

For 2 port transmission to UE Receiver with 4Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & j \\ 1 & -j \\ 1 & j \\ 1 & -j \end{bmatrix}.$$

For 4 port transmission to UE Receiver with 4Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & 1 & j & j \\ 1 & 1 & -j & -j \\ 1 & -1 & j & -j \\ 1 & -1 & -j & j \end{bmatrix}.$$

For 8 port transmission to UE Receiver with 4Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & 1 & 1 & 1 & j & j & j & j \\ 1 & 1 & 1 & 1 & -j & -j & -j & -j \\ 1 & 1 & -1 & -1 & j & j & -j & -j \\ 1 & 1 & -1 & -1 & -j & -j & j & j \end{bmatrix}$$

B.1.1 Definition of Additive White Gaussian Noise (AWGN) Interferer

Note that the AWGN interferer can be used in static propagation conditions, or in conjunction with multi-path fading.

The acceptable uncertainties of the AWGN interferer are defined in Annex F.

B.2 Multi-path fading Propagation Conditions

The multipath propagation conditions consist of several parts:

- A delay profile in the form of a "tapped delay-line", characterized by a number of taps at fixed positions on a sampling grid. The profile can be further characterized by the r.m.s. delay spread and the maximum delay spanned by the taps.
- A combination of channel model parameters that include the Delay profile and the Doppler spectrum that is characterized by a classical spectrum shape and a maximum Doppler frequency
- A set of correlation matrices defining the correlation between the UE and eNodeB antennas in case of multi-antenna systems.

B.2.1 Delay profiles

The delay profiles are selected to be representative of low, medium and high delay spread environments. The resulting model parameters are defined in Table B.2.1-1 and the tapped delay line models are defined in Tables B.2.1-2, B.2.1-3 and B.2.1-4.

Table B.2.1-1: Delay profiles for E-UTRA channel models

Model	Number of channel taps	Delay spread (r.m.s.)	Maximum excess tap delay (span)
Extended Pedestrian A (EPA)	7	45 ns	410 ns
Extended Vehicular A model (EVA)	9	357 ns	2510 ns
Extended Typical Urban model (ETU)	9	991 ns	5000 ns

Table B.2.1-2: Extended Pedestrian A model (EPA)

Excess tap delay [ns]	Relative power [dB]
0	0.0
30	-1.0
70	-2.0
90	-3.0
110	-8.0
190	-17.2
410	-20.8

Table B.2.1-3: Extended Vehicular A model (EVA)

Excess tap delay [ns]	Relative power [dB]
0	0.0
30	-1.5
150	-1.4
310	-3.6
370	-0.6
710	-9.1
1090	-7.0
1730	-12.0
2510	-16.9

Table B.2.1-4: Extended Typical Urban model (ETU)

Excess tap delay [ns]	Relative power [dB]
0	-1.0
50	-1.0
120	-1.0
200	0.0
230	0.0
500	0.0
1600	-3.0
2300	-5.0
5000	-7.0

B.2.2 Combinations of channel model parameters

The propagation conditions used for the performance measurements in multi-path fading environment are indicated as EVA[number], EPA[number] or ETU[number] where 'number' indicates the maximum Doppler frequency (Hz).

Table B.2.2-1: Void

B.2.3 MIMO Channel Correlation Matrices

The MIMO channel correlation matrices defined in B.2.3 apply for the antenna configuration using uniform linear arrays at both eNodeB and UE.

B.2.3.1 Definition of MIMO Correlation Matrices

Table B.2.3.1-1 defines the correlation matrix for the eNodeB

Table B.2.3.1-1: eNodeB correlation matrix

	One antenna	Two antennas	Four antennas
eNode B Correlation	$R_{eNB} = 1$	$R_{eNB} = \begin{pmatrix} 1 & \alpha \\ \alpha^* & \mathbf{1} \end{pmatrix}$	$R_{eNB} = \begin{pmatrix} 1 & \alpha^{1/9} & \alpha^{4/9} & \alpha \\ \alpha^{1/9*} & 1 & \alpha^{1/9} & \alpha^{4/9} \\ \alpha^{4/9*} & \alpha^{1/9*} & 1 & \alpha^{1/9} \\ \alpha^* & \alpha^{4/9*} & \alpha^{1/9*} & 1 \end{pmatrix}$

Table B.2.3.1-2 defines the correlation matrix for the UE:

Table B.2.3.1-2: UE correlation matrix

	One antenna	Two antennas	Four antennas
UE Correlation	$R_{UE} = 1$	$R_{UE} = \begin{pmatrix} 1 & \beta \\ \beta^* & \mathbf{1} \end{pmatrix}$	$R_{UE} = \begin{pmatrix} 1 & \beta^{1/9} & \beta^{4/9} & \beta \\ \beta^{1/9*} & 1 & \beta^{1/9} & \beta^{4/9} \\ \beta^{4/9*} & \beta^{1/9*} & 1 & \beta^{1/9} \\ \beta^* & \beta^{4/9*} & \beta^{1/9*} & 1 \end{pmatrix}$

Table B.2.3.1-3 defines the channel spatial correlation matrix R_{spat}. The parameters, α and β in Table B.2.3.1-3 defines the spatial correlation between the antennas at the eNodeB and UE.

Table B.2.3.1-3: R_{spat} correlation matrices

1x2 case	$R_{spat} = R_{UE} = \begin{bmatrix} 1 & \beta \\ \beta^* & 1 \end{bmatrix}$
2x1 case	$R_{spat} = R_{eNB} = \begin{bmatrix} 1 & \alpha \\ \alpha^* & 1 \end{bmatrix}$
2x2 case	$R_{spat} = R_{eNB} \otimes R_{UE} = \begin{bmatrix} 1 & \alpha \\ \alpha^* & 1 \end{bmatrix} \otimes \begin{bmatrix} 1 & \beta \\ \beta^* & 1 \end{bmatrix} = \begin{bmatrix} 1 & \beta & \alpha & \alpha\beta \\ \beta^* & 1 & \alpha\beta^* & \alpha \\ \alpha^* & \alpha^*\beta & 1 & \beta \\ \alpha^*\beta^* & \alpha^* & \beta^* & 1 \end{bmatrix}$
4x2 case	$R_{spat} = R_{eNB} \otimes R_{UE} = \begin{bmatrix} 1 & \alpha^{1/9} & \alpha^{4/9} & \alpha \\ \alpha^{1/9*} & 1 & \alpha^{1/9} & \alpha^{4/9} \\ \alpha^{4/9*} & \alpha^{1/9*} & 1 & \alpha^{1/9} \\ \alpha^* & \alpha^{4/9*} & \alpha^{1/9*} & 1 \end{bmatrix} \otimes \begin{bmatrix} 1 & \beta \\ \beta^* & 1 \end{bmatrix}$
4x4 case	$R_{spat} = R_{eNB} \otimes R_{UE} = \begin{bmatrix} 1 & \alpha^{1/9} & \alpha^{4/9} & \alpha \\ \alpha^{1/9*} & 1 & \alpha^{1/9} & \alpha^{4/9} \\ \alpha^{4/9*} & \alpha^{1/9*} & 1 & \alpha^{1/9} \\ \alpha^* & \alpha^{4/9*} & \alpha^{1/9*} & 1 \end{bmatrix} \otimes \begin{pmatrix} 1 & \beta^{1/9} & \beta^{4/9} & \beta \\ \beta^{1/9*} & 1 & \beta^{1/9} & \beta^{4/9} \\ \beta^{4/9*} & \beta^{1/9*} & 1 & \beta^{1/9} \\ \beta^* & \beta^{4/9*} & \beta^{1/9*} & 1 \end{pmatrix}$

For cases with more antennas at either eNodeB or UE or both, the channel spatial correlation matrix can still be expressed as the Kronecker product of R_{eNB} and R_{UE} according to $R_{spat} = R_{eNB} \otimes R_{UE}$.

B.2.3.2 MIMO Correlation Matrices at High, Medium and Low Level

The α and β for different correlation types are given in Table B.2.3.2-1.

Table B.2.3.2-1

Low correlation		Medium Correlation		High Correlation	
α	β	α	β	α	β
0	0	0.3	0.9	0.9	0.9

The correlation matrices for high, medium and low correlation are defined in Table B.2.3.2-2, B.2.3.2-3 and B.2.3.2-4,as below.

The values in the Table B.2.3.2-2 table have been adjusted for the 4x2 and 4x4 high correlation cases to insure the correlation matrix is positive semi-definite after round-off to 4 digit precision. This is done using the equation:

$$\mathbf{R}_{high} = [\mathbf{R}_{spatial} + aI_n]/(1+a)$$

Where the value “a” is a scaling factor such that the smallest value is used to obtain a positive semi-definite result. For the 4x2 high correlation case, a=0.00010. For the 4x4 high correlation case, a=0.00012.

The same method is used to adjust the 4x4 medium correlation matrix in Table B.2.3.2-3 to insure the correlation matrix is positive semi-definite after round-off to 4 digit precision with a = 0.00012.

Table B.2.3.2-2: MIMO correlation matrices for high correlation

1x2 case	$R_{high} = \begin{pmatrix} 1 & 0.9 \\ 0.9 & 1 \end{pmatrix}$
2x1 case	$R_{high} = \begin{pmatrix} 1 & 0.9 \\ 0.9 & 1 \end{pmatrix}$
2x2 case	$R_{high} = \begin{pmatrix} 1 & 0.9 & 0.9 & 0.81 \\ 0.9 & 1 & 0.81 & 0.9 \\ 0.9 & 0.81 & 1 & 0.9 \\ 0.81 & 0.9 & 0.9 & 1 \end{pmatrix}$
4x2 case	$R_{high} = \begin{bmatrix} 1.0000 & 0.8999 & 0.9883 & 0.8894 & 0.9542 & 0.8587 & 0.8999 & 0.8099 \\ 0.8999 & 1.0000 & 0.8894 & 0.9883 & 0.8587 & 0.9542 & 0.8099 & 0.8999 \\ 0.9883 & 0.8894 & 1.0000 & 0.8999 & 0.9883 & 0.8894 & 0.9542 & 0.8587 \\ 0.8894 & 0.9883 & 0.8999 & 1.0000 & 0.8894 & 0.9883 & 0.8587 & 0.9542 \\ 0.9542 & 0.8587 & 0.9883 & 0.8894 & 1.0000 & 0.8999 & 0.9883 & 0.8894 \\ 0.8587 & 0.9542 & 0.8894 & 0.9883 & 0.8999 & 1.0000 & 0.8894 & 0.9883 \\ 0.8999 & 0.8099 & 0.9542 & 0.8587 & 0.9883 & 0.8894 & 1.0000 & 0.8999 \\ 0.8099 & 0.8999 & 0.8587 & 0.9542 & 0.8894 & 0.9883 & 0.8999 & 1.0000 \end{bmatrix}$
4x4 case	$R_{high} = \begin{bmatrix} 1.0000 & 0.9882 & 0.9541 & 0.8999 & 0.9882 & 0.9767 & 0.9430 & 0.8894 & 0.9541 & 0.9430 & 0.9105 & 0.8587 & 0.8999 & 0.8894 & 0.8587 & 0.8099 \\ 0.9882 & 1.0000 & 0.9882 & 0.9541 & 0.9767 & 0.9882 & 0.9767 & 0.9430 & 0.9430 & 0.9541 & 0.9430 & 0.9105 & 0.8894 & 0.8999 & 0.8894 & 0.8587 \\ 0.9541 & 0.9882 & 1.0000 & 0.9882 & 0.9430 & 0.9767 & 0.9882 & 0.9767 & 0.9105 & 0.9430 & 0.9541 & 0.9430 & 0.8587 & 0.8894 & 0.8999 & 0.8894 \\ 0.8999 & 0.9541 & 0.9882 & 1.0000 & 0.8894 & 0.9430 & 0.9767 & 0.9882 & 0.8587 & 0.9105 & 0.9430 & 0.9541 & 0.8099 & 0.8587 & 0.8894 & 0.8999 \\ 0.9882 & 0.9767 & 0.9430 & 0.8894 & 1.0000 & 0.9882 & 0.9541 & 0.8999 & 0.9882 & 0.9767 & 0.9430 & 0.8894 & 0.9541 & 0.9430 & 0.9105 & 0.8587 \\ 0.9767 & 0.9882 & 0.9767 & 0.9430 & 0.9882 & 1.0000 & 0.9882 & 0.9541 & 0.9767 & 0.9882 & 0.9767 & 0.9430 & 0.9430 & 0.9541 & 0.9430 & 0.9105 \\ 0.9430 & 0.9767 & 0.9882 & 0.9767 & 0.9541 & 0.9882 & 1.0000 & 0.9882 & 0.9430 & 0.9767 & 0.9882 & 0.9767 & 0.9105 & 0.9430 & 0.9541 & 0.9430 \\ 0.8894 & 0.9430 & 0.9767 & 0.9882 & 0.8999 & 0.9541 & 0.9882 & 1.0000 & 0.8894 & 0.9430 & 0.9767 & 0.9882 & 0.8587 & 0.9105 & 0.9430 & 0.9541 \\ 0.9541 & 0.9430 & 0.9105 & 0.8587 & 0.9882 & 0.9767 & 0.9430 & 0.8894 & 1.0000 & 0.9882 & 0.9541 & 0.8999 & 0.9882 & 0.9767 & 0.9430 & 0.8894 \\ 0.9430 & 0.9541 & 0.9430 & 0.9105 & 0.9767 & 0.9882 & 0.9767 & 0.9430 & 0.9882 & 1.0000 & 0.9882 & 0.9541 & 0.9767 & 0.9882 & 0.9767 & 0.9430 \\ 0.9105 & 0.9430 & 0.9541 & 0.9430 & 0.9430 & 0.9767 & 0.9882 & 0.9767 & 0.9541 & 0.9882 & 1.0000 & 0.9882 & 0.9430 & 0.9767 & 0.9882 & 0.9767 \\ 0.8587 & 0.9105 & 0.9430 & 0.9541 & 0.8894 & 0.9430 & 0.9767 & 0.9882 & 0.8999 & 0.9541 & 0.9882 & 1.0000 & 0.8894 & 0.9430 & 0.9767 & 0.9882 \\ 0.8999 & 0.8894 & 0.8587 & 0.8099 & 0.9541 & 0.9430 & 0.9105 & 0.8587 & 0.9882 & 0.9767 & 0.9430 & 0.8894 & 1.0000 & 0.9882 & 0.9541 & 0.8999 \\ 0.8894 & 0.8999 & 0.8894 & 0.8587 & 0.9430 & 0.9541 & 0.9430 & 0.9105 & 0.9767 & 0.9882 & 0.9767 & 0.9430 & 0.9882 & 1.0000 & 0.9882 & 0.9541 \\ 0.8587 & 0.8894 & 0.8999 & 0.8894 & 0.9105 & 0.9430 & 0.9541 & 0.9430 & 0.9430 & 0.9767 & 0.9882 & 0.9767 & 0.9541 & 0.9882 & 1.0000 & 0.9882 \\ 0.8099 & 0.8587 & 0.8894 & 0.8999 & 0.8587 & 0.9105 & 0.9430 & 0.9541 & 0.8894 & 0.9430 & 0.9767 & 0.9882 & 0.8999 & 0.9541 & 0.9882 & 1.0000 \end{bmatrix}$

Table B.2.3.2-3: MIMO correlation matrices for medium correlation

1x2 case	N/A
2x1 case	N/A
2x2 case	$R_{medium} = \begin{pmatrix} 1 & 0.9 & 0.3 & 0.27 \\ 0.9 & 1 & 0.27 & 0.3 \\ 0.3 & 0.27 & 1 & 0.9 \\ 0.27 & 0.3 & 0.9 & 1 \end{pmatrix}$
4x2 case	$R_{medium} = \begin{pmatrix} 1.0000 & 0.9000 & 0.8748 & 0.7873 & 0.5856 & 0.5271 & 0.3000 & 0.2700 \\ 0.9000 & 1.0000 & 0.7873 & 0.8748 & 0.5271 & 0.5856 & 0.2700 & 0.3000 \\ 0.8748 & 0.7873 & 1.0000 & 0.9000 & 0.8748 & 0.7873 & 0.5856 & 0.5271 \\ 0.7873 & 0.8748 & 0.9000 & 1.0000 & 0.7873 & 0.8748 & 0.5271 & 0.5856 \\ 0.5856 & 0.5271 & 0.8748 & 0.7873 & 1.0000 & 0.9000 & 0.8748 & 0.7873 \\ 0.5271 & 0.5856 & 0.7873 & 0.8748 & 0.9000 & 1.0000 & 0.7873 & 0.8748 \\ 0.3000 & 0.2700 & 0.5856 & 0.5271 & 0.8748 & 0.7873 & 1.0000 & 0.9000 \\ 0.2700 & 0.3000 & 0.5271 & 0.5856 & 0.7873 & 0.8748 & 0.9000 & 1.0000 \end{pmatrix}$
4x4 case	$R_{medium} = \begin{pmatrix} 1.0000 & 0.9882 & 0.9541 & 0.8999 & 0.8747 & 0.8645 & 0.8347 & 0.7872 & 0.5855 & 0.5787 & 0.5588 & 0.5270 & 0.3000 & 0.2965 & 0.2862 & 0.2700 \\ 0.9882 & 1.0000 & 0.9882 & 0.9541 & 0.8645 & 0.8747 & 0.8645 & 0.8347 & 0.5787 & 0.5855 & 0.5787 & 0.5588 & 0.2965 & 0.3000 & 0.2965 & 0.2862 \\ 0.9541 & 0.9882 & 1.0000 & 0.9882 & 0.8347 & 0.8645 & 0.8747 & 0.8645 & 0.5588 & 0.5787 & 0.5855 & 0.5787 & 0.2862 & 0.2965 & 0.3000 & 0.2965 \\ 0.8999 & 0.9541 & 0.9882 & 1.0000 & 0.7872 & 0.8347 & 0.8645 & 0.8747 & 0.5270 & 0.5588 & 0.5787 & 0.5855 & 0.2700 & 0.2862 & 0.2965 & 0.3000 \\ 0.8747 & 0.8645 & 0.8347 & 0.7872 & 1.0000 & 0.9882 & 0.9541 & 0.8999 & 0.8747 & 0.8645 & 0.8347 & 0.7872 & 0.5855 & 0.5787 & 0.5588 & 0.5270 \\ 0.8645 & 0.8747 & 0.8645 & 0.8347 & 0.9882 & 1.0000 & 0.9882 & 0.9541 & 0.8645 & 0.8747 & 0.8645 & 0.8347 & 0.5787 & 0.5855 & 0.5787 & 0.5588 \\ 0.8347 & 0.8645 & 0.8747 & 0.8645 & 0.9541 & 0.9882 & 1.0000 & 0.9882 & 0.8347 & 0.8645 & 0.8747 & 0.8645 & 0.5588 & 0.5787 & 0.5855 & 0.5787 \\ 0.7872 & 0.8347 & 0.8645 & 0.8747 & 0.8999 & 0.9541 & 0.9882 & 1.0000 & 0.7872 & 0.8347 & 0.8645 & 0.8747 & 0.5270 & 0.5588 & 0.5787 & 0.5855 \\ 0.5855 & 0.5787 & 0.5588 & 0.5270 & 0.8747 & 0.8645 & 0.8347 & 0.7872 & 1.0000 & 0.9882 & 0.9541 & 0.8999 & 0.8747 & 0.8645 & 0.8347 & 0.7872 \\ 0.5787 & 0.5855 & 0.5787 & 0.5588 & 0.8645 & 0.8747 & 0.8645 & 0.8347 & 0.9882 & 1.0000 & 0.9882 & 0.9541 & 0.8645 & 0.8747 & 0.8645 & 0.8347 \\ 0.5588 & 0.5787 & 0.5855 & 0.5787 & 0.8347 & 0.8645 & 0.8747 & 0.8645 & 0.9541 & 0.9882 & 1.0000 & 0.9882 & 0.8347 & 0.8645 & 0.8747 & 0.8645 \\ 0.5270 & 0.5588 & 0.5787 & 0.5855 & 0.7872 & 0.8347 & 0.8645 & 0.8747 & 0.8999 & 0.9541 & 0.9882 & 1.0000 & 0.7872 & 0.8347 & 0.8645 & 0.8747 \\ 0.3000 & 0.2965 & 0.2862 & 0.2700 & 0.5855 & 0.5787 & 0.5588 & 0.5270 & 0.8747 & 0.8645 & 0.8347 & 0.7872 & 1.0000 & 0.9882 & 0.9541 & 0.8999 \\ 0.2965 & 0.3000 & 0.2965 & 0.2862 & 0.5787 & 0.5855 & 0.5787 & 0.5588 & 0.8645 & 0.8747 & 0.8645 & 0.8347 & 0.9882 & 1.0000 & 0.9882 & 0.9541 \\ 0.2862 & 0.2965 & 0.3000 & 0.2965 & 0.5588 & 0.5787 & 0.5855 & 0.5787 & 0.8347 & 0.8645 & 0.8747 & 0.8645 & 0.9541 & 0.9882 & 1.0000 & 0.9882 \\ 0.2700 & 0.2862 & 0.2965 & 0.3000 & 0.5270 & 0.5588 & 0.5787 & 0.5855 & 0.7872 & 0.8347 & 0.8645 & 0.8747 & 0.8999 & 0.9541 & 0.9882 & 1.0000 \end{pmatrix}$

Table B.2.3.2-4: MIMO correlation matrices for low correlation

1x2 case	$R_{low} = \mathbf{I}_2$
2x1 case	$R_{low} = \mathbf{I}_2$
2x2 case	$R_{low} = \mathbf{I}_4$
4x2 case	$R_{low} = \mathbf{I}_8$
4x4 case	$R_{low} = \mathbf{I}_{16}$

In Table B.2.3.2-4, $\mathbf{I}_d$ is the $d \times d$ identity matrix.

B.2.3A MIMO Channel Correlation Matrices using cross polarized antennas

The MIMO channel correlation matrices defined in B.2.3A apply for the antenna configuration using cross polarized (XP/X-pol) antennas at both eNodeB and UE. The cross-polarized antenna elements with +/-45 degrees polarization

slant angles are deployed at eNB and cross-polarized antenna elements with +90/0 degrees polarization slant angles are deployed at UE.

For the cross-polarized antennas, the N antennas are labelled such that antennas for one polarization are listed from 1 to N/2 and antennas for the other polarization are listed from N/2+1 to N, where N is the number of transmit or receive antennas.

B.2.3A.1 Definition of MIMO Correlation Matrices using cross polarized antennas

For the channel spatial correlation matrix, the following is used:

$$R_{spat} = P\left(R_{eNB} \otimes \Gamma \otimes R_{UE}\right)P^{T}$$

Where

- R_{UE} is the spatial correlation matrix at the UE with same polarization,
- R_{eNB} is the spatial correlation matrix at the eNB with same polarization,
- Γ is a polarization correlation matrix, and
- $(\bullet)^{T}$ denotes transpose.

The matrix Γ is defined as

$$\Gamma = \begin{bmatrix} 1 & 0 & -\gamma & 0 \\ 0 & 1 & 0 & \gamma \\ -\gamma & 0 & 1 & 0 \\ 0 & \gamma & 0 & 1 \end{bmatrix}$$

A permutation matrix P element is defined as:

$$P(a,b) = \begin{cases} 1 & for \quad a = (j-1)Nr + i \quad and \quad b = 2(j-1)Nr + i, \qquad i = 1,\cdots,Nr,\ j = 1,\cdots Nt/2 \\ 1 & for \quad a = (j-1)Nr + i \quad and \quad b = 2(j - Nt/2)Nr - Nr + i, \quad i = 1,\cdots,Nr,\ j = Nt/2+1,\cdots,Nt \\ 0 & otherwise \end{cases}$$

Where N_t and N_r is the number of transmitter and receiver respectively. This is used to map the spatial correlation coefficients in accordance with the antenna element labelling system described in B.2.3A.

B.2.3A.2 Spatial Correlation Matrices using cross polarized antennas at eNB and UE sides

B.2.3A.2.1 Spatial Correlation Matrices at eNB side

For 2-antenna transmitter using one pair of cross-polarized antenna elements, $R_{eNB} = 1$.

For 4-antenna transmitter using two pairs of cross-polarized antenna elements, $R_{eNB} = \begin{pmatrix} 1 & \alpha \\ \alpha^{*} & \boldsymbol{1} \end{pmatrix}$.

For 8-antenna transmitter using four pairs of cross-polarized antenna elements, $R_{eNB} = \begin{pmatrix} 1 & \alpha^{1/9} & \alpha^{4/9} & \alpha \\ \alpha^{1/9*} & 1 & \alpha^{1/9} & \alpha^{4/9} \\ \alpha^{4/9*} & \alpha^{1/9*} & 1 & \alpha^{1/9} \\ \alpha^{*} & \alpha^{4/9*} & \alpha^{1/9*} & 1 \end{pmatrix}$.

B.2.3A.2.2 Spatial Correlation Matrices at UE side

For 2-antenna transmitter using one pair of cross-polarized antenna elements, $R_{UE} = 1$.

For 4-antenna transmitter using two pairs of cross-polarized antenna elements, $R_{UE} = \begin{pmatrix} 1 & \beta \\ \beta^* & \mathbf{1} \end{pmatrix}$.

B.2.3A.3 MIMO Correlation Matrices using cross polarized antennas

The values for parameters α, β and γ for low correlation and high spatial correlation are given in Table B.2.3A.3-1.

Table B.2.3A.3-1

High spatial correlation		
α	β	γ
0.9	0.9	0.3
Note 1: Value of α applies when more than one pair of cross-polarized antenna elements at eNB side. Note 2: Value of β applies when more than one pair of cross-polarized antenna elements at UE side.		

The correlation matrices for high spatial and low correlation are defined in Table B.2.3A.3-2 as below.

The values in Table B.2.3A.3-2 have been adjusted to insure the correlation matrix is positive semi-definite after round-off to 4 digit precision. This is done using the equation:

$$\mathbf{R}_{high} = [\mathbf{R}_{spat} + aI_n]/(1+a)$$

Where the value "a" is a scaling factor such that the smallest value is used to obtain a positive semi-definite result. For the 8x2 high spatial correlation case, a=0.00010.

Table B.2.3A.3-2: MIMO correlation matrices for high spatial correlation

4x2 case

$$R_{high} = \begin{bmatrix} 1.0000 & 0.0000 & 0.9000 & 0.0000 & -0.3000 & 0.0000 & -0.2700 & 0.0000 \\ 0.0000 & 1.0000 & 0.0000 & 0.9000 & 0.0000 & 0.3000 & 0.0000 & 0.2700 \\ 0.9000 & 0.0000 & 1.0000 & 0.0000 & -0.2700 & 0.0000 & -0.3000 & 0.0000 \\ 0.0000 & 0.9000 & 0.0000 & 1.0000 & 0.0000 & 0.2700 & 0.0000 & 0.3000 \\ -0.3000 & 0.0000 & -0.2700 & 0.0000 & 1.0000 & 0.0000 & 0.9000 & 0.0000 \\ 0.0000 & 0.3000 & 0.0000 & 0.2700 & 0.0000 & 1.0000 & 0.0000 & 0.9000 \\ -0.2700 & 0.0000 & -0.3000 & 0.0000 & 0.9000 & 0.0000 & 1.0000 & 0.0000 \\ 0.0000 & 0.2700 & 0.0000 & 0.3000 & 0.0000 & 0.9000 & 0.0000 & 1.0000 \end{bmatrix}$$

8x2 case

$$R_{high} = \begin{bmatrix} 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.9542 & 0.0000 & 0.8999 & 0.0000 & -0.3000 & 0.0000 & -0.2965 & 0.0000 & -0.2862 & 0.0000 & -0.2700 & 0.0000 \\ 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.9542 & 0.0000 & 0.8999 & 0.0000 & 0.3000 & 0.0000 & 0.2965 & 0.0000 & 0.2862 & 0.0000 & 0.2700 \\ 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.9542 & 0.0000 & -0.2965 & 0.0000 & -0.3000 & 0.0000 & -0.2965 & 0.0000 & -0.2862 & 0.0000 \\ 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.9542 & 0.0000 & 0.2965 & 0.0000 & 0.3000 & 0.0000 & 0.2965 & 0.0000 & 0.2862 \\ 0.9542 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & -0.2862 & 0.0000 & -0.2965 & 0.0000 & -0.3000 & 0.0000 & -0.2965 & 0.0000 \\ 0.0000 & 0.9542 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.2862 & 0.0000 & 0.2965 & 0.0000 & 0.3000 & 0.0000 & 0.2965 \\ 0.8999 & 0.0000 & 0.9542 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & -0.2700 & 0.0000 & -0.2862 & 0.0000 & -0.2965 & 0.0000 & -0.3000 & 0.0000 \\ 0.0000 & 0.8999 & 0.0000 & 0.9542 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.2700 & 0.0000 & 0.2862 & 0.0000 & 0.2965 & 0.0000 & 0.3000 \\ -0.3000 & 0.0000 & -0.2965 & 0.0000 & -0.2862 & 0.0000 & -0.2700 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.9542 & 0.0000 & 0.8999 & 0.0000 \\ 0.0000 & 0.3000 & 0.0000 & 0.2965 & 0.0000 & 0.2862 & 0.0000 & 0.2700 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.9542 & 0.0000 & 0.8999 \\ -0.2965 & 0.0000 & -0.3000 & 0.0000 & -0.2965 & 0.0000 & -0.2862 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.9542 & 0.0000 \\ 0.0000 & 0.2965 & 0.0000 & 0.3000 & 0.0000 & 0.2965 & 0.0000 & 0.2862 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 & 0.9542 \\ -0.2862 & 0.0000 & -0.2965 & 0.0000 & -0.3000 & 0.0000 & -0.2965 & 0.0000 & 0.9542 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.9883 & 0.0000 \\ 0.0000 & 0.2862 & 0.0000 & 0.2965 & 0.0000 & 0.3000 & 0.0000 & 0.2965 & 0.0000 & 0.9542 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 & 0.9883 \\ -0.2700 & 0.0000 & -0.2862 & 0.0000 & -0.2965 & 0.0000 & -0.3000 & 0.0000 & 0.8999 & 0.0000 & 0.9542 & 0.0000 & 0.9883 & 0.0000 & 1.0000 & 0.0000 \\ 0.0000 & 0.2700 & 0.0000 & 0.2862 & 0.0000 & 0.2965 & 0.0000 & 0.3000 & 0.0000 & 0.8999 & 0.0000 & 0.9542 & 0.0000 & 0.9883 & 0.0000 & 1.0000 \end{bmatrix}$$

B.2.3A.4 Beam steering approach

Given the channel spatial correlation matrix in B.2.3A.1, the corresponding random channel matrix ***H*** can be calculated. The signal model for the k-th subframe is denoted as:

$$y = HD_{\theta_k}Wx + n$$

Where

- H is the N¬r xNt channel matrix per subcarrier.
- D_{θ_k} is the steering matrix,

For 8 transmission antennas, $D_{\theta_k} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \otimes \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & e^{j\theta_k} & 0 & 0 \\ 0 & 0 & e^{j2\theta_k} & 0 \\ 0 & 0 & 0 & e^{j3\theta_k} \end{bmatrix}$;

For 4 transmission antennas, $D_{\theta_k} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \otimes \begin{bmatrix} 1 & 0 \\ 0 & e^{j\theta_k} \end{bmatrix}$.

- θ_k controls the phase variation, and the phase for k-th subframe is denoted by $\theta_k = \theta_0 + \Delta\theta \cdot k$, where θ_0 is the random start value with the uniform distribution, i.e. $\theta_0 \in [0, 2\pi]$, $\Delta\theta$ is the step of phase variation, which is defined in Table B.2.3A.4-1, and ***k*** is the linear increment of 1 for every subframe throughout the simulation,
- W is the precoding matrix for Nt transmission antennas,
- y is the received signal, x is the transmitted signal, and n is AWGN.

Table B.2.3A.4-1: The step of phase variation

Variation Step	Value (rad/subframe)
$\Delta\theta$	1.2566×10^{-3}

B.2.4 Propagation conditions for CQI tests

[For Channel Quality Indication (CQI) tests, the following additional multi-path profile is used:

$$h(t,\tau) = \delta(\tau) + a\exp(-i2\pi f_D t)\delta(\tau - \tau_d)$$

in continuous time (t,τ) representation, with τ_d the delay, a a constant and f_D the Doppler frequency.]

B.2.5 FFS

B.2.6 MBSFN Propagation Channel Profile

Table B.2.6-1 shows propagation conditions that are used for the MBSFN performance requirements in multi-path fading environment in an extended delay spread environment.

Table B.2.6-1: Propagation Conditions for Multi-Path Fading Environments for MBSFN Performance Requirements in an extended delay spread environment

Extended Delay Spread	
Maximum Doppler frequency [5Hz]	
Relative Delay [ns]	Relative Mean Power [dB]
0	0
30	-1.5
150	-1.4
310	-3.6
370	-0.6
1090	-7.0
12490	-10
12520	-11.5
12640	-11.4
12800	-13.6
12860	-10.6
13580	-17.0
27490	-20
27520	-21.5
27640	-21.4
27800	-23.6
27860	-20.6
28580	-27.0

B.3 High speed train scenario

The high speed train condition for the test of the baseband performance is a non fading propagation channel with one tap. Doppler shift is given by

$$f_s(t) = f_d \cos\theta(t) \quad \text{(B.3.1)}$$

where $f_s(t)$ is the Doppler shift and f_d is the maximum Doppler frequency. The cosine of angle $\theta(t)$ is given by

$$\cos\theta(t) = \frac{D_s/2 - vt}{\sqrt{D_{\min}{}^2 + (D_s/2 - vt)^2}},\ 0 \le t \le D_s/v \quad \text{(B.3.2)}$$

$$\cos\theta(t) = \frac{-1.5D_s + vt}{\sqrt{D_{\min}{}^2 + (-1.5D_s + vt)^2}},\ D_s/v < t \le 2D_s/v \quad \text{(B.3.3)}$$

$$\cos\theta(t) = \cos\theta(t \mod (2D_s/v)),\ t > 2D_s/v \quad \text{(B.3.4)}$$

where $D_s/2$ is the initial distance of the train form eNodeB, and $D_{\min}$ is eNodeB Railway track distance, both in meters; v is the velocity of the train in m/s, t is time in seconds.

Doppler shift and cosine angle are given by equation B.3.1 and B.3.2-B.3.4 respectively, where the required input parameters listed in table B.3-1 and the resulting Doppler shift is shown in Figure B.3-1 are applied for all frequency bands.

Table B.3-1: High speed train scenario

Parameter	Value
D_s	300 m
$D_{\min}$	2 m
v	300 km/h
f_d	750 Hz

NOTE 1: Parameters for HST conditions in table B.3-1 including f_d and Doppler shift trajectories presented on figure B.3-1 were derived from Band7 and are applied for performance verification in all frequency bands.

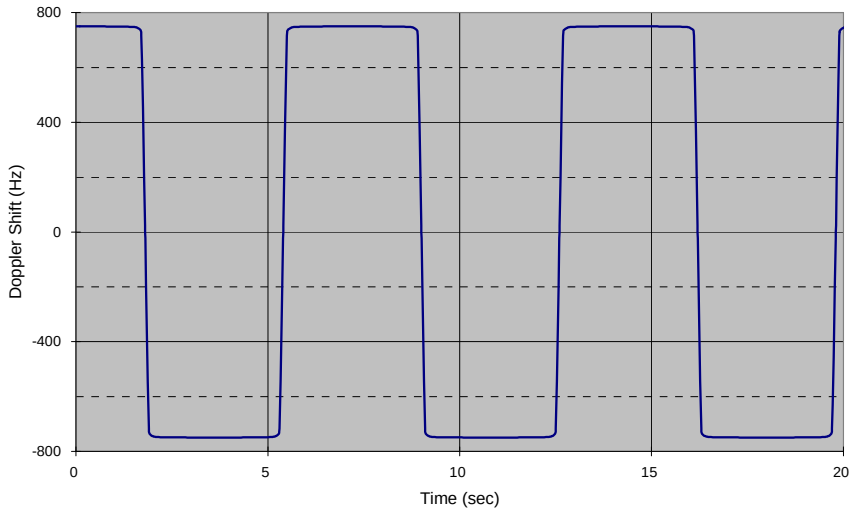


Figure B.3-1: Doppler shift trajectory

For 1x2 antenna configuration, the same $h(t,\tau)$ is used to describe the channel between every pair of Tx and Rx.

For 2x2 antenna configuration, the same $h(t,\tau)$ is used to describe the channel between every pair of Tx and Rx with phase shift according to $\mathbf{H} = \begin{pmatrix} 1 & j \\ 1 & -j \end{pmatrix}$.

B.3A HST-SFN scenario

There is an infinite number of RRHs distributed equidistantly along the track with the same Cell ID as depicted in figure B.3A-1.

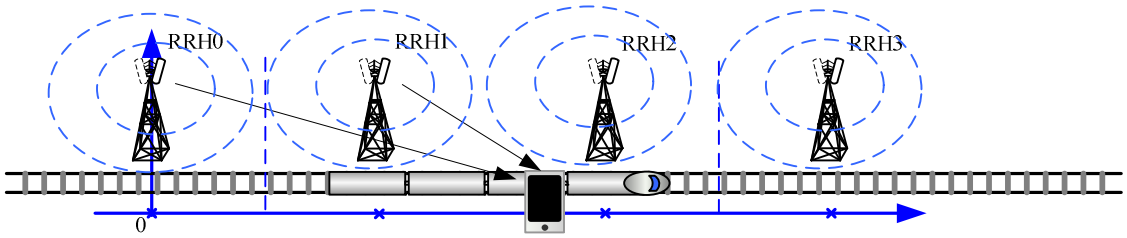


Figure B.3A-1: Deployment of HST-SFN

The location of RRH *k* is given as:

$$x_k = k * D_s + j * D_{\min} \qquad \text{(B.3A.1)}$$

where: $k \in [-\infty, \infty]$, $j = sqrt(-1)$ and $D_{\min}$ is the distance between the RRHs and railway track, while D_s is the distance of two RRHs, both in meters.

The train location is denoted as:

$$y = a + j * 0 \qquad \text{(B.3A.2)}$$

where: $a \in [0, \infty]$ and *a* means distance in meters, which means the train is right on the track.

The HST-SFN scenario for the test of the baseband performance is a non fading propagation channel with four taps, namely the four nearest RRHs. Thus RRH *k* is visible for the train only in the range:

$$k * D_s - 2 * D_s \le a < k * D_s + 2 * D_s \qquad \text{(B.3A.3)}$$

Power level P_k (dB) for the signal from *k*th RRH, normalized to the total power received from all visible RRHs, is given by:

$$P_k = -20\lg(|y - x_k|) + 20\lg(|D_S|) - 10\lg\left(\sum_{i \in \{i \mid i*D_S - 2*D_S \le a < i*D_S + 2*D_S\}} \frac{|D_S|^2}{|y - x_i|^2}\right) \text{ for}$$

$$k * D_s - 2 * D_s \le a < k * D_s + 2 * D_s \qquad \text{(B.3A.4)}$$

Doppler shift $F_{D,k}$ (Hz) from *k*th RRH is given by:

$$F_{D,k} = f_C \times real\left[-v \times \frac{y - x_k}{|y - x_k| \times C}\right] \text{ for } k * D_s - 2 * D_s \le a < k * D_s + 2 * D_s \qquad \text{(B.3A.5)}$$

The relative delay T_k (s) for the signal from *k*th RRH can be derived as:

$$T_k = \frac{|y - x_k|}{C} \text{ for } k * D_s - 2 * D_s \le a < k * D_s + 2 * D_s \qquad \text{(B.3A.6)}$$

In the above *v* (m/s) is the moving speed of the train, f_C (Hz) is the centre frequency, and *C* (m/s) is the velocity of light.

Power level, Doppler shift and relative delay are given by equations B.3A.4 ~ B.3A.6 respectively, where the required input parameters listed in table B.3A-1 and the resulting Doppler shift shown in Figure B.3A-3 are applied for all frequency bands.

Table B.3A-1: HST-SFN scenario

Parameter	Value
D_s	1000 m
$D_{\min}$	50m
v	350 km/h
f_d	872 Hz

NOTE 1: Parameters for HST-SFN scenario in Table B.3A-1 including f_d and Doppler shift trajectories presented in Figure B.3A-2 were derived from Band 7 and are applied for performance verification in all frequency bands. And the trajectories of relative power, Doppler shifts and relative delay presented in Figures B.3A-2~ B.3A-4 are derived from the equations B.3A.4 ~ B.3A.6 respectively.

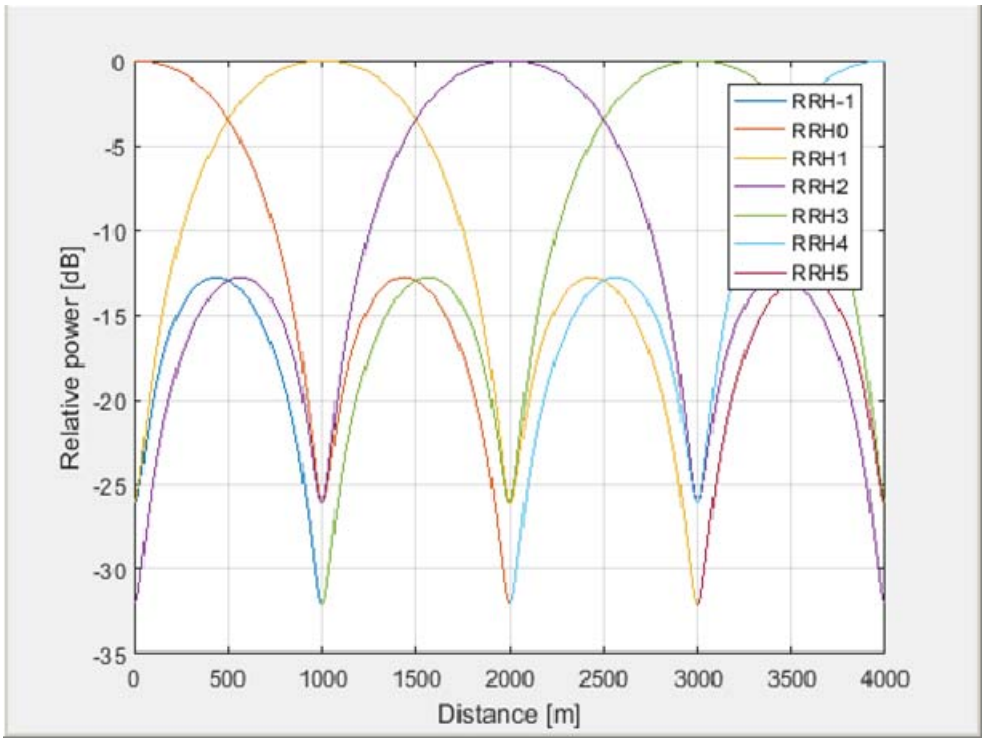


Figure B.3A-2: Relative power level trajectories

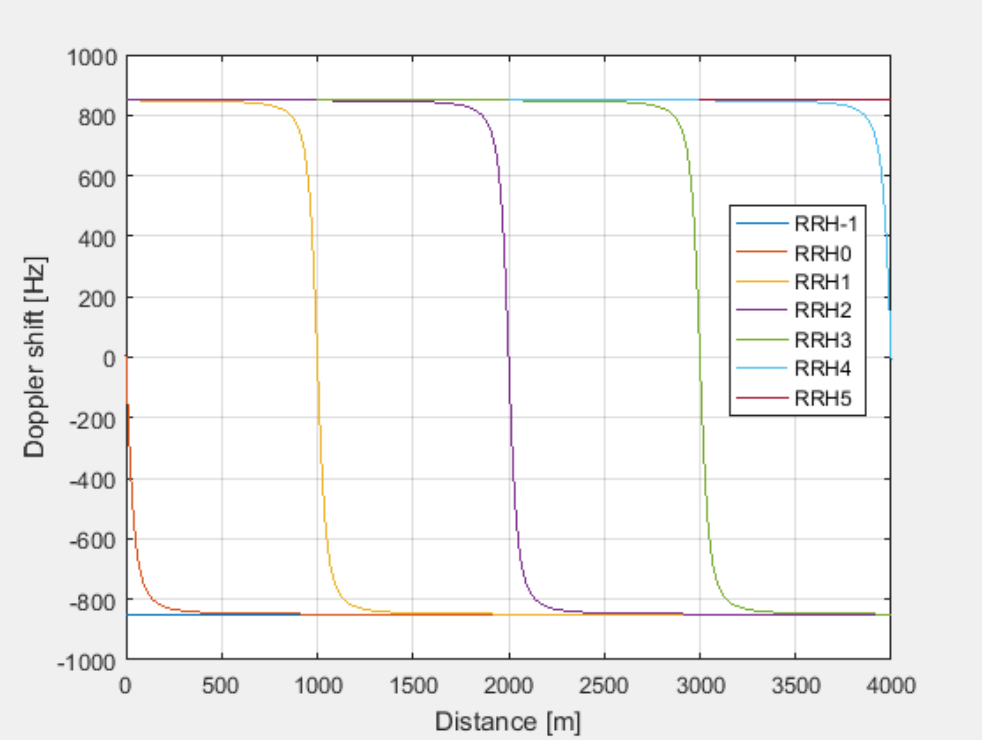


Figure B.3A-3: Doppler shifts trajectories

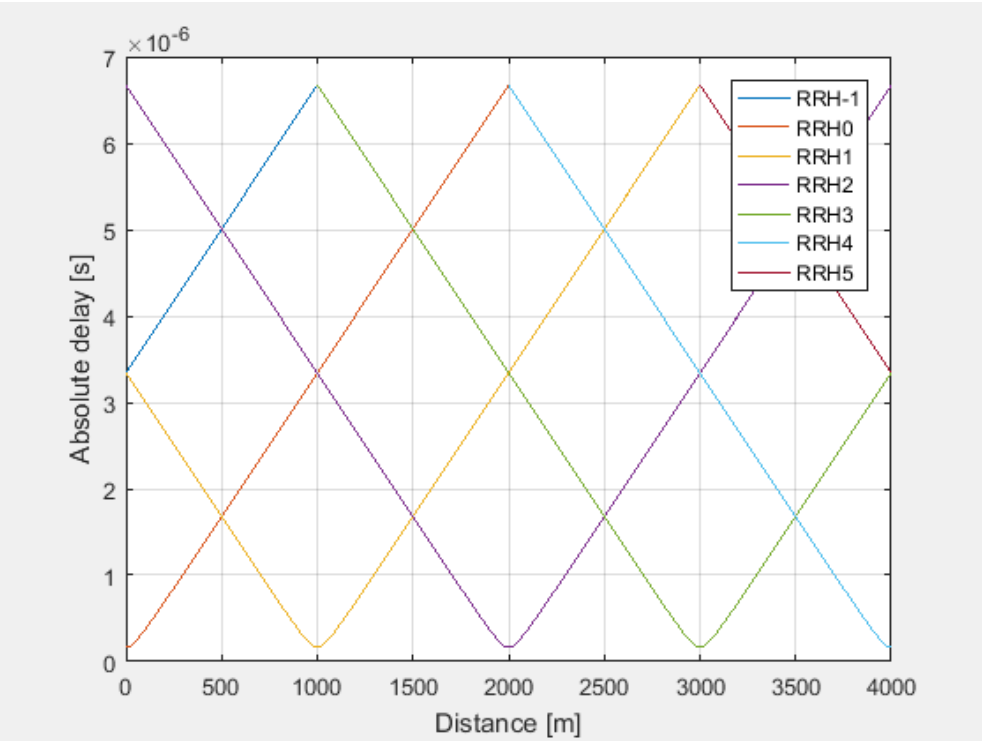


Figure B.3A-4: Relative delay trajectories

For 2x2 antenna configuration, the same $h(t,\tau)$ is used to describe the channel between every pair of Tx and Rx with phase shift according to $\mathbf{H} = \begin{pmatrix} 1 & j \\ 1 & -j \end{pmatrix}$.

B.4 Beamforming Model

B.4.1 Single-layer random beamforming (Antenna port 5, 7 or 8)

Single-layer transmission on antenna port 5 or on antenna port 7 or 8 without a simultaneous transmission on the other antenna port, is defined by using a precoder vector $W(i)$ of size 2×1 randomly selected with the number of layers $\upsilon = 1$ from Table 6.3.4.2.3-1 in TS 36.211 [8] as beamforming weights. This precoder takes as an input the signal $y^{(p)}(i)$, $i = 0,1,...,M_{\text{symb}}^{\text{ap}} - 1$, for antenna port $p \in \{5, 7, 8\}$, with $M_{\text{symb}}^{\text{ap}}$ the number of modulation symbols including the user-specific reference symbols (DRS), and generates a block of signals $y_{bf}(i) = \left[y_{bf}(i) \quad \tilde{y}_{bf}(i)\right]^T$ the elements of which are to be mapped onto the same physical RE but transmitted on different antenna elements:

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W(i)y^{(p)}(i)$$

Single-layer transmission on antenna port 7 or 8 with a simultaneous transmission on the other antenna port, is defined by using a pair of precoder vectors $W_1(i)$ and $W_2(i)$ each of size 2×1, which are not identical and randomly selected with the number of layers $\upsilon = 1$ from Table 6.3.4.2.3-1 in TS 36.211 [8], as beamforming weights, and normalizing the transmit power as follows:

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = \frac{1}{\sqrt{2}}\left(W_1(i)y^{(7)}(i) + W_2(i)y^{(8)}(i)\right)$$

The precoder update granularity is specific to a test case.

The CSI reference symbols $a_{k,l}^{(p)}$ satisfying $p \bmod 2 = 1$, $p \in \{15,16,..,22\}$, are transmitted on the same physical antenna element as the modulation symbols $y_{bf}(i)$. The CSI reference symbols $a_{k,l}^{(p)}$ satisfying $p \bmod 2 = 0$, $p \in \{15,16,..,22\}$, are transmitted on the same physical antenna element as the modulation symbols $\tilde{y}_{bf}(i)$.

B.4.2 Dual-layer random beamforming (antenna ports 7 and 8)

Dual-layer transmission on antenna ports 7 and 8 is defined by using a precoder matrix $W(i)$ of size 2×2 randomly selected with the number of layers $\upsilon = 2$ from Table 6.3.4.2.3-1 in TS 36.211 [8] as beamforming weights. This precoder takes as an input a block of signals for antenna ports 7 and 8, $y(i) = \left[y^{(7)}(i) \quad y^{(8)}(i)\right]^T$, $i = 0,1,..., M_{\text{symb}}^{\text{ap}} - 1$, with $M_{\text{symb}}^{\text{ap}}$ being the number of modulation symbols per antenna port including the user-specific reference symbols, and generates a block of signals $y_{bf}(i) = \left[y_{bf}(i) \quad \tilde{y}_{bf}(i)\right]^T$ the elements of which are to be mapped onto the same physical RE but transmitted on different antenna elements:

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W(i)\begin{bmatrix} y^{(7)}(i) \\ y^{(8)}(i) \end{bmatrix},$$

The precoder update granularity is specific to a test case.

The CSI reference symbols $a_{k,l}^{(p)}$ satisfying $p \bmod 2 = 1$, $p \in \{15,16,..,22\}$, are transmitted on the same physical antenna element as the modulation symbols $y_{bf}(i)$. The CSI reference symbols $a_{k,l}^{(p)}$ satisfying $p \bmod 2 = 0$, $p \in \{15,16,..,22\}$, are transmitted on the same physical antenna element as the modulation symbols $\tilde{y}_{bf}(i)$.

B.4.3 Generic beamforming model (antenna ports 7-14)

The transmission on antenna port(s) $p = 7,8,...,\upsilon + 6$ is defined by using a precoder matrix $W(i)$ of size $N_{CSI} \times \upsilon$, where N_{CSI} is the number of CSI reference signals configured per test and υ is the number of spatial layers. This precoder takes as an input a block of signals for antenna port(s) $p = 7,8,...,\upsilon + 6$, $y^{(p)}(i) = \left[y^{(7)}(i) \quad y^{(8)}(i) \quad \cdots \quad y^{(6+\upsilon)}(i) \right]$, $i = 0,1,...,M_{\text{symb}}^{\text{ap}} - 1$, with $M_{\text{symb}}^{\text{ap}}$ being the number of modulation symbols per antenna port including the user-specific reference symbols (DM-RS), and generates a block of signals $y_{bf}^{(q)}(i) = \left[y_{bf}^{(0)}(i) \quad y_{bf}^{(1)}(i) \quad \ldots \quad y_{bf}^{(N_{CSI}-1)}(i) \right]^T$ the elements of which are to be mapped onto the same time-frequency index pair (k,l) but transmitted on different physical antenna elements:

$$\begin{bmatrix} y_{bf}^{(0)}(i) \\ y_{bf}^{(1)}(i) \\ \vdots \\ y_{bf}^{(N_{CSI}-1)}(i) \end{bmatrix} = W(i) \begin{bmatrix} y^{(7)}(i) \\ y^{(8)}(i) \\ \vdots \\ y^{(6+\upsilon)}(i) \end{bmatrix}$$

The precoder matrix $W(i)$ is specific to a test case.

The physical antenna elements are identified by indices $j = 0,1,...,N_{ANT} - 1$, where $N_{ANT} = N_{CSI}$ is the number of physical antenna elements configured per test.

Modulation symbols $y_{bf}^{(q)}(i)$ with (i.e. beamformed PDSCH and DM-RS) are mapped to the physical antenna index.

Modulation symbols with $p \in \{0,1,...,P-1\}$ (i.e. PBCH, PDCCH, PHICH, PCFICH) are mapped to the physical antenna index $j = p$, where P is the number of cell-specific reference signals configured per test.

Modulation symbols $a_{k,l}^{(p)}$ with $p \in \{0,1,...,P-1\}$ (i.e. CRS) are mapped to the physical antenna index $j = p$, where P is the number of cell-specific reference signals configured per test.

Modulation symbols $a_{k,l}^{(p)}$ with $p \in \{15,16,...,14+N_{CSI}\}$ (i.e. CSI-RS) are mapped to the physical antenna index $j = p - 15$, where N_{CSI} is the number of CSI reference signals configured per test.

B.4.4 Random beamforming for EPDCCH distributed transmission (Antenna port 107 and 109)

EPDCCH distributed transmission on antenna port 107 and antenna port 109 is defined by using a pair of precoder vectors $W_1(i)$ and $W_2(i)$ each of size 2×1, which are not identical and randomly selected per EPDCCH PRB pair with the number of layers $\upsilon = 1$ from Table 6.3.4.2.3-1 in [8], as beamforming weights. This precoder takes as an input the signal $y^{(p)}(i)$, $i = 0,1,...,M_{\text{symb}}^{\text{ap}} - 1$, for antenna port $p \in \{107,109\}$, with $M_{\text{symb}}^{\text{ap}}$ the number of modulation symbols including the user-specific reference symbols (DMRS), and generates a block of signals $y_{bf}(i) = \left[y_{bf}(i) \quad \tilde{y}_{bf}(i) \right]^T$. When EPDCCH is associated with port 107, the transmitted block of signals is denoted as

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W_1(i) y^{(107)}(i).$$

When EPDCCH is associated with port 109, the transmitted block of signals is denoted as

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W_2(i) y^{(109)}(i).$$

B.4.5 Random beamforming for EPDCCH localized transmission (Antenna port 107, 108, 109 or 110)

EPDCCH localized transmission on antenna port 107, 108, 109 or 110 is defined by using a precoder vector $W(i)$ of size 2×1 randomly selected with the number of layers $\upsilon = 1$ from Table 6.3.4.2.3-1 in [8] as beamforming weights. This precoder takes as an input the signal $y^{(p)}(i)$, $i = 0,1,...,M_{\text{symb}}^{\text{ap}} - 1$, for antenna port $p \in \{107,108,109,110\}$, with $M_{\text{symb}}^{\text{ap}}$ the number of modulation symbols including the user-specific reference symbols (DMRS), and generates a block of signals $y_{bf}(i) = \left[y_{bf}(i) \quad \tilde{y}_{bf}(i)\right]^T$ the elements of which are to be mapped onto the same physical RE but transmitted on different antenna elements:

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W(i) y^{(p)}(i) .$$

B.5 Interference models for enhanced performance requirements Type-A

This clause provides a description for the modelling of interfering cell transmissions for enhanced performance requirements Type-A including: definition of dominant interferer proportion, transmission mode 3, 4 and 9 type of interference modelling.

B.5.1 Dominant interferer proportion

Each interfering cell involved in enhanced performance requirements Type-A is characterized by its associated dominant interferer proportion (DIP) value:

$$DIP_i = \frac{\hat{I}_{or(i+1)}}{N_{oc}'}$$

where is $\hat{I}_{or(i+1)}$ is the average received power spectral density from the i-th strongest interfering cell involved in the requirement scenario ($\hat{I}_{or(1)}$ is assumed to be the power spectral density associated with the serving cell) and $N_{oc}' = \sum_{j=2}^{N} \hat{I}_{or(j)} + N_{oc}$ where N_{oc} is the average power spectral density of a white noise source consistent with the definition provided in subclause 3.2 and N is the total number of cells involved in a given requirement scenario.

B.5.2 Transmission mode 3 interference model

This subclause provides transmission mode 3 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the entire PDSCH region and the full transmission bandwidth. Transmitted physical channels shall include PSS, SSS and PBCH.

For each subframe and each CQI subband as defined in subclause 7.2 of [10], a transmission rank shall be randomly determined independently from other CQI subbands as well as other interfering cells. Probabilities of occurrence of each possible transmission rank are as specified in the requirement scenario.

For rank-1 transmission over a subband, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to 16QAM randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8].

For rank-2 transmission over a subband, precoding for spatial multiplexing with large delay CDD over two layers for the number of antenna ports in the requirement scenario shall be applied to 16QAM randomly modulated layer symbols, as specified in subclause 6.3.4.2.2 of [8].

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.5.3 Transmission mode 4 interference model

This subclause provides transmission mode 4 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the entire PDSCH region and the full transmission bandwidth. Transmitted physical channels shall include PSS, SSS and PBCH.

For each subframe and each CQI subband as defined in subclause 7.2 of [10], a transmission rank shall be randomly determined independently from other CQI subbands as well as other interfering cells. Probabilities of occurrence of each possible transmission rank are as specified in the requirement scenario.

For each subframe and CQI subband, a precoding matrix for the number of layers υ associated to the selected rank shall be selected randomly from Table 6.3.4.2.3-1 of [8]. Note that codebook index 0 shall be excluded from random precoder selection when the number of layers is $\upsilon = 2$.

Precoding for spatial multiplexing with cell-specific reference signals for the number of antenna ports in the requirement scenario shall be applied to 16QAM randomly modulated layer symbols, as specified in subclause 6.3.4.2.1 of [8] with the selected precoding matrices for each subframe and each CQI subband.

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.5.4 Transmission mode 9 interference model

This subclause provides transmission mode 9 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the entire PDSCH region and the full transmission bandwidth. Transmitted physical channels shall include PSS, SSS and PBCH.

For each subframe and each CQI subband as defined in subclause 7.2 of [10], a transmission rank shall be randomly determined independently from other CQI subbands as well as other interfering cells. Probabilities of occurrence of each possible transmission rank are as specified in the requirement scenario.

For each subframe and each CQI subband, a precoding matrix for the number of layers υ associated to the selected rank shall be selected randomly from Table 6.3.4.2.3-2 of [8].

The generic beamforming model in subclause B.4.3 shall be applied assuming cell-specific reference signals and CSI reference signals as specified in the requirement scenario. Random precoding with selected rank and precoding matrices for each subframe and each CQI subband shall be applied to 16QAM randomly modulated layer symbols including the user-specific reference symbols over antenna port 7 when the rank is one and antenna ports 7, 8 when the rank is two.

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.6 Interference models for enhanced performance requirements Type-B

This clause provides a description for the modelling of interfering cell transmissions for enhanced performance requirements Type-B including: transmission mode 2, 3, 4 and 9 type of interference modelling and a definition of the random interference model.

B.6.1 Transmission mode 2 interference model

This subclause provides transmission mode 2 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the PDSCH region as specified in subclause B.6.6. Transmitted physical channels shall include PSS, SSS and PBCH.

The MCS shall be randomly determined with probabilities of occurrence of each possible MCS as specified in subclause B.6.6.

Precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to the randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8].

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.6.2 Transmission mode 3 interference model

This subclause provides transmission mode 3 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the PDSCH region as specified in subclause B.6.6. Transmitted physical channels shall include PSS, SSS and PBCH.

The transmission rank shall be randomly determined for each user defined in section B.6.6 with probabilities of occurrence of each possible transmission rank as specified in subclause B.6.6.

The MCS shall be randomly determined with probabilities of occurrence of each possible MCS as specified in subclause B.6.6.

For rank-1 transmission, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to the randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8].

For rank-2 transmission, precoding for spatial multiplexing with large delay CDD over two layers for the number of antenna ports in the requirement scenario shall be applied to the randomly modulated layer symbols, as specified in subclause 6.3.4.2.2 of [8].

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.6.3 Transmission mode 4 interference model

This subclause provides transmission mode 4 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the PDSCH region as specified in subclause B.6.6. Transmitted physical channels shall include PSS, SSS and PBCH.

The transmission rank shall be randomly determined with probabilities of occurrence of each possible transmission rank as specified in subclause B.6.6.

The MCS shall be randomly determined with probabilities of occurrence of each possible MCS as specified in subclause B.6.6.

For each TTI, for each user defined in B.6.6, a single precoding matrix for the number of layers υ associated to the selected rank shall be selected randomly from Table 6.3.4.2.3-1 of [8]. Note that codebook index 0 shall be excluded from random precoder selection when the number of layers is $\upsilon = 2$.

Precoding for spatial multiplexing with cell-specific reference signals for the number of antenna ports in the requirement scenario shall be applied to randomly modulated layer symbols, as specified in subclause 6.3.4.2.1 of [8] with the selected precoding matrices as specified in subclause B.6.6.

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.6.4 Transmission mode 9 interference model

This subclause provides transmission mode 9 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the PDSCH region as specified in subclause B.6.6. Transmitted physical channels shall include PSS, SSS and PBCH.

The transmission rank shall be randomly determined with probabilities of occurrence of each possible transmission rank as specified in subclause B.6.6.

The MCS shall be randomly determined with probabilities of occurrence of each possible MCS as specified in subclause B.6.6.

For each TTI, for each user defined in B.6.6, a single precoding matrix for the number of layers υ associated to the selected rank shall be selected randomly from Table 6.3.4.2.3-1 of [8]. Note that codebook index 0 shall be excluded from random precoder selection when the number of layers is $\upsilon = 2$.

The generic beamforming model in subclause B.4.3 shall be applied assuming cell-specific reference signals and CSI reference signals as specified in the requirement scenario. Random precoding with selected rank and precoding matrices for each subframe shall be applied to randomly modulated layer symbols including the user-specific reference symbols over antenna port 7 when the rank is one and antenna ports 7, 8 when the rank is two.

For each TTI, for each user defined in B.6.6, the scrambling ID value nSCID is randomly assigned from the set of $\{0,1\}$.

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.6.5 CRS interference model

This subclause provides for the CRS interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe there is no PDSCH transmitted. Transmitted physical channels shall include PSS, SSS and PBCH.

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [8]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.6.6 Random interference model

This subclause presents the interference model which defines the resource allocation, MCS and rank for the two interference cells. The model includes approximately 10% DTX on these interference cells. Table B.6.6-1 shows the resource allocation for four users in two different configurations for each of the two interferers. Table B.6.6-2 shows the resource allocation to be used for special subframes with TM9 interference. Table B.6.6-3 shows the probabilities for the MSC and rank for these users.

Table B.6.6-1: Resource allocation for the random interference model

Resource allocation configurations Indexes	User Index	Resource allocation for random interference model				Probability
		Resource allocation type	Bitmap for resource allocation (Note 1)			
			1st field bitmap	2nd field bitmap	3rd field bitmap	
Configuration 1	User 0	1	00	0	10101000101010	50%
	User 1	1	00	0	01010101010101	
	User 2	0	01001001001001001			
	User 3	0	00100100100100100			
Configuration 2	User 0	1	00	0	10101010101010	50%
	User 1	1	00	1	01010100010101	
	User 2	0	01001001001001001			
	User 3	0	00100100100100100			

NOTE 1: The 1st, 2nd, and 3rd field bitmaps are only valid for resource allocation type 1 which was defined in [10].
NOTE 2: The resource allocation model is used for both 1st and 2nd interfering cells and the resource allocation is independent for each interfering cell.

Table B.6.6-2: Resource allocation for the random interference model for TM9 special subframes

Resource allocation configurations Indexes	User Index	Resource allocation for random interference model				Probability
		Resource allocation type	Bitmap for resource allocation (Note 1)			
			1st field bitmap	2nd field bitmap	3rd field bitmap	
Configuration 1	User 0	1	00	0	10101000101010	50%
	User 1	1	00	0	01010101000001	
	User 2	0	01001000001001001			
	User 3	0	00100100000100100			
Configuration 2	User 0	1	00	0	10101000101010	50%
	User 1	1	00	1	01010000010101	
	User 2	0	01001000001001001			
	User 3	0	00100100000100100			

NOTE 1: The 1st, 2nd, and 3rd field bitmaps are only valid for resource allocation type 1 which was defined in [10].
NOTE 2: The resource allocation model is used for both 1st and 2nd interfering cells and the resource allocation is independent for each interfering cell.

Table B.6.6-3: MCS and rank configuration for the random interference model

MCS probability			Rank probability	
MCS5	**MCS14**	**MCS25**	**Rank 1**	**Rank 2**
50%	25%	25%	80%	20%

NOTE 1: The MCS and rank should follow the probability indicated in the table randomly per UE per TTI.
NOTE 2: The probabilities for MCS and rank configuration are used for both 1st and 2nd interfering cells. The MCS and rank configurations are independent for each interfering cell.

B.7 FFS

B.8 Burst transmission models for Frame structure type 3

B.8.1 Burst transmission model for one LAA SCell

This clause provides a description for burst transmission models for Frame structure type 3.

One burst is defined as downlink transmissions which occupy one or more consecutive subframes. The burst transmission format is determined according to the steps below:

1) Select the number of subframes N randomly from a given set of the number of subframes S_1 with equal probability as the total length of burst transmission format. The length includes both occupied OFDM symbols and non-occupied OFDM symbols within the burst format. S_1 is given per test case.

2) If N is equal to 1, the subframe is set as fully occupied, otherwise:

   - For demodulation test, the starting position for the first subframe is randomly selected from OFDM symbol 0 and OFDM symbol 7 with equal probability. For CSI test, the starting position for the first subframe is OFDM symbol 0.

   - The configuration of occupied OFDM symbols in the last subframe is randomly selected from configuration set S_2. S_2 is given per test case.

A uniform random variable from [0, 1] is generated. If the random variable is less than *p* which is given per test case,

- If both the last subframe of previous burst and first subframe of new burst format are fully occupied, start burst transmission after deferring one subframe from the last subframe of previous burst. Otherwise, start burst transmission at the end of last subframe of previous burst.

- Otherwise, the burst transmission is muted and the muting duration is the same as the number of subframes for determined burst format.

Annex C (normative): Downlink Physical Channels

This annex specifies the downlink physical channels that are needed for setting a connection and channels that are needed during a connection.

C.0 Downlink signal levels

The downlink power settings in Table C.0-1 or Table C.0-2 are used unless otherwise specified in a test case.

If the UE has more than one Rx antenna, the downlink signal is applied to each one. All UE Rx antennas shall be connected.

If the UE has one Rx antenna, the downlink signal is applied to it.

Table C.0-1: Default Downlink power levels for E-UTRA

	Unit	Channel bandwidth					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Number of RBs		6	15	25	50	75	100
Channel BW Power	dBm	-66	-62	-60	-57	-55	-54
RS EPRE	dBm/15kHz	-85	-85	-85	-85	-85	-85
Note 1: The channel bandwidth powers and RB allocations are informative, based on -85dBm/15kHz RS_EPRE, then scaled according to the number of RBs and rounded to the nearest integer dBm value. Full RE allocation with no boost or deboost is assumed in this calculation, but allocation may vary during setup. Note 2: The power level is specified at each UE Rx antenna.							

Table C.0-2: Default Downlink power levels for NB-IoT

	Unit	
Subcarriers		12
Channel BW Power	dBm	-74
NRS EPRE	dBm/15kHz	-85
Note 1: The channel bandwidth power is informative, based on -85dBm/15kHz NRS_EPRE, then scaled according to the number of subcarriers and rounded to the nearest integer dBm value. Full RE allocation with no boost or deboost is assumed in this calculation, but allocation may vary during setup. Note 2: The power level is specified at the UE Rx antenna		

The default signal level uncertainty is +/-3dB at each test port, for any level specified. If the uncertainty value is critical for the test purpose, a tighter uncertainty is specified for the related test case in Annex F.

C.1 General

Table C.1-1 describes the mapping of downlink physical channels and signals to physical resources for E-UTRA FDD.

Table C.1-2 describes the mapping of downlink physical channels and signals to physical resources for E-UTRA TDD.

Table C.1-3 describes the mapping of downlink physical channels and signals to physical resources for NB-IoT.

Table C.1-1: Mapping of downlink physical channels and signals to physical resources for E-UTRA FDD

Physical channel	Time Domain Location	Frequency Domain Location	Note
RS	Symbols 0, 4 of each subframe for antenna port 0 & 1 Symbol 1 of each subframe for antenna port 2 & 3	Downlink system bandwidth dependent	Mapping rule is specified in TS 36.211 6.10.1.2 - CELL_ID = 0
PBCH	Symbols 0 to 3 of slot 1 of subframe 0 of each radio frame	Occupies 72 subcarriers centred on the DC subcarrier	Mapping rule is specified in TS 36.211 Section 6.6.4 (Note 2)
PSS	Symbol 6 of slot 0 and 10 of each radio frame	Occupies 62 subcarriers centred on the DC subcarrier. Additional 10 subcarriers (5 on each side) adjacent to the centred 62 subcarriers are reserved.	Mapping rule is specified in TS 36.211 Section 6.11.1.2
SSS	Symbol 5 of slots 0 and 10 of each radio frame	Occupies 62 subcarriers centred on the DC subcarrier. Additional 10 subcarriers (5 on each side) adjacent to the centred 62 subcarriers are reserved.	Mapping rule is specified in TS 36.211 Section 6.11.2.2
PCFICH	Symbol 0 of each subframe	Downlink system bandwidth dependent. Maps into 4 REGs uniformly spread in the frequency domain over the whole system bandwidth.	Mapping rule is specified in TS 36.211 Section 6.7.4 (Note 1) - CELL_ID = 0
PHICH	Symbol 0 of each subframe	Downlink system bandwidth dependent. Each PHICH group maps into 3 REGs in the frequency domain on the REGs not assigned to PCFICH over the whole system bandwidth	Mapping rule is specified in TS 36.211 Section 6.9.3 (Note 1) - CELL_ID = 0 - Ng = 1 - Normal PHICH duration -Number of PHICH groups = 1(BW=1.4MHz)/2(BW=3MHz)/ 4(BW=5MHz)/7(BW=10MHz)/ 10(BW=15MHz)/13(BW=20MHz) Not required for UE category M1 testing
PDCCH	Symbols 0, 1, 2, 3 of each subframe for 1.4 MHz Symbols 0, 1, 2, of each subframe for 3 and 5 MHz Symbols 0, 1 of each subframe for 10, 15 and 20 MHz	The remaining REGs not allocated to both PCFICH and PHICH are used for PDCCH	Mapping rule is specified in TS 36.211 Section 6.8.5 (Note 1)
MPDCCH	Same as PDSCH	For Subframe 0, subcarriers corresponding to resource elements not allocated to RS, PSS, SSS and PBCH (core set and repetitions) and reserved for PBCH antenna ports 3 and 4 on the 72 central subcarriers. For Subframe 5, subcarriers corresponding to resource elements not allocated to RS, PSS and SSS. For Subframe 9, subcarriers corresponding to resource elements not allocated to RS, PSS, SSS and PBCH (repetitions). For other subframes, subcarriers corresponding to resource elements not allocated to RS.	Mapping rule is specified in TS 36.211 Section 6.8B.5 (Note 1) Only required for UE category M1 testing
PDSCH	All remaining OFDM symbols of	For Subframe 0,	Note that there are reserved

	each subframe not allocated to PDCCH	REs not allocated to RS, PSS, SSS and PBCH, is allocated to PDSCH For Subframe 5, REs not allocated to RS, PSS and SSS, is allocated to PDSCH For other subframes, REs not allocated to RS, is allocated to PDSCH	REs that are not used for transmission of any physical channels (Note 3) & (Note 4) which need to be taken into account when allocating REs to PDSCH

Note 1: In case a single cell-specific RS is configured, cell-specific RS shall be assume to be present on antenna ports 0 and 1 for the purpose of mapping a symbol-quadruplet to a REG (resource-element group). (See TS 36.211 Section 6.2.4).

Note 2: PBCH is mapped into RE assuming RS from 4 antennas are used at the eNB transmitter, irrespective of the actual number of Tx antenna. Resource elements assumed to be reserved for RS but not used for transmission of RS shall not be used for transmission of any physical channel. (See TS 36.211 Section 6.6.4).

Note 3: In slot 0 and slot 10 of each radio frame, there are reserved REs for PSS and SSS that are not used for transmission of any physical channels. (See TS 36.211 Section 6.11.1.2 & 6.11.2.2).

Note 4: REs used for RS transmission on any of the antenna ports in a slot shall not be used for any transmission on any other antenna port in the same slot and set to zero. (See TS 36.211 Section 6.10.1.2).

Table C.1-2: Mapping of downlink physical channels and signals to physical resources for E-UTRA TDD

Physical channel	Time Domain Location	Frequency Domain Location	Note
RS	Symbols 0, 4 of each subframe for antenna port 0 & 1 Symbol 1 of each subframe for antenna port 2 & 3	Downlink system bandwidth dependent.	Mapping rule is specified in TS 36.211[8] 6.10.1.2 - CELL_ID = 0
PBCH	Symbols 0 to 3 of slot 1 of subframe 0 of each radio frame	Occupies 72 subcarriers centred on the DC subcarrier	Mapping rule is specified in TS 36.211[8] Section 6.6.4 (Note 3)
PSS	Symbol 2 of slot 2 and 12 of each radio frame	Occupies 62 subcarriers centred on the DC subcarrier. Additional 10 subcarriers (5 on each side) adjacent to the centred 62 subcarriers are reserved.	Mapping rule is specified in TS 36.211[8] Section 6.11.1.2
SSS	Symbol 6 of slots 1 and 11 of each radio frame	Occupies 62 subcarriers centred on the DC subcarrier. Additional 10 subcarriers (5 on each side) adjacent to the centred 62 subcarriers are reserved.	Mapping rule is specified in TS 36.211[8] Section 6.11.2.2
PCFICH	Symbol 0 of each subframe and special subframe	Downlink system bandwidth dependent. Maps into 4 REGs uniformly spread in the frequency domain over the whole system bandwidth	Mapping rule is specified in TS 36.211[8] Section 6.7.4 (Note 2) - CELL_ID = 0
PHICH	Symbol 0 of each subframe and special subframe	Downlink system bandwidth dependent. Each PHICH group maps into 3 REGs in the frequency domain on the REGs not assigned to PCFICH over the whole system bandwidth	Mapping rule is specified in TS 36.211[8] Section 6.9.3 (Note 2) - CELL_ID = 0 - Ng = 1 - Normal PHICH duration -Number of PHICH groups = 1(BW=1.4MHz)/2(BW=3MHz)/ 4(BW=5MHz)/7(BW=10MHz)/ 10(BW=15MHz)/13(BW=20MHz) Not required for UE category M1 testing
PDCCH	For normal subframes(0,4,5,9) Symbols 0, 1, 2, 3 of each subframe for 1.4 MHz Symbols 0, 1, 2, of each subframe for 3 and 5 MHz Symbols 0, 1 of each subframe for 10, 15 and 20 MHz For special subframe (1&6) Symbols 0, 1 of each subframe for all BWs	The remaining REGs not allocated to both PCFICH and PHICH are used for PDCCH	Mapping rule is specified in TS 36.211[8] Section 6.8.5 (Note 2)
MPDCCH	Same as PDSCH	For Subframe 0, subcarriers corresponding to resource elements not allocated to RS, SSS and PBCH (core set and repetitions) and reserved for PBCH antenna ports 3 and 4 on the 72 central subcarriers. For Subframe 5, subcarriers corresponding to resource elements not allocated to RS, SSS and PBCH (repetitions). For Subframe 1 and 6, resource elements not allocated to RS, PSS, GP and UpPTS. For other subframes, subcarriers corresponding to resource elements not allocated to RS.	Mapping rule is specified in TS 36.211[8] Section 6.8B.5 (Note 2) Only required for UE category M1 testing

PDSCH	,All remaining OFDM symbols of each subframe not allocated to PDCCH with the following exception: For 1.4MHz,no data shall be scheduled on special subframes (1&6) to avoid problems with insufficient PDCCH performance	For Subframe 0, REs not allocated to RS, SSS and PBCH, is allocated to PDSCH For Subframe 5, REs not allocated to RS and SSS, is allocated to PDSCH For Subframe 1 and 6, REs not allocated to RS, PSS, GP and UpPTS is allocated to PDSCH For other downlink subframes, REs not allocated to RS is allocated to PDSCH	Note that there are reserved REs that are not used for transmission of any physical channels (Note 4) & (Note 5) which need to be taken into account when allocating REs to PDSCH

Note 1: The mapping is based on the default TDD configuration for subframe assignment and special subframe patterns (see 36.508 [7]subclause 4.6.3)

Note 2: In case a single cell-specific RS is configured, cell-specific RS shall be assume to be present on antenna ports 0 and 1 for the purpose of mapping a symbol-quadruplet to a REG (resource-element group). (See TS 36.211[8] Section 6.2.4).

Note 3: PBCH is mapped into RE assuming RS from 4 antennas are used at the eNB transmitter, irrespective of the actual number of Tx antenna. Resource elements assumed to be reserved for RS but not used for transmission of RS shall not be used for transmission of any physical channel. (See TS 36.211[8] Section 6.6.4).

Note 4: In slot 1,2,11 and 12 of each radio frame, there are reserved REs for PSS and SSS that are not used for transmission of any physical channels. (See TS 36.211[8] Section 6.11.1.2 & 6.11.2.2).

Note 5: REs used for RS transmission on any of the antenna ports in a slot shall not be used for any transmission on any other antenna port in the same slot and set to zero. (See TS 36.211[8] Section 6.10.1.2).

Table C.1-3: Mapping of downlink physical channels and signals to physical resources for NB-IoT

Physical channel	Time Domain Location	Frequency Domain Location	Note
NPBCH	NPBCH is transmitted in subframe 0 in every radio frame. NPBCH consists of 8 independently decodable blocks of 80 ms duration. The time interval where MIB remains unchanged is 640 ms. NPBCH does not use the first 3 symbols in a subframe in in-band operation. For stand-alone and guard-band, the first 3 symbols (of the subframe transmitting NPBCH) contain no NPBCH.	Occupies any of the 12 subcarriers not reserved for transmission of reference signals	Mapping rule is specified in TS 36.211 [8] sub clause 10.2.4.4
NPSS	NPSS is transmitted in subframe 5. NPSS uses the last 11 OFDM symbols of subframes in which NB-PSS occurs for normal CP. NB-IoT PSS/SSS do not use: - the LTE PDCCH control region - REs used by LTE CRS NSSS periodicity is 10ms.	NPSS is mapped to sub-carriers #0-10 of the NB-IoT carrier	Mapping rule is specified in TS 36.211 [8] sub clause 10.2.7.1.2
NSSS	NSSS is transmitted in subframe 9. NSSS uses the last 11 OFDM symbols of subframes in which NB-SSS occurs for normal CP. NB-IoT PSS/SSS do not use: - the LTE PDCCH control region - REs used by LTE CRS NSSS periodicity is 20ms.	The number of subcarriers for NSSS is 12	Mapping rule is specified in TS 36.211 [8] sub clause 10.2.7.2.2
NPDCCH	NPDCCH on a given NB-IoT carrier are not mapped to the subframes containing NPSS/NSSS/PBCH on that carrier. NPDCCH are not be mapped onto resources elements used for NRS. NPDCCH are not overlapped with PBCH, PSS, SSS, or CRS. One or two NPDCCHs can be transmitted in a subframe. In in-band, first 3 OFDM symbols are not used for NPDCCH. In stand-alone and guard-band, all OFDM symbols are available for NPDCCH. NPDCCH and NPDSCH are multiplexed only based on TDM at subframe level: - It means that only cross subframe scheduling is supported - The start of an NPDCCH search space is >=4ms after the end of the last NPDCCH search space	NPDCCH is transmitted on an aggregation of one or two consecutive narrowband control channel elements (NCCEs), where a narrowband control channel element corresponds to 6 consecutive subcarriers in a subframe where NCCE 0 occupies subcarriers 0 through 5 and NCCE 1 occupies subcarriers 6 through 11	Mapping rule is specified in TS36.211 [8] sub clause 10.2.5.5
NPDSCH	The start of NB-PDSCH transmission is >=4ms later than the end of its associated DL assignment. NPDSCH on a given NB-IoT	Occupies any of the 12 subcarriers not reserved for transmission of reference signals	Mapping rule is specified in TS 36.211 [8] sub clause 10.2.3.4

	carrier are not mapped to the subframes containing NPSS/NSSS/PBCH on that carrier. NPDSCH resource elements should be different from the ones used for NRS. NPDSCH resource elements should be different from the ones used for CRS.		
NRS	Narrowband reference signals are transmitted in all NB-IoT downlink subframes in a cell supporting NPDSCH transmission. NRS is not transmitted in subframes that are not NB-IoT downlink subframes, except if these subframes contain NPBCH or NPDSCH carrying SystemInformationBlockType1-NB where NRS shall be transmitted Narrowband reference signals are transmitted in subframes #0 and #4 and in subframes #9 not containing NSSS [when no NB-IoT downlink subframes configuration has not been established]. The narrowband reference signals shall not be mapped to subframes containing NPSS or NSSS. NRS are transmitted on one or two antenna ports 0 to 1 (Figure 10.2.6.2-1 in TS 36.211 [8]).	2 subcarriers per antenna port in any OFDM symbol where NRS is transmitted	

C.2 Set-up

Table C.2-1 describes the downlink Physical Channels that are required for E-UTRA connection set up.

Table C.2-1: Downlink Physical Channels required for E-UTRA connection set-up

Physical Channel	EPRE Ratio	Note
PBCH	PBCH_RA = 0 dB	
	PBCH_RB = 0 dB	
PSS	PSS_RA = 0 dB	
SSS	SSS_RA = 0 dB	
PCFICH	PCFICH_RB = 0 dB	
PDCCH	PDCCH_RA = 0 dB	
	PDCCH_RB = 0 dB	
MPDCCH	MPDCCH_RA = 0 dB	Only required for UE category M1 testing
	MPDCCH_RB = 0 dB	
PDSCH	PDSCH_RA = 0 dB	
	PDSCH_RB = 0 dB	
PHICH	PHICH_RA = 0 dB	Note 2 Not required for UE category M1 testing
	PHICH_RB = 0 dB	
Note 1: No boosting is applied. Note 2: PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.		

Table C.2-2 describes the configuration of PDSCH and PDCCH before measurement for E-UTRA FDD and Table C.2-3 for E-UTRA TDD.

Table C.2-4 describes the configuration of PDSCH and MPDCCH before measurement for FDD and Table C.2-5 for TDD.

Table C.2-2: PDSCH and PDCCH configuration for E-UTRA FDD

Parameter	Unit	Value	Comments
Allocated resource blocks		6	
MCS Index		-	TB Size with transmitting message in 1TTI
Number of HARQ processes	Processes	8	
Maximum number of HARQ transmission		5	
Aggregation level	CCE	2	Note 4
DCI Format for PDSCH		Format 1A	
DCI Format for PUSCH		Format 0	
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz. Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 3: The PDSCH shall be occupied 6 resource blocks centred on the DC subcarrier. Note 4: For PDCCH using SI-RNTI, Aggregation level: a)Tables C.3.0-3, C.3.1-3, and C.3.2-3 for RF tests b)Table A.2.1-1 of 36.521-3 for RRM tests.			

Table C.2-3: PDSCH and PDCCH configuration for E-UTRA TDD

Parameter	Unit	Value	Comments
Allocated resource blocks		6	
MCS Index		0	TB Size with transmitting message in 1TTI
Number of HARQ processes (Note 1)	Processes	7	
Maximum number of HARQ transmission		4	
Aggregation level	CCE	2	Note 5
DCI Format for PDSCH		Format 1A	
DCI Format for PUSCH		Format 0	

Note 1: Number of HARQ processes shall be determined by UL/DL configuration, for configuration other than 1,the process number shall be set per TS 36.213 [10] Table 8-1.
Note 2: For normal downlink subframes, 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs.
Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 4: The PDSCH shall be occupied 6 resource blocks centred on the DC subcarrier.
Note 5: For PDCCH using SI-RNTI, Aggregation level:
a)Tables C.3.0-3, C.3.1-3, and C.3.2-3 for RF tests
b)Table A.2.2-1 of 36.521-3 for RRM tests

Table C.2-4: PDSCH and MPDCCH configuration for FDD

Parameter	Unit	Value	Comments
Allocated resource blocks		[6]	
MCS Index		-	TB Size with transmitting message in 1TTI
Number of HARQ processes, CE Mode A	Processes	[8]	
Number of HARQ processes, CE Mode B	Processes	[2]	
Maximum number of HARQ transmission		[5]	
Aggregation level	CCE	[2]	Note 4
DCI Format for PDSCH		Format 6-1A	CE Mode A
DCI Format for PDSCH		Format 6-1B	CE mode B
DCI Format for PUSCH		Format 6-0A	CE Mode A
DCI Format for PUSCH		Format 6-0B	CE mode B

Note 1: [2] symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. [3] symbols allocated to PDCCH for 5 MHz and 3 MHz. [4] symbols allocated to PDCCH for 1.4 MHz.
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8].
Note 3: Void.
Note 4: For MPDCCH using SI-RNTI, Aggregation level:
a)Tables C.3.0-3, C.3.1-3, and C.3.2-3 for RF tests
b)Table A.2.1-1 of 36.521-3 for RRM tests.

Table C.2-5: PDSCH and MPDCCH configuration for TDD

Parameter	Unit	Value	Comments
Allocated resource blocks		[6]	
MCS Index		[0]	TB Size with transmitting message in 1TTI
Number of HARQ processes, CE Mode A (Note 1)	Processes	[7]	
Number of HARQ processes, CE Mode B	Processes	[2]	
Maximum number of HARQ transmission		[4]	
Aggregation level	CCE	[2]	Note 5
DCI Format for PDSCH		Format 6-1A	CE Mode A
DCI Format for PDSCH		Format 6-1B	CE mode B
DCI Format for PUSCH		Format 6-0A	CE Mode A
DCI Format for PUSCH		Format 6-0B	CE mode B
Note 1: Number of HARQ processes shall be determined by UL/DL configuration, for configuration other than 1,the process number shall be set per TS 36.213 [10] Table 8-1. Note 2: For normal downlink subframes, [2] symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. [3] symbols allocated to PDCCH for 5 MHz and 3 MHz. [4] symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only [2] OFDM symbols are allocated to PDCCH for all BWs. Note 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [8]. Note 4: Void. Note 5: For MPDCCH using SI-RNTI, Aggregation level: a)Tables C.3.0-3, C.3.1-3, and C.3.2-3 for RF tests b)Table A.2.2-1 of 36.521-3 for RRM tests			

Table C.2-6: Downlink Physical Channels required for connection set-up, NB-IoT

Physical Channel	EPRE Ratio	Note
NPBCH	NPBCH_RA = 0 dB	
	NPBCH_RB = 0 dB	
NPSS	NPSS_RA = 0 dB	
NSSS	NSSS_RA = 0 dB	
NPDCCH	NPDCCH_RA = 0 dB	
	NPDCCH_RB = 0 dB	
NPDSCH	NPDSCH_RA = 0 dB	
	NPDSCH_RB = 0 dB	
Note 1: No boosting is applied.		

Table C.2-7 describes the configuration of NPDSCH and NPDCCH before measurement for NB-IoT.

Table C.2-7: NPDSCH and NPDCCH configuration for NB-IoT

Parameter	Unit	Value	Comments
Allocated subcarriers		[FFS]	
MCS Index		-	TB Size with transmitting message in 1TTI
Number of HARQ processes	Processes	1	
Maximum number of HARQ transmission		1	
Aggregation level	NCCE	2	
DCI Format for NPDSCH		Format N1	
DCI Format for NPUSCH		Format N0	
Note 1: Reference signal NRS, Synchronization signals NPSS, NSSS and NPBCH allocated as per TS 36.211 [8]			

Table C.2-8, describes the GNSS configuration required for V2V and V2X.

Table C.2-8: GNSS configuration for V2V and V2X

System	Parameters	Unit	Value
	Number of generated satellites per system	-	[8]
	HDOP Range	-	1.4 to 2.1
	Propagation conditions	-	AWGN
GPS(1)	Reference signal power level for all satellites	dBm	-128.5
Galileo	Reference signal power level for all satellites	dBm	-127
GLONASS	Reference signal power level for all satellites	dBm	-131
QZSS	Reference signal power level for all satellites	dBm	-128.5
BDS	Reference signal power level for all satellites	dBm	-133
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on UE capabilities. NOTE 2: The DUT UE shall support at least one system and will be configured for the supported system(s).			

C.3 Connection

The following clauses describes the downlink Physical Channels that are transmitted during a connection i.e., when measurements are done.

C.3.0 Measurement of Transmitter Characteristics

Table C.3.0-1 is applicable for measurements on the Transmitter Characteristics (clause 6).

Table C.3.0-1: Downlink Physical Channels transmitted during a connection (FDD and TDD)

Physical Channel	EPRE Ratio	Note
PBCH	PBCH_RA = 0 dB	
	PBCH_RB = 0 dB	
PSS	PSS_RA = 0 dB	
SSS	SSS_RA = 0 dB	
PCFICH	PCFICH_RB = 0 dB	
PDCCH	PDCCH_RA = 0 dB	
	PDCCH_RB = 0 dB	
MPDCCH	MPDCCH_RA = 0 dB	Only required for UE category M1 testing
	MPDCCH_RB = 0 dB	
PDSCH	PDSCH_RA = 0 dB	
	PDSCH_RB = 0 dB	
PHICH	PHICH_RB = 0 dB	Note 1, Note 2 Not required for UE category M1 testing
Note 1: PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group. Note 2: For CA tests with 1 UL, no PHICH resources are assigned to the DUT in the SCell. Note 3: Unused PDCCH or MPDCCH resources and PHICH groups are padded with resource element groups with power level given respectively by PDCCH_RA/RB or MPDCCH_RA/RB and PHICH_RB, such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.		

NOTE 1: No boosting is applied.

Table C.3.0-2: Power allocation for OFDM symbols and reference signals

Parameter	Unit	Value	Note
Transmitted power spectral density I_{or}	dBm/15 kHz	Test specific	1. I_{or} shall be kept constant throughout all OFDM symbols
Cell-specific reference signal power ratio E_{RS} / I_{or}		0 dB	

Table C.3.0-3: PDCCH Aggregation Level (in CCE-s)

Bandwidth	DCI for DL (SI-RNTI)	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)	Notes
1.4 MHz	4	1	1	Note 1
3 MHz	4	4	4	Note 1
5 MHz	4	4	4	Note 1
10 MHz	8	8	8	Note 1
15 MHz	8	8	8	Note 1
20 MHz	8	8	8	Note 1
Note 1: No DL data allocated on TDD special subframes				

Table C.3.0-3a: MPDCCH Aggregation Level (in ECCE-s)

Bandwidth	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)
1.4 MHz	2	4
3 MHz	2	4
5 MHz	2	4
10 MHz	2	4
15 MHz	2	4
20 MHz	2	4

C.3.1 Measurement of Receiver Characteristics

Table C.3.1-1 or Table C.3.1-5 is applicable for measurements on the Receiver Characteristics (clause 7).

Table C.3.1-1: Downlink Physical Channels transmitted during a connection (E-UTRA FDD and TDD)

Physical Channel	EPRE Ratio	Note
PBCH	PBCH_RA = 0 dB	
	PBCH_RB = 0 dB	
PSS	PSS_RA = 0 dB	
SSS	SSS_RA = 0 dB	
PCFICH	PCFICH_RB = 0 dB	
PDCCH	PDCCH_RA = 0 dB	
	PDCCH_RB = 0 dB	
MPDCCH	MPDCCH_RA = 0 dB	Only required for UE category M1 testing
	MPDCCH_RB = 0 dB	
PDSCH	PDSCH_RA = 0 dB	
	PDSCH_RB = 0 dB	
PHICH	PHICH_RB = 0 dB	Note 1, Note 2 Not required for UE category M1 testing
OCNG	OCNG_RA = 0 dB	
	OCNG_RB = 0 dB	
Note 1: PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group. Note 2: For CA tests with 1 UL, no PHICH resources are assigned to the DUT in the SCell. In such case PHICH of SCell is entirely part of OCNG pattern used.		

NOTE 1: No boosting is applied.

Table C.3.1-2: Power allocation for OFDM symbols and reference signals

Parameter	Unit	Value	Note
Transmitted power spectral density I_{or}	dBm/15 kHz	Test specific	1. I_{or} shall be kept constant throughout all OFDM symbols
Cell-specific reference signal power ratio E_{RS} / I_{or}		0 dB	

Table C.3.1-3: PDCCH Aggregation Level (in CCE-s)

Bandwidth	DCI for DL (SI-RNTI)	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)	Notes
1.4 MHz	4	4	2	Note 1, 2
3 MHz	4	4	2	Note 2
5 MHz	8	8	4	Note 2
10 MHz	8	8	8	Note 2
15 MHz	8	8	8	Note 2
20 MHz	8	8	8	Note 2
Note 1: No DL data allocated on TDD special subframes Note 2: No DL data allocated on subframe 5				

Table C.3.1-3a: MPDCCH Aggregation Level (in ECCE-s)

Bandwidth	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)
1.4 MHz	2	4
3 MHz	2	4
5 MHz	2	4
10 MHz	2	4
15 MHz	2	4
20 MHz	2	4

Table C.3.1-4: FFS

Table C.3.1-5: Downlink Physical Channels transmitted during a connection for NB-IoT

Physical Channel	EPRE Ratio	Note
NPBCH	NPBCH_RA = 0 dB	
	NPBCH_RB = 0 dB	
NPSS	NPSS_RA = 0 dB	
NSSS	NSSS_RA = 0 dB	
NPDCCH	NPDCCH_RA = 0 dB	
	NPDCCH_RB = 0 dB	
NPDSCH	NPDSCH_RA = 0 dB	
	NPDSCH_RB = 0 dB	

Table C.3.1-6: Power allocation for OFDM symbols and reference signals for NB-IoT

Parameter	Unit	Value	Note
Transmitted power spectral density I_{or}	dBm/15 kHz	Test specific	1. I_{or} shall be kept constant throughout all OFDM symbols
Cell-specific reference signal power ratio E_{RS} / I_{or}		0 dB	

Table C.3.1-7: NPDCCH Aggregation Level (in NCCE-s)

FFS

C.3.2 Measurement of Performance requirements

Table C.3.2-1 is applicable for measurements in which uniform RS-to-EPRE boosting for all downlink physical channels.

Table C.3.2-1: Downlink Physical Channels transmitted during a connection (FDD and TDD and Frame structure Type 3)

Physical Channel	EPRE Ratio	Note
PBCH	PBCH_RA = $\rho_A + \sigma$	
	PBCH_RB = $\rho_B + \sigma$	
PSS	PSS_RA = 0 (Note 4)	
SSS	SSS_RA = 0 (Note 4)	
PCFICH	PCFICH_RB = $\rho_B + \sigma$	
PDCCH	PDCCH_RA = $\rho_A + \sigma$	
	PDCCH_RB = $\rho_B + \sigma$	
EPDCCH	EPDCCH_RA = ρ_A	
	EPDCCH_RB = ρ_B	
MPDCCH	MPDCCH_RA = $\rho_A+\delta$	Only required for UE category M1 testing
	MPDCCH_RB = $\rho_B+\delta$	
PDSCH	PDSCH_RA = ρ_A	
	PDSCH_RB = ρ_B	
PMCH	PMCH_RA = ρ_A	
	PMCH_RA = ρ_B	
MBSFN RS	MBSFN RS_RA = ρ_A	
	MBSFN RS_RA = ρ_B	
PHICH	PHICH_RB = $\rho_B + \sigma$	Note 1, Note 2 Not required for UE category M1 testing
OCNG	OCNG_RA = $\rho_A + \sigma$	
	OCNG_RB = $\rho_B + \sigma$	
Note 1: PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group. Note 2: For CA tests with 1 UL, no PHICH resources are assigned to the DUT in the SCell. In such case PHICH of SCell is entirely part of OCNG pattern used.		

NOTE 1: ρ_A denotes the ratio of PDSCH EPRE to cell-specific RS EPRE among PDSCH REs in all the OFDM symbols not containing cell-specific RS. ρ_B denotes the ratio of PDSCH EPRE to cell-specific RS EPRE among PDSCH REs in all the OFDM symbols containing cell-specific RS.

NOTE 2: $\rho_A = \rho_B = 0$ dB means no RS boosting.

NOTE 3: MBSFN RS and OCNG are not defined downlink physical channels in [8].

NOTE 4: Assuming PSS and SSS transmitted on a single antenna port.

NOTE 5: ρ_A, ρ_B, and σ are test specific, $\sigma = 0$ dB otherwise.

NOTE 6: For TM8, TM9 and TM10, ρ_A and ρ_B are used for the purpose of the test set up only.

NOTE 7: For Frame Structure Type 3, PBCH are not defined.

Table C.3.2-2: Power allocation for OFDM symbols and reference signals

Parameter	Unit	Value	Note
Total transmitted power spectral density I_{or}	dBm/15 kHz	Test specific	1. I_{or} shall be kept constant throughout all OFDM symbols
Cell-specific reference signal power ratio E_{RS} / I_{or}		Test specific	1. Applies for antenna port *p*
Energy per resource element EPRE		Test specific	1. The complex-valued symbols $y^{(p)}(i)$ and $a_{k,l}^{(p)}$ defined in [8] shall conform to the given EPRE value. 2. For TM8, TM9 and TM10, the reference point for EPRE is before the precoder in Annex B.4.

Table C.3.2-3: PDCCH Aggregation Level (in CCE-s) for PDSCH demodulation and PMI performance tests

Bandwidth	DCI for DL (SI-RNTI)	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)	Notes
1.4 MHz	4	4	2	Note 1, 2
3 MHz	4	4	2	Note 2
5 MHz	8	8	4	Note 2
10 MHz	8	8	8	Note 2
15 MHz	8	8	8	Note 2
20 MHz	8	8	8	Note 2
Note 1: No DL data allocated on TDD special subframes Note 2: No DL data allocated on subframe 5				

Table C.3.2-3a: MPDCCH Aggregation Level (in ECCE-s) for PDSCH demodulation tests

Bandwidth	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)	Notes
1.4 MHz	16	16	Note 1, 2, 3
3 MHz	16	16	Note 2, 3
5 MHz	16	16	Note 2, 3
10 MHz	16	16	Note 2, 3
15 MHz	16	16	Note 2, 3
20 MHz	16	16	Note 2, 3
Note 1: No DL data allocated on TDD special subframes Note 2: No DL data allocated on subframe 5 Note 3: For using 2PRB for MPDCCH, aggregation level 2 and 4 are used to transmit DCI for DL(C-RNTI) and UL(C-RNTI), resptectively.				

Table C.3.2-4: PDCCH Aggregation Level for CQI and RI performance tests (in CCE-s)

Bandwidth	DCI for DL (SI-RNTI)	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)	Notes
1.4 MHz				
3 MHz				
5 MHz				
10 MHz	8	8	8	Note 1,2
15 MHz				
20 MHz				
Note 1: 3 symbols allocated to PDCCH Note 2: No DL data allocated on subframes 0 and 5 for FDD and 0, 1, 5 and 6 for TDD				

Table C.3.2-4a: MPDCCH Aggregation Level for CQI tests (in ECCE-s)

Bandwidth	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)	Notes
1.4 MHz			
3 MHz			
5 MHz			
10 MHz	16	16	Note 1, 2
15 MHz			
20 MHz			
Note 1: No DL data allocated on subframes 0 and 5 for FDD and 0, 1, 5 and 6 for TDD Note 2: For using 2PRB for MPDCCH, aggregation level 2 and 4 are used to transmit DCI for DL(C-RNTI) and UL(C-RNTI), resptectively.			

Table C.3.2-5: PDCCH Aggregation Level for sustained downlink data rate performance tests (in CCE-s)

Bandwidth	DCI for DL (SI-RNTI)	DCI for DL (C-RNTI)	DCI for UL (C-RNTI)	Notes
1.4 MHz				
3 MHz				
5 MHz	4	2	2	Note 1,4
10 MHz	4	4	4	Note 1,2,4
15 MHz	4	8	4	Note 1,3,4
20 MHz	8	8	8	Note 1,3,4
Note 1: 1 symbol allocated to PDCCH Note 2: On subframe 5 Aggregation level 2 is used to transmit DCI for DL(C-RNTI) and UL(C-RNTI). Note 3: On subframe 5, Aggregation level 4 is used to transmit DCI for DL(C-RNTI) and UL(C-RNTI). Note 4: No DL data allocated on subframes 1 for TDD.				

C.3.3 Aggressor cell power allocation for Measurement of Performance Requirements when ABS is Configured

For the performance requirements and channel state information reporting when ABS is configured, the power allocation for the physical channels of the aggressor cell in non-ABS and ABS is listed in Table C.3.3-1.

Table C.3.3-1: Downlink physical channels transmitted in aggressor cell when ABS is configured in this cell

Physical Channel	Parameters	Unit	EPRE Ratio	
			Non-ABS	ABS
PBCH	PBCH_RA	dB	ρ_A	Note 1
	PBCH_RB	dB	ρ_B	Note 1
PSS	PSS_RA	dB	ρ_A	Note 1
SSS	SSS_RA	dB	ρ_A	Note 1
PCFICH	PCFICH_RB	dB	ρ_B	Note 1
PHICH	PHICH_RA	dB	ρ_A	Note 1
	PHICH_RB	dB	ρ_B	Note 1
PDCCH	PDCCH_RA	dB	ρ_A	Note 1
	PDCCH_RB	dB	ρ_B	Note 1
PDSCH	PDSCH_RA	dB	N/A	Note 1
	PDSCH_RB	dB	N/A	Note 1
OCNG	OCNG_RA	dB	ρ_A	Note 1
	OCNG_RB	dB	ρ_B	Note 1
Note 1: -∞ dB is allocated for this channel in this test.				

Table C.3.3-2: Downlink physical channels transmitted in aggressor cell when ABS is configured in this cell when the CRS assistance information is provided

Physical Channel	Parameters	Unit	EPRE Ratio	
			Non-ABS	ABS
PBCH	PBCH_RA	dB	ρ_A	ρ_A
	PBCH_RB	dB	ρ_B	ρ_B
PSS	PSS_RA	dB	ρ_A	ρ_A
SSS	SSS_RA	dB	ρ_A	ρ_A
PCFICH	PCFICH_RB	dB	ρ_B	Note 1
PHICH	PHICH_RA	dB	ρ_A	Note 1
	PHICH_RB	dB	ρ_B	Note 1
PDCCH	PDCCH_RA	dB	ρ_A	Note 1
	PDCCH_RB	dB	ρ_B	Note 1
PDSCH	PDSCH_RA	dB	N/A	Note 1
	PDSCH_RB	dB	N/A	Note 1
OCNG	OCNG_RA	dB	ρ_A	Note 1
	OCNG_RB	dB	ρ_B	Note 1
Note 1: -∞ dB is allocated for this channel in this test.				

C.3.4 Power Allocation for Measurement of Performance Requirements when Quasi Co-location Type B: same Cell ID

For the performance requirements related to quasi-collocation type B behaviour when transmission points share the same Cell ID, the power allocation for the physical channels of the serving cell is listed in table C.3.4-1 and the power allocation for the physical channels of the cell transmitting PDSCH is listed in table C.3-4-2

Table C.3.4-1: Downlink physical channels transmitted in the serving cell (TP1)

Physical Channel	EPRE Ratio
PBCH	PBCH_RA = ρ_A+ σ
	PBCH_RB = ρ_B+ σ
PSS	PSS_RA = 0 (Note 2)
SSS	SSS_RA = 0 (Note 2)
PDSCH	PDSCH_RA = ρ_A
	PDSCH_RB = ρ_B
PCFICH	PCFICH_RB = ρ_B+ σ
PDCCH	PDCCH_RA = ρ_A+ σ
	PDCCH_RB = ρ_B+ σ

NOTE 1: ρ_A= ρ_B = 0 dB means no RS boosting.

NOTE 2: Assuming PSS and SSS transmitted on a single antenna port.

NOTE 3: ρ_A, ρ_B and σ are test specific.

Table C.3.4-2: Downlink physical channels for the transmission point transmitting PDSCH (TP2)

Physical Channel	Value
PDSCH	Test Specific

C.3.5 Simplified CA testing method

For CA tests which require more than 16 independent faders, if a test system cannot support a throughput measurement with fading on all carriers simultaneously, the simplified CA testing method shall be used.

In the simplified CA testing method, the resulting propagation channel(s) shall be generated by considering a number of independent faders needed for one carrier and connecting them to the signal of randomly chosen carrier(s). The maximum number of channel faders on the test will be less than or equal to 16. The remaining carrier(s) shall be connected without a channel fader but with AWGN. The throughput is then collected only for the carrier(s) connected to channel faders.

In the simplified CA testing method, the test shall be repeated by choosing carrier(s) excluding already chosen carrier(s) until all the carrier(s) are tested under fading conditions. All the collected throughputs from each carrier shall be compared against the reference value of the requirements.

All supported carriers shall be configured and activated during the test.

Annex D (normative): Characteristics of the Interfering Signal

D.1 General

Some RF performance requirements for the E-UTRA UE receiver are defined with interfering signals present in addition to the wanted signal. When the wanted channel band width is wider than or equal to 5MHz, a modulated 5MHz full band width E-UTRA down link signal, and in some cases an additional CW signal, are used. For wanted channel band widths below 5MHz, the band width of the modulated interferer should be equal to the channel band width of the wanted signal.

D.2 Interference signals

Table D.2-1 describes the modulated interferer for different channel band width options.

Table D.2-1: Description of modulated E-UTRA interferer

	Channel bandwidth					
	1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
RB	6	15	25	25	25	25
$BW_{Interferer}$	1.4 MHz	3 MHz	5 MHz	5 MHz	5 MHz	5 MHz

Table D.2-2 describes the GSM interferer.

Table D.2-2: Description of GSM interferer

$BW_{Interferer}$	200kHz
Modulation	GMSK

Annex E (normative): Global In-Channel TX-Test

Note: Clauses E.2.2 to E.5.9.3 are descriptions, which assume no power ramping adjacent to the measurement period. *Power ramping adjacent to the measurement period requires exclusion periods, described in clause E.7*

E.1 General

The global in-channel TX test enables the measurement of all relevant parameters that describe the in-channel quality of the output signal of the TX under test in a single measurement process.

The parameters describing the in-channel quality of a transmitter, however, are not necessarily independent. The algorithm chosen for description inside this annex places particular emphasis on the exclusion of all interdependencies among the parameters.

E.2 Signals and results

E.2.1 Basic principle

The process is based on the comparison of the actual **output signal of the TX under test**, received by an ideal receiver, with a **reference signal**, that is generated by the measuring equipment and represents an ideal error free received signal. All signals are represented as equivalent (generally complex) baseband signals.

The description below uses numbers as examples. These numbers are taken from frame structure 1 with normal CP length and 20 MHz bandwidth. The application of the text below, however, is not restricted to this frame structure and bandwidth.

E.2.2 Output signal of the TX under test

The output signal of the TX under test is acquired by the measuring equipment and stored for further processing. It is sampled at a sampling rate of 30.72 Msps. In the time domain it comprises at least 10 uplink subframes. The measurement period is derived by concatenating the correct number of individual uplink slots until the correct measurement period is reached. The output signal is named z(v). Each slot is modelled as a signal with the following parameters: demodulated data content, carrier frequency, amplitude and phase for each subcarrier, timing, carrier leakage.

NOTE 1: TDD

For frame structure type 2, subframes with special fields (UpPTS) do not undergo any evaluation. Since the uplink subframes are not continuous, the 20 slots should be extracted from more than 1 continuous radio frame:

Figure E.2.2-1 is an example for uplink-downlink configuration 1 (DSUUDDSUUD) as specified in TS 36.211 [8] Table 4.2-2,assuming all uplink subframes are active.

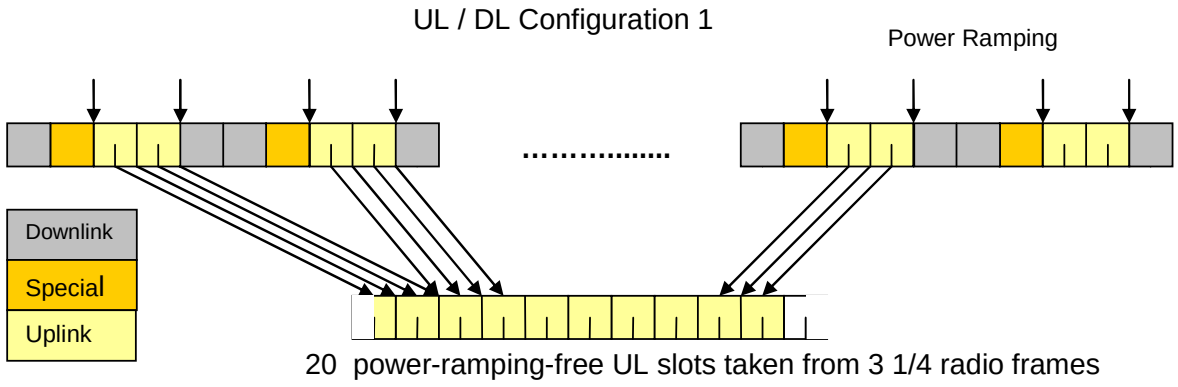


Figure E.2.2-1: Example of uplink – downlink configuration 1

E.2.3 Reference signal

Two types of reference signal are defined:

The reference signal $i_1(v)$ is constructed by the measuring equipment according to the relevant TX specifications, using the following parameters: demodulated data content, nominal carrier frequency, nominal amplitude and phase for each subcarrier, nominal timing, no carrier leakage. It is represented as a sequence of samples at a sampling rate of 30.72 Msps in the time domain.

The reference signal $i_2(v)$ is constructed by the measuring equipment according to the relevant TX specifications, using the following parameters: restricted data content: nominal reference symbols, (all modulation symbols for user data symbols are set to 0V), nominal carrier frequency, nominal amplitude and phase for each applicable subcarrier, nominal timing, no carrier leakage. It is represented as a sequence of samples at a sampling rate of 30.72 Msps in the time domain.

NOTE: The PUCCH is off during the time under test.

E.2.4 Measurement results

The measurement results, achieved by the global in channel TX test are the following:

- Carrier Frequency error
- EVM (Error Vector Magnitude)
- Carrier leakage
- Unwanted emissions, falling into non allocated resource blocks.
- EVM equalizer spectrum flatness

E.2.5 Measurement points

The unwanted emission falling into non-allocated RB(s) is calculated directly after the FFT as described below. In contrast to this, the EVM for the allocated RB(s) is calculated after the IDFT. The samples after the TX-RX chain equalizer are used to calculate EVM equalizer spectrum flatness. Carrier frequency error and carrier leakage is calculated in the block “RF correction”.

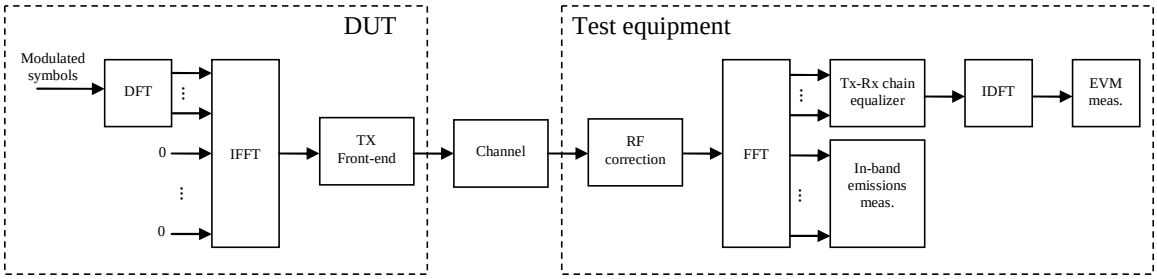


Figure E.2.5-1: EVM measurement points

E.3 Signal processing

E.3.1 Pre FFT minimization process

Before applying the pre-FFT minimization process, z(ν) and i(ν) are portioned into 20 pieces, comprising one slot each. Each slot is processed separately. Sample timing, Carrier frequency and carrier leakage in z(ν) are jointly varied in order to minimise the difference between z(ν) and i(ν). Best fit (minimum difference) is achieved when the RMS difference value between z(ν) and i(ν) is an absolute minimum.

The carrier frequency variation and the IQ variation are the measurement results: Carrier Frequency Error and Carrier leakage.

From the acquired samples 20 carrier frequencies and 20 carrier leakages can be derived.

NOTE 1: The minimisation process, to derive carrier leakage and RF error can be supported by Post FFT operations. However the minimisation process defined in the pre FFT domain comprises all acquired samples (i.e. it does not exclude the samples in between the FFT widths and it does not exclude the bandwidth outside the transmission bandwidth configuration

NOTE 2: The algorithm would allow deriving Carrier Frequency error and Sample Frequency error of the TX under test separately. However there are no requirements for Sample Frequency error. Hence the algorithm models the RF and the sample frequency commonly (not independently). It returns one error and does not distinguish between both.

After this process the samples z(ν) are called $z^0(\nu)$.

E.3.2 Timing of the FFT window

The FFT window length is 2048 samples per OFDM symbol. 7 FFTs (14336 samples) cover less than the acquired number of samples (15360 samples) The position in time for FFT must be determined.

In an ideal signal, the FFT may start at any instant within the cyclic prefix without causing an error. The TX filter, however, reduces the window. The EVM requirements shall be met within a window W<CP. There are three different instants for FFT:

Centre of the reduced window, called $\Delta\tilde{c}$, $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2.

The timing of the measured signal is determined in the pre FFT domain as follows, using $z^0(\nu)$ and $i_2(\nu)$:

1. The measured signal is delay spread by the TX filter. Hence the distinct boarders between the OFDM symbols and between Data and CP are also spread and the timing is not obvious.

2. In the Reference Signal $i_2(\nu)$ the timing is known.

3. Correlation between (1.) and (2.) will result in a correlation peak. The meaning of the correlation peak is approx. the “impulse response” of the TX filter. The meaning of “impulse response” assumes that the autocorrelation of

the reference signal $i_2(v)$ is a Dirac peak and that the correlation between the reference signal $i_2(v)$ and the data in the measured signal is 0. The correlation peak, (the highest, or in case of more than one, the earliest) indicates the timing in the measured signal.

From the acquired samples 20 timings can be derived.

For all calculations, except EVM, the number of samples in $z^0(v)$ is reduced to 7 blocks of samples, comprising 2048 samples (FFT width) and starting with $\Delta\tilde{c}$ in each OFDM symbol including the demodulation reference signal.

For the EVM calculation the output signal under test is reduced to 14 blocks of samples, comprising 2048 samples (FFT width) and starting with $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2 in each OFDM symbol including the demodulation reference signal.

The number of samples, used for FFT is reduced compared to $z^0(v)$. This subset of samples is called z'(v).

The timing of the centre $\Delta\tilde{c}$ with respect to the different CP length in a slot is as follows: (Frame structure 1, normal CP length)

$\Delta\tilde{c}$ is on T_f=72 within the CP of length 144 (in OFDM symbol 1 to 6)

$\Delta\tilde{c}$ is on T_f=88 (=160-72) within the CP of length 160 (in OFDM symbol 0)

E.3.3 Post FFT equalisation

Perform 7 FFTs on z'(v), one for each OFDM symbol in a slot using the timing $\Delta\tilde{c}$, including the demodulation reference symbol. The result is an array of samples, 7 in the time axis t times 2048 in the frequency axis f. The samples represent the DFT coded data symbols (in OFDM-symbol 0,1,2,4,5and 6 in each slot) and demodulation reference symbols (OFDM symbol 3 in each slot) in the allocated RBs and inband emissions in the non allocated RBs within the transmission BW.

Only the allocated resource blocks in the frequency domain are used for equalisation.

The nominal demodulation reference symbols and nominal DFT coded data symbols are used to equalize the measured data symbols. (Location for equalization see Figure E.2.5-1)

NOTE: The nomenclature inside this note is local and not valid outside.

The nominal DFT coded data symbols are created by a demodulation process. The location to gain the demodulated data symbols is "EVM" in Figure E.2.5-1. A demodulation process as follows is recommended:

1. Equalize the measured DFT coded data symbols using the reference symbols for equalisation. Result: Equalized DFT coded data symbols
2. iDFT transform the equalized DFT coded data symbols: Result: Equalized data symbols
3. Decide for the nearest constellation point: Result: Nominal data symbols
4. DFT transform the nominal data symbols: Result: Nominal DFT coded data symbols

At this stage we have an array of Measured DFT coded data-Symbols and reference-Symbols (MS(f,t))

versus an array of Nominal DFT coded data-Symbols and reference Symbols (NS(f,t))

(complex, the arrays comprise 6 DFT coded data symbols and 1 demodulation reference symbol in the time axis and the number of allocated subcarriers in the frequency axis.)

MS(f,t) and NS(f,t) are processed with a least square (LS) estimator, to derive one equalizer coefficient per time slot and per allocated subcarrier. EC(f)

$$EC(f) = \frac{\sum_{t=0}^{6} NS(f,t)^* NS(f,t)}{\sum_{t=0}^{6} NS(f,t)^* MS(f,t)}$$

With * denoting complex conjugation.

EC(f) are used to equalize the DFT-coded data symbols. The measured DFT-coded data and the references symbols are equalized by:

$$Z'(f,t) = MS(f,t) \cdot EC(f)$$

With · denoting multiplication.

Z'(f,t), restricted to the data symbol (excluding t=3) is used to calculate EVM, as described in E.4.1.

EC(f) is used in E.4.4 to calculate EVM equalizer spectral flatness.

NOTE: although an exclusion period for EVM may be applicable in E.7, the post FFT minimisation process is done over 7 symbols (6 DFT-coded data symbols and 1 reference symbol).

The samples of the non allocated resource blocks within the transmission bandwidth configuration in the post FFT domain are called Y(f,t) (f covering the non allocated subcarriers within the transmission bandwidth configuration, t covering the OFDM symbols during 1 slot).

E.4 Derivation of the results

E.4.1 EVM

For EVM create two sets of Z'(f,t)., according to the timing " $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2" using the equalizer coefficients from E.3.3.

Perform the iDFTs on Z'(f,t). The IDFT-decoding preserves the meaning of t but transforms the variable f (representing the allocated sub carriers) into another variable g, covering the same count and representing the demodulated symbols. The samples in the post IDFT domain are called iZ'(g, t). The equivalent ideal samples are called iI(g,t). Those samples of Z'(f,t), carrying the reference symbols (=symbol 3) are not iDFT processed.

The EVM is the difference between the ideal waveform and the measured and equalized waveform for the allocated RB(s)

$$EVM = \sqrt{\frac{\sum_{t \in T} \sum_{g \in G} \left| iZ'(g,t) - iI(g,t) \right|^2}{|G| \cdot |T| \cdot P_0}},$$

where

t covers the count of demodulated symbols with the considered modulation scheme being active within the measurement period, (i.e. symbol 0,1,2,4,5and 6 in each slot, →|T|=6)

g covers the count of demodulated symbols with the considered modulation scheme being active within the allocated bandwidth. (|G|=12* L_{CRBs} (with L_{CRBs} : number of allocated resource blocks)).

$iZ'(g,t)$ are the samples of the signal evaluated for the EVM.

$iI(g,t)$ is the ideal signal reconstructed by the measurement equipment, and

P_0 is the average power of the ideal signal. For normalized modulation symbols P_0 is equal to 1.

From the acquired samples 40 EVM value can be derived, 20 values for the timing $\Delta\tilde{c}$ –W/2 and 20 values for the timing $\Delta\tilde{c}$ +W/2

E.4.2 Averaged EVM

EVM is averaged over all basic EVM measurements.

The averaging comprises n UL slots (for frame structure 2: excluding special fields(UpPTS))

$$\overline{EVM} = \sqrt{\frac{1}{n}\sum_{t=1}^{n} EVM_t^2}$$

where n is

n = 20 for PUCCH, PUSCH, PSDCH, PSCCH, and PSSCH,

n = 48 for PBSCH.

The averaging is done separately for timing $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2 leading to $\overline{\mathrm{EVM}}_{\mathrm{l}}$ and $\overline{\mathrm{EVM}}_{\mathrm{h}}$

$EVM_{\text{final}} = \max(\overline{\mathrm{EVM}}_{l}, \overline{\mathrm{EVM}}_{h})$ is compared against the test requirements.

E.4.3 In-band emissions measurement

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks.

Explanatory Note:

The inband emission measurement is only meaningful with allocated RBs next to non allocated RB. The allocated RBs are necessary but not under test. The non allocated RBs are under test. The RB allocation for this test is as follows: The allocated RBs are at one end of the channel BW, leaving the other end unallocated. The number of allocated RBs is smaller than half of the number of RBs, available in the channel BW. This means that the vicinity of the carrier in the centre is unallocated.

There are 3 types of inband emissions:

1. General
2. IQ image
3. Carrier leakage

Carrier leakage are inband emissions next to the carrier.

IQ image are inband emissions symmetrically (with respect to the carrier) on the other side of the allocated RBs.

General are applied to all unallocated RBs.

For each evaluated RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply.

In specific the following combinations:

- Power (General)
- Power (General + Carrier leakage)
- Power (General + IQ Image)

  1 and 2 is expressed in terms of power in one non allocated RB under test, normalized to the average power of an allocated RB (unit dB).

  3 is expressed in terms of power in one non allocated RB, normalized to the power of all allocated RBs. (unit dBc).

This is the reason for two formulas *Emissions* $_{relative}$.

Create one set of Y(t,f) per slot according to the timing " $\Delta\tilde{c}$ "

For the non-allocated RBs below the in-band emissions are calculated as follows

$$Emissions_{absolute}(\Delta_{RB}) = \begin{cases} \frac{1}{|T_s|}\sum_{t\in T_s} \sum_{\max(f_{\min},(c_l+12\cdot\Delta_{RB}*\Delta f))}^{c_l+(12\cdot\Delta_{RB}+11)*\Delta f} |Y(t,f)|^2, \Delta_{RB} < 0 \\ \frac{1}{|T_s|}\sum_{t\in T_s} \sum_{c_h+(12\cdot\Delta_{RB}-11)*\Delta f}^{\min(f_{\max},(c_h+12\cdot\Delta_{RB}*\Delta f))} |Y(t,f)|^2, \Delta_{RB} > 0 \end{cases},$$

where

the upper formula represents the in band emissions below the allocated frequency block and the lower one the in band emissions above the allocated frequency block.

T_s is a set of $|T_s|$ SC-FDMA symbols with the considered modulation scheme being active within the measurement period,

Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB}=1$ for the first upper or $\Delta_{RB}=-1$ for the first lower adjacent RB),

$f_{\min}$ and $f_{\max}$ are the lower and upper edge of the UL transmission BW configuration,

c_l and c_h are the lower and upper edge of the allocated BW,

Δf is 15kHz,and

$Y(t,f)$ is the frequency domain signal evaluated for in-band emissions as defined in the subsection E.3.3

The allocated RB power per RB and the total allocated RB power are given by:

$$P_{RB} = \frac{1}{|T_s|\cdot L_{CRBs}}\sum_{t\in T_s} \sum_{c_l}^{c_l+(12\cdot L_{CRBs}-1)*\Delta f} |\mathrm{MS}(t,f)|^2 \ [\mathrm{dBm/180\,kHz}]$$

$$P_{All-RBs} = \frac{1}{|T_s|}\sum_{t\in T_s} \sum_{c_l}^{c_l+(12\cdot L_{CRBs}-1)*\Delta f} |\mathrm{MS}(t,f)|^2 \ [\mathrm{dBm}]$$

The relative in-band emissions, applicable for General and IQ image, are given by:

$$Emissions_{relative}(\Delta_{RB}) = 10\cdot\log_{10}\left(\frac{Emissions_{absolute}(\Delta_{RB})}{\frac{1}{|T_s|\cdot L_{CRBs}}\sum_{t\in T_s}\sum_{c_l}^{c_l+(12\cdot L_{CRBs}-1)*\Delta f}|\mathrm{MS}(t,f)|^2}\right)[\mathrm{dB}]$$

$$= Emissions_{absolute}(\Delta_{RB})[\mathrm{dBm/180\,kHz}] - P_{RB}\ [\mathrm{dBm/180\,kHz}]$$

where

L_{CRBs} is the number of allocated resource blocks,

and

$\mathrm{MS}(t, f)$ is the frequency domain samples for the allocated bandwidth, as defined in the subsection E.3.3.

The relative in-band emissions, applicable for carrier leakage, is given by:

$$Emissions_{relative} = 10 \cdot \log_{10}\left(\frac{Emissions_{absolute}(RBnextDC)}{\frac{1}{|T_s|}\sum_{t \in T_s}\sum_{c_1}^{c_1+(12 \cdot L_{CRBs}-1)*\Delta f}|\mathrm{MS}(t, f)|^2}\right)[\mathrm{dBc}]$$

$$= Emissions_{absolute}(RBnextDC)[\mathrm{dBm/180\,kHz}] - P_{All-RBs}[\mathrm{dBm}]$$

where RBnextDC means: Resource Block next to the carrier.

This is one RB, namely the central one in case of an odd number of RBs in the channel BW.

This is one pair of RBs, namely the immediately adjacent RBs to the carrier in case of an even number of RBs in the channel BW.

Although an exclusion period may be applicable in the time domain, when evaluating EVM (clause E.7), the inband emissions measurement interval is defined over one complete slot in the time domain.

From the acquired samples 20 functions for general in band emissions and IQ image inband emissions can be derived. 20 values or 20 pairs of carrier leakage inband emissions can be derived. They are compared against different limits.

E.4.4 EVM equalizer spectrum flatness

For EVM equalizer spectrum flatness use EC(f) as defined in E.3.3. Note, EC(f) represents equalizer coefficient $f \in F$, f is the allocated subcarriers within the transmission bandwidth ((|F|=12* L_{CRBs})

From the acquired samples 20 functions EC(f) can be derived.

EC(f) is broken down to 2 functions:

$$\mathrm{EC}_1(\mathrm{f}), f \in Range\ \ 1$$

$$\mathrm{EC}_2(\mathrm{f}), f \in Range\ \ 2$$

Where Range 1 and Range 2 are as defined in Table 6.5.2.4.5-1 for normal condition and Table 6.5.2.4.5-2 for extreme condition

The following peak to peak ripple is calculated:

$\mathrm{RP}_1 = 20 * \log(\max(|\mathrm{EC}_1(\mathrm{f})|) / \min(|\mathrm{EC}_1(\mathrm{f})|))$,which denote the maximum ripple in Range 1

$\mathrm{RP}_2 = 20 * \log(\max(|\mathrm{EC}_2(\mathrm{f})|) / \min(|\mathrm{EC}_2(\mathrm{f})|))$,which denote the maximum ripple in Range 2

$\mathrm{RP}_{12} = 20 * \log(\max(|\mathrm{EC}_1(\mathrm{f})|) / \min(|\mathrm{EC}_2(\mathrm{f})|))$,which denote the maximum ripple between the upper side of Range 1 and lower side of Range 2

$\mathrm{RP}_{21} = 20 * \log(\max(|\mathrm{EC}_2(\mathrm{f})|) / \min(|\mathrm{EC}_1(\mathrm{f})|))$,which denote the maximum ripple between the upper side of Range 2 and lower side of Range 1

E.4.5 Frequency error and Carrier leakage

See E.3.1.

E.4.6 EVM of Demodulation reference symbols (EVM$_{DMRS}$)

For the purpose of EVM $_{DMRS}$, the steps E.2.2 to E.4.2 are repeated 6 times, constituting 6 EVM $_{DMRS}$ sub-periods. The only purpose of the repetition is to cover the longer gross measurement period of EVM $_{DMRS}$ (120 time slots) and to derive the FFT window timing per sub-period.

The bigger of the EVM results in one 20 TS period corresponding to the timing $\Delta\tilde{c}$ –W/2 or $\Delta\tilde{c}$ +W/2 is compared against the limit. (Clause E.4.2) This timing is re-used for EVM $_{DMRS}$ in the equivalent EVM $_{DMRS}$ sub-period.

For EVM the demodulation reference symbols are excluded, while the data symbols are used. For EVM$_{DMRS}$ the data symbols are excluded, while the demodulation references symbols are used. This is illustrated in figure E.4.6-1

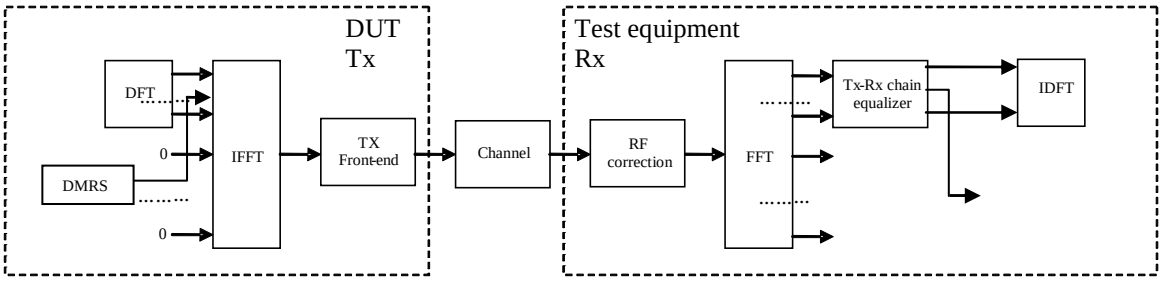


Figure E.4.6-1: EVM$_{DMRS}$ measurement points

Re-use the following formula from E.3.3:

$$Z'(f,t) = MS(f,t) \cdot EC(f)$$

To calculate EVM$_{DMRS}$, the data symbol (t=0,1,2,4,5,6) in Z'(f,t) are excluded and only the reference symbol (t=3) is used.

The EVM $_{DMRS}$ is the difference between the ideal waveform and the measured and equalized waveform for the allocated RB(s)

$$EVM_{DMRS} = \sqrt{\frac{\sum_{t \in T} \sum_{f \in F} \left| Z'(f,t) - I(f,t) \right|^2}{|T| \cdot P_0 \cdot |F|}},$$

where

t covers the count of demodulation reference symbols (i.e. only symbol 3 in each slot, so count =1)

f covers the count of demodulation reference symbols within the allocated bandwidth. (|F|=12* L_{CRBs} (with L_{CRBs} : number of allocated resource blocks)).

$Z'(f,t)$ are the samples of the signal evaluated for the EVM $_{DMRS}$

$I(f,t)$ is the ideal signal reconstructed by the measurement equipment, and

P_0 is the average power of the ideal signal. For normalized modulation symbols P_0 is equal to 1.

20 such results are generated per measurement sub-period.

E.4.6.1 1st average for EVM DMRS

EVM DMRS is averaged over all basic EVM DMRS measurements in one sub-period

The averaging comprises 20 UL slots (for frame structure 2: excluding special fields(UpPTS))

$$1stEVM_{DMRS} = \sqrt{\frac{1}{20}\sum_{i=1}^{20} EVM_{DMRS_i}^2}$$

The timing is taken from the EVM for the data. 6 of those results are achieved from the samples. In general the timing is not the same for each result.

E.4.6.2 Final average for EVM DMRS

$$finalEVM_{DMRS} = \sqrt{\frac{1}{6}\sum_{i=1}^{6} 1stEVM_{DMRS_i}^2}$$

E.5 EVM and inband emissions for PUCCH

For the purpose of worst case testing, the PUCCH shall be located on the edges of the Transmission Bandwidth Configuration (6,15,25,50,75,100 RBs).

The EVM for PUCCH (EVM_{PUCCH}) is averaged over 20 slots. At least 20 TSs shall be transmitted by the UE without power change. SRS multiplexing shall be avoided during this period. The following transition periods are applicable: One OFDM symbol on each side of the slot border (instant of band edge alternation).

The description below is generic in the sense that all 6 PUCCH formats are covered. Although the number of OFDM symbols in one slot is 6 or 7 (depending on the cyclic prefix length), the text below uses 7 without excluding 6.

E.5.1 Basic principle

The basis principle is the same as described in E.2.1

E.5.2 Output signal of the TX under test

The output signal of the TX under test is processed same as described in E.2.2

E.5.3 Reference signal

The reference signal is defined same as in E.2.3. Same as in E.2.3, $i_1(v)$ is the ideal reference for EVM_{PUCCH} and $i_2(v)$ is used to estimate the FFT window timing.

Note PUSCH is off during the PUCCH measurement period.

E.5.4 Measurement results

The measurement results are:

- EVM_{PUCCH}
- Inband emissions with the sub-results: General in-band emission, IQ image (according to: 36.101. Annex F.4, Clause starting with: “At this stage the ….”)

E.5.5 Measurement points

The measurement points are illustrated in the figure below:

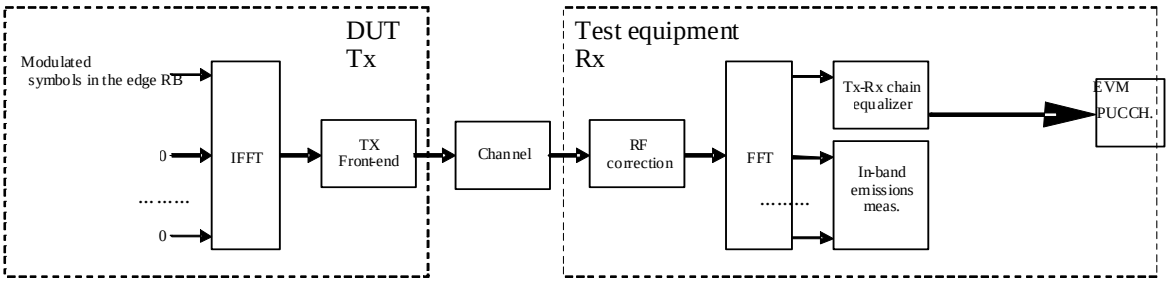


Figure E.5.5-1

E.5.6 Pre FFT minimization process

The pre FFT minimisation process is the same as describes in clause E.3.1.

NOTE: although an exclusion period for EVM_{PUCCH} is applicable in E.5.9.1, the pre FFT minimisation process is done over the complete slot.

RF error, and carrier leakage are necessary for best fit of the measured signal towards the ideal signal in the pre FFT domain. However they are not used to compare them against the limits.

E.5.7 Timing of the FFT window

Timing of the FFT window is estimated with the same method as described in E.3.2.

E.5.8 Post FFT equalisation

The post FFT equalisation is described separately without reference to E.3.3:

Perform 7 FFTs on z'(v), one for each OFDM symbol in a slot using the timing $\Delta\tilde{c}$, including the demodulation reference symbol. The result is an array of samples, 7 in the time axis t times 2048 in the frequency axis f. The samples represent the OFDM symbols (data and reference symbols) in the allocated RBs and inband emissions in the non allocated RBs within the transmission BW.

Only the allocated resource blocks in the frequency domain are used for equalisation.

The nominal reference symbols and **nominal** OFDM data symbols are used to equalize the measured data symbols.

Note: (The nomenclature inside this note is local and not valid outside)

The nominal OFDM data symbols are created by a demodulation process. A demodulation process as follows is recommended:

1. Equalize the measured OFDM data symbols using the reference symbols for equalisation. Result: Equalized OFDM data symbols

2. Decide for the nearest constellation point, however not independent for each subcarrier in the RB. 12 constellation points are decided dependent, using the applicable CAZAC sequence. Result: Nominal OFDM data symbols

At this stage we have an array of Measured data-Symbols and reference-Symbols (MS(f,t))

versus an array of Nominal data-Symbols and reference Symbols (NS(f,t))

The arrays comprise in sum 7 data and reference symbols, depending on the PUCCH format, in the time axis and the number of allocated sub-carriers in the frequency axis.

MS(f,t) and NS(f,t) are processed with a least square (LS) estimator, to derive one equalizer coefficient per time slot and per allocated subcarrier. EC(f)

$$EC(f) = \frac{\sum_{t=0}^{6} NS(f,t)^{*} NS(f,t)}{\sum_{t=0}^{6} MS(f,t)^{*} NS(f,t)}$$

With * denoting complex conjugation.

EC(f) are used to equalize the OFDM data together with the demodulation reference symbols by:

$$Z'(f,t) = MS(f,t) \cdot EC(f)$$

With · denoting multiplication.

Z'(f,t) is used to calculate EVM_{PUCCH}, as described in E.5.9 1

NOTE: although an exclusion period for EVM_{PUCCH} is applicable in E.5.9.1, the post FFT minimisation process is done over 7 OFDM symbols.

The samples of the non allocated resource blocks within the transmission bandwidth configuration in the post FFT domain are called Y(f,t) (f covering the non allocated subcarriers within the transmission bandwidth configuration, t covering the OFDM symbols during 1 slot).

E.5.9 Derivation of the results

E.5.9.1 EVM_{PUCCH}

For EVM_{PUCCH} create two sets of Z'(f,t)., according to the timing " $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2" using the equalizer coefficients from E.5.8

The EVM_{PUCCH} is the difference between the ideal waveform and the measured and equalized waveform for the allocated RB(s)

$$EVM_{PUCCH} = \sqrt{\frac{\sum_{t \in T} \sum_{f \in F} \left| Z'(f,t) - I(f,t) \right|^2}{|T| \cdot P_0 \cdot |F|}},$$

where

the OFDM symbols next to slot boarders (instant of band edge alternation) are excluded:

t covers less than the count of demodulated symbols in the slot (|T|= 5)

f covers the count of subcarriers within the allocated bandwidth. (|F|=12)

$Z'(f,t)$ are the samples of the signal evaluated for the EVM_{PUCCH}

$I(f,t)$ is the ideal signal reconstructed by the measurement equipment, and

P_0 is the average power of the ideal signal. For normalized modulation symbols P_0 is equal to 1.

From the acquired samples 40 EVM_{PUCCH} value can be derived, 20 values for the timing $\Delta\tilde{c}$ –W/2 and 20 values for the timing $\Delta\tilde{c}$ +W/2

E.5.9.2 Averaged EVM_{PUCCH}

EVM_{PUCCH} is averaged over all basic EVM_{PUCCH} measurements

The averaging comprises 20 UL slots (for frame structure 2: excluding special fields(UpPTS))

$$\overline{EVM}_{PUCCH} = \sqrt{\frac{1}{20}\sum_{i=1}^{20} EVM_{PUCCH\ i}^{2}}$$

The averaging is done separately for timing $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2 leading to $\overline{EVM}_{PUCCH,low}$ and $\overline{EVM}_{PUCCH,high}$

$EVM_{PUCCH,final} = \max(\overline{EVM}_{PUCCH,low}, \overline{EVM}_{PUCCH,high})$ is compared against the test requirements.

E.5.9.3 In-band emissions measurement

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks

Create one set of Y(t,f) per slot according to the timing "$\Delta\tilde{c}$"

For the non-allocated RBs the in-band emissions are calculated as follows

$$Emissions_{absolute}(\Delta_{RB}) = \begin{cases} \frac{1}{|T_s|}\sum_{t\in T_s} \sum_{\max(f_{\min},(c_l+12\cdot\Delta_{RB}*\Delta f))}^{c_l+(12\cdot\Delta_{RB}+11)*\Delta f} |Y(t,f)|^2, \Delta_{RB} < 0 \\ \frac{1}{|T_s|}\sum_{t\in T_s} \sum_{c_h+(12\cdot\Delta_{RB}-11)*\Delta f}^{\min(f_{\max},(c_h+12\cdot\Delta_{RB}*\Delta f))} |Y(t,f)|^2, \Delta_{RB} > 0 \end{cases},$$

where

the upper formula represents the inband emissions below the allocated frequency block and the lower one the inband emissions above the allocated frequency block.

T_s is a set of $|T_s|$ OFDM symbols in the measurement period,

Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ for the first upper or $\Delta_{RB} = -1$ for the first lower adjacent RB),

$f_{\min}$ and $f_{\max}$ are the lower and upper edge of the UL system BW,

c_l and c_h are the lower and upper edge of the allocated BW,

Δf is 15kHz,and

$Y(t,f)$ is the frequency domain signal evaluated for in-band emissions as defined in the subsection E.5.8

The relative in-band emissions are, given by

$$Emissions_{relative}(\Delta_{RB}) = 10*\log_{10}\frac{Emissions_{absolute}(\Delta_{RB})}{\frac{1}{|T_s|\cdot L_{CRBs}}\sum_{t\in T_s}\sum_{c_l}^{c_l+(12\cdot L_{CRBs}-1)*\Delta f}|MS(t,f)|^2}[dB]$$

where

L_{CRBs} is the number of allocated RBs, which is always 1 in case of PUCCH

and $\mathrm{MS}(t, f)$ is the frequency domain samples for the allocated bandwidth, as defined in the subsection E.5.8

Although an exclusion period for EVM is applicable in E.5.9.1, the inband emissions measurement interval is defined over one complete slot in the time domain.

From the acquired samples 20 functions for inband emissions can be derived.

Since the PUCCH allocation is always on the upper or lower band-edge, the opposite of the allocated one represents the IQ image, and the remaining inner RBs represent the general inband emissions. They are compared against different limits.

E.6 EVM for PRACH

The description below is generic in the sense that all 5 PRACH formats are covered. The numbers, used in the text below are taken from PRACH format#0 without excluding the other formats. The sampling rate for the PUSCH, 30.72 Msps in the time domain, is re-used for the PRACH. The carrier spacing of the PUSCH is 12 (format 0 to 3) and 2 (format 4) times of the PRACH. This results in an oversampling factor of 12 (format 0 to 3) and 2 (format 4), when acquiring the time samples for the PRACH. The pre-FFT algorithms (clauses E.6.6 and E.6.7) use all time samples, although oversampled. For the FFT the time samples are decimated by the factor of 12 (format 0 to 3) and 2 (format 4), resulting in the same FFT size as for the other transmit modulation tests (2048). Decimation requires a decision, which samples are used and which ones are rejected. The algorithm in E.6.6, Timing of the FFT window, can also be used to decide about the used samples.

E.6.1 Basic principle

The basis principle is the same as described in E.2.1

E.6.2 Output signal of the TX under test

The output signal of the TX under test is processed same as described in E.2.2

The measurement period is different:

- 2 PRACH preambles are recorded for format 0and 1,
- 1 PRACH preamble is recorded for format 2 and 3, each containing 1 CP and 2 preamble sequences
- 10 RPRACH preambles are recorded for format 4.

E.6.3 Reference signal

The test description in 6.5.2.1.4.1A is based on non contention based access:

- PRACH configuration index (responsible for Preamble format, System frame number and subframe number)
- Preamble ID
- Preamble power

signalled to the UE, defines the reference signal unambiguously, such that no demodulation process is necessary to gain the reference signal.

The reference signal i(v) is constructed by the measuring equipment according to the relevant TX specifications, using the following parameters: the applicable Zadoff Chu sequence, nominal carrier frequency, nominal amplitude and phase for each subcarrier, nominal timing, no carrier leakage. It is represented as a sequence of samples at a sampling rate of 30.72 Msps in the time domain.

E.6.4 Measurement results

The measurement result is:

- EVMPRACH

E.6.5 Measurement points

The measurement points are illustrated in the figure below:

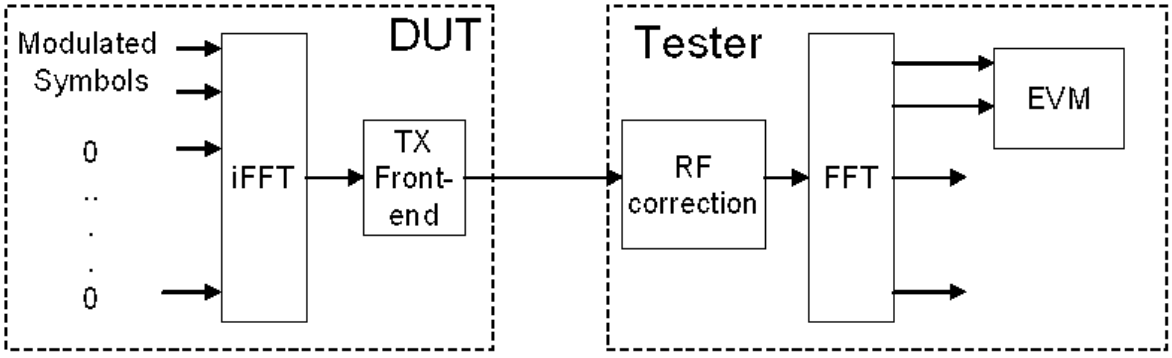


Figure E.6.5-1

E.6.6 Pre FFT minimization process

The pre-FFT minimization process is applied to each PRACH preamble separately. The time period for the pre- FFT minimisation process includes the complete CP and Zadoff-Chu sequence (in other words, the power transition period is per definition outside of this time period) Sample timing, Carrier frequency and carrier leakage in z(ν) are jointly varied in order to minimise the difference between z(ν) and i(ν). Best fit (minimum difference) is achieved when the RMS difference value between z(ν) and i(ν) is an absolute minimum.

After this process the samples z(ν) are called $z^0(\nu)$.

RF error, and carrier leakage are necessary for best fit of the measured signal towards the ideal signal in the pre FFT domain. However they are not used to compare them against the limits.

E.6.7 Timing of the FFT window

The FFT window length is 24576 samples for preamble format 0, however in the measurement period is at least 27744 samples are taken. The position in time for FFT must be determined.

In an ideal signal, the FFT may start at any instant within the cyclic prefix without causing an error. The TX filter, however, reduces the window. The EVM requirements shall be met within a window W<CP.

The reference instant for the FFT start is the centre of the reduced window, called $\Delta\tilde{c}$,

EVM is measured at the following two instants: $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2.

The timing of the measured signal $z^0(\nu)$ with respect to the ideal signal i(ν) is determined in the pre FFT domain as follows:

Correlation between $z^0(\nu)$ and i(ν) will result in a correlation peak. The meaning of the correlation peak is approx. the “impulse response” of the TX filter. The correlation peak, (the highest, or in case of more than one, the earliest) indicates the timing in the measured signal with respect to the ideal signal.

W is different for different preamble formats and shown in TableE.6.7-1.

Table E.6.7-1EVM window length for PRACH

Preamble format	Cyclic prefix length[1] N_{cp}	Nominal FFT size[2]	EVM window length *W* in FFT samples	Ratio of *W* to CP[3]
0	3168	24576	3072	96.7%
1	21024	24576	20928	99.5%
2	6240	49152	6144	98.5%
3	21024	49152	20928	99.5%
4	448	4096	432	96.4%
Note 1: The unit is number of samples, sampling rate of 30.72MHz is assumed Note 2: Decimation of time samples by 12(format 0 to 3) and factor 2 (format 4) is assumed, leading to a uniform FFT size of 2048 for all formats. Note 3: These percentages are informative				

The number of samples, used for FFT is reduced compared to $z^0(\nu)$. This subset of samples is called z''(ν).

The sample frequency 30.72 MHz is oversampled with respect to the PRACH-subcarrier spacing of 1.25kHz (format 0 to 3) and 7.5kHz (format 4). EVM is based on 2048 samples per PRACH preamble and requires decimation of the time samples by the factor of 12 (format 0 to 3) and factor 2 (format 4). The final number of samples per PRACH preamble, used for FFT is reduced compared to $z^{''}(\nu)$ by the factor of 12 (format 0 to 3) and factor 2 (format 4). This subset of samples is called z'(ν).

E.6.8 Post FFT equalisation

Equalisation is not applicable for the PRACH.

E.6.9 Derivation of the results

E.6.9.1 EVM_{PRACH}

Perform FFT on z'(ν) and i(ν) using the FFT timing $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2.

For format 2 and 3 the first and the repeated preamble sequence are FFT-converted separately. using the standard FFT length 0f 2048

The EVM_{PRACH} is the difference between the ideal waveform and the measured and equalized waveform for the allocated RB(s).

$$EVM_{PRACH} = \sqrt{\frac{\sum_{f \in F} \left| Z'(f) - I(f) \right|^2}{N_{ZC} \cdot P_0}},$$

where

f covers the count of demodulated symbols within the allocated bandwidth.

$Z'(f)$ are the samples of the signal evaluated for the EVM_{PRACH}

$I(f)$ is the ideal signal reconstructed by the measurement equipment, and

P_0 is the average power of the ideal signal. For normalized modulation symbols P_0 is equal to 1.

N_{ZC} is random access preamble sequence length.

From the acquired samples 4 EVM_{PRACH} value can be derived, 2 values for the timing $\Delta\tilde{c}$ –W/2 and 2 values for the timing $\Delta\tilde{c}$ +W/2 (4 and 2 applies for format 0,1,2,3. 20 and 10 applies for format 4).

E.6.9.2 Averaged EVM_{PRACH}

The PRACH EVM, EVM_{PRACH} , is averaged over two preamble sequence measurements for preamble formats 0, 1, 2, 3, and it is averaged over 10 preamble sequence measurements for preamble format 4.

$$\overline{EVM}_{PRACH} = \sqrt{\frac{1}{2}\sum_{i=1}^{2} EVM_{PRACH\,i}^{2}} \quad \text{for preamble formats 0,1,2,3}$$

$$\overline{EVM}_{PRACH} = \sqrt{\frac{1}{10}\sum_{i=1}^{10} EVM_{PRACH\,i}^{2}} \quad \text{for preamble format 4}$$

The averaging is done separately for timing $\Delta\tilde{c}$ –W/2 and $\Delta\tilde{c}$ +W/2 leading to $\overline{EVM}_{PRACH,low}$ and $\overline{EVM}_{PRACH,high}$

$EVM_{PRACH,final} = \max(\overline{EVM}_{PRACH,low}, \overline{EVM}_{PRACH,high})$ is compared against the test requirements.

E.7 EVM with exclusion period

E.7.1 General

EVM with exclusion periods is defined in clause 6.5.2.1.1, third paragraph. For PUCCH entire symbols are excluded, if applicable. For PUSCH fractions of symbols are excluded, if applicable. The exclusion period for PUSCH is defined at the air interface, leading to exclusion periods in the EVM domain. The necessary mapping is described in this clause.

E.7.2 The model

The exclusion period in the time domain has corresponding periods in the quasi time domains (Table E.7.2). The mapping of corresponding periods needs only scaling and cyclic shifting.

The algorithm below uses a sampling frequency 30.72 MHz and FFT-width 2048 for all bandwidths. Bandwidth-adapted sampling frequencies and FFT-widths are not excluded. Only normal cyclic prefix is mentioned in the model without excluding the extended CP.

Table. E.7.2: Model for mapping exclusion period in the time domain

	TX				Channel	EVM meter				
Operation		DFT		iFFT			FFT		iDFT	
Meaning	Modulation symbols		Precoded symbols		BB samples	BB samples		Precoded symbols		demodula-ted symbols
No of samples	allocated Sub Carriers		allocated subcarriers + unallocated subcarriers = 2048		allocated subcarriers + unallocated subcarriers + CP samples	2048, position depending on EVM window		allocated subcarriers		allocated subcarriers
Domain	Quasi time domain		Frequency domain		Time domain	Time domain		Frequency domain		Quasi time domain
text below		1	2	3	4	7	7	8	9	11

1. A sequence of complex valued modulation symbols are Transform-Precoded (DFT) according to 36.211 clause 5.3.3. The size of this transformation is the number of allocated subcarriers.

2. The outcome of (1) is supplemented by 0 for the non allocated subcarriers. In sum 2048 subcarriers.

3. The baseband time signal (without CP) is then calculated by a iFFT according to 36.211 clause 5.6

4. (3) is then supplemented by a cyclic prefix (144 or 160 samples) leading to 2192 or 2208 samples. (144 CP samples = 144 tail samples from the data field)

5. (4) is transmitted over the channel and sampled by the EVM meter.

6. In case of an exclusion period those samples of (5) are marked, where the exclusion applies. The exclusion period is an unbroken leading or lagging exclusion period next to a subframe or timeslot boarder.

7.Depending on early or late EVM-window a subset of 2048 samples (out of 2192 or 2208 samples) are the input for the subsequent FFT. These samples may or may not comprise marked samples. The result are 2048 frequency domain samples.

8. The non allocated subcarriers are removed from the 2048 samples.

9. (8) is then iDFT transformed. The result are demodulated complex valued symbols in the same domain as (1)

10. Step 7, 8 and 9 are modified by an equalizer algorithm.
For the purpose of this clause, the equalizer partly re-does step 4 (CP insertion):
The equalizer algorithm cuts that subset of CP samples, covered by the FFT, from the head and copies it to the tail of the data field.

11. The result of (10) is: complex valued symbols in the same sequence as in (1) They are compared with (1) symbol by symbol for EVM. Due to exclusion in the time domain (6) we have marked corresponding symbols, which are disregarded for EVM.

12. From step 1 to 4 the number of samples is expanded. A subset of expanded samples is marked as excluded. Form step 6 to step 9 the number of samples is compressed, leading to a non integer number of samples, marked as excluded. The number of marked samples in this domain is rounded up at the expense of the EVM samples

E.7.3 Illustration

The figures below illustrate the cyclic shift due to the equalizer and scaling.

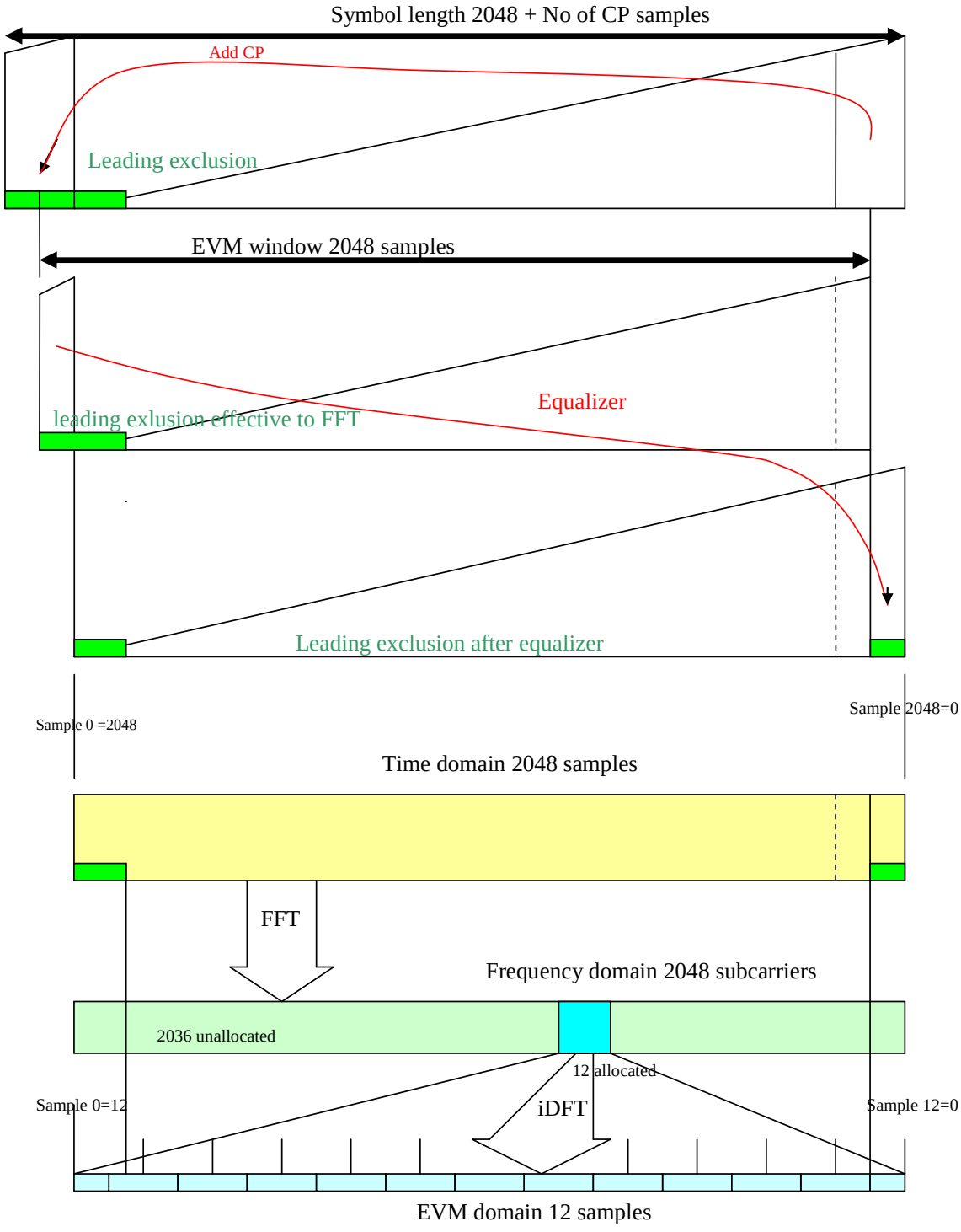


Figure E.7.3-1: leading exclusion period (when number of RBs=1)

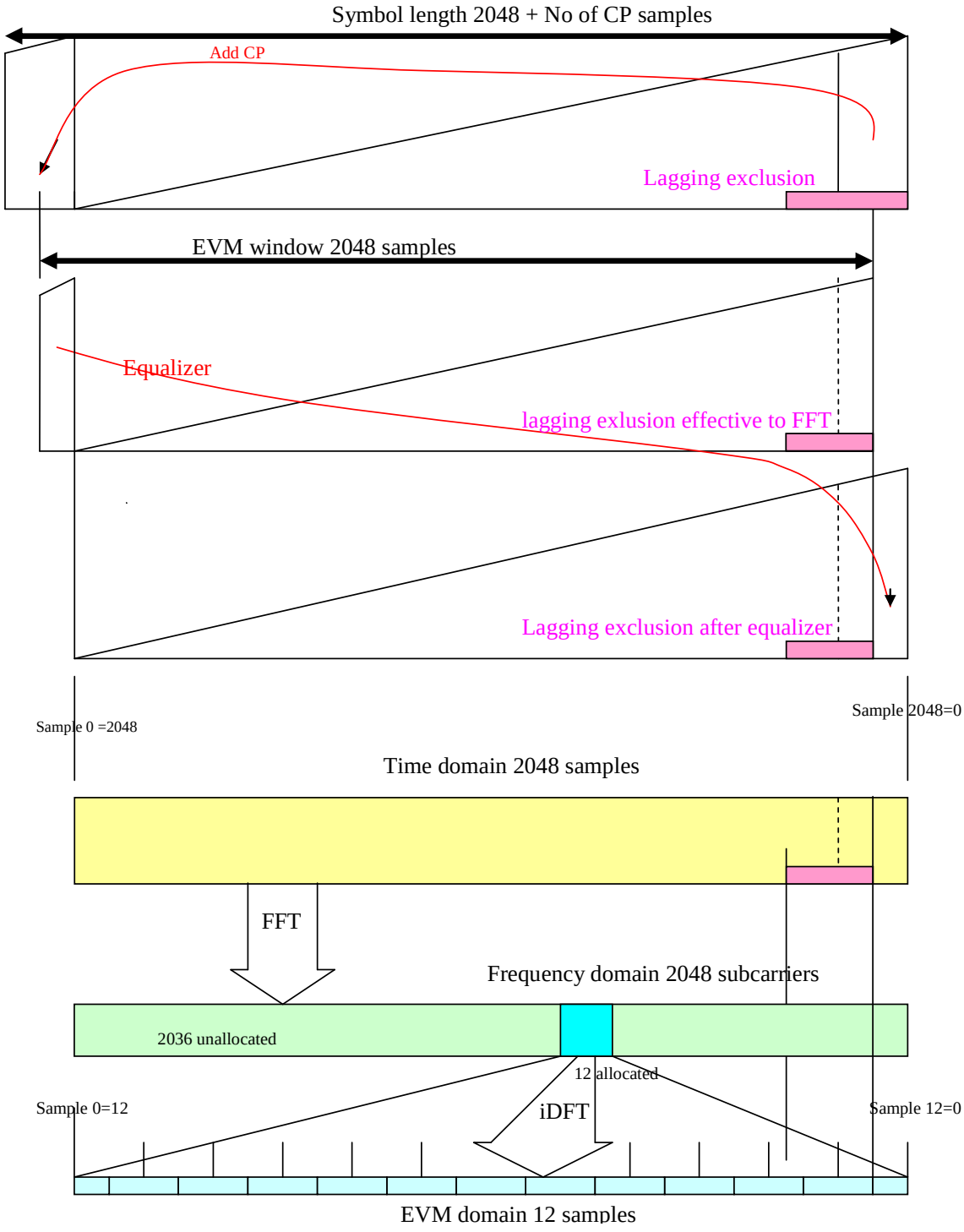


Figure E.7.3-2: lagging exclusion period (when number of RBs=1)

Legend to figure E.7.3-1

The figure contains 6 related subfigures.

The upper 3 triangles illustrate the cyclic shift due to EVM windowing and equalizer.

The lower 3 boxes illustrate the mapping from the time domain, where the exclusion period is defined, into the EVM domain, where EVM samples are actually excluded.

Cyclic shift

The leading exclusion period covers the entire CP and a part of the data field. The EVM window masks a part of the exclusion period. For the purpose of this annex, the equalizer re-arranges the time domain samples into the original order, splitting the exclusion period into two parts.

Mapping

The split exclusion period (after cyclic shift) is copied from above. The frequency domain is derived by Fast Fourier Transformation from the time domain and represent the frequency domain with 2048 subcarriers, 12 of them are allocated, and the rest is unallocated. The 12 allocated subcarriers are iDFT transformed into the EVM domain comprising 12 samples. Note that all 3 domains are displayed cyclically: the leftmost sample is identical to the rightmost sample.

The two transformations map the time domain into the EVM domain, carrying out a compression of samples 12/2048. In spite of the compression, there is a correspondence of ranges in the time domain and in the EVM domain. One sample in the EVM domain comprises a range, which is influenced from (and only from) the equivalent samples in the time domain vertically above. Note that this correspondence holds irrespective of the position of the 12 allocated samples in the frequency domain.

Example leading exclusion (figure E.7.3-1)

Sample No in the EVM domain	Influence(exclusion) from the time domain	EVM exclusion
12=0	full	excluded
1	partly	excluded
2 to 11	none	counted

Example lagging exclusion example (figure E.7.3-2)

Sample No in the EVM domain	Influence(exclusion) from the time domain	EVM exclusion
12=0	none	counted
1 to 9	none	counted
10	partly	excluded
11	full	excluded

E.7.4 Formula

The exclusion period is defined in µs at the air interface.

Convert the µs's into No of samples in the time domain.

No of exclusion samples (before EVM windowing and equalizer) is calculated from:

No of exclusion sample = ceil (30.72 * Exclusion µs)

then, EVM windowing and equalizer is applied by 2048 samples based cyclic shift process.

(the upper 3 triangles illustrate in fig. E.7.3-1 and -2.)

Determine the indices **k**, to be excluded in the time domain, according to fig. E.7.3-1 and -2

(after application of EVM windowing and equaliser, original sample order,

k = subset from the set (0 to 2047))

The indices **l** in the EVM domain, to be excluded, are:

l = [round (**k***12* L_{CRBs} / 2048)]mod(12*L_{CRBs})

with L_{CRBs} number of allocated resource blocks

E.8 EVM for category NB1

E.8.1 Averaged EVM

The general EVM for category NB1 is calculated using the procedure defined in Annex E.4 with the exception that the general EVM is averaged over basic EVM measurements for 240/L_{Ctone} slots in the time domain, where L_{Ctone} = {1, 3, 6, 12} is the number of subcarriers for the transmission.

E.8.2 EVM of Demodulation reference symbols (EVM_{DMRS})

The calculation of the EVM for the demodulation reference symbols for category NB1 follows the procedure defined for DMRS in Annex E.4 with the exception that the basic EVM_{DMRS} measurements are first averaged over 240/ L_{Ctone} slots to obtain the intermediate average EVM.

E.8.3 EVM for NPRACH

The calculation of the NPRACH EVM for both formats follows the procedure defined for PRACH in Annex E.6 with the exception that EVM_{PRACH} is averaged over 64 preamble measurements.

E.8.4 Window length for category NB1

The EVM window length, W, for NPUSCH is set to 1 (in FFT samples where the nominal FFT size is 128 for 15 kHz sub-carrier spacing and 512 for 3.75 kHz sub-carrier spacing).
The EVM window length, W, for NPRACH is set to 110 for preamble format 0 and to 494 for preamble format 1 (both in FFT samples where the nominal FFT size is 512).

Annex F (normative): Measurement uncertainties and Test Tolerances

F.1 Acceptable uncertainty of Test System (normative)

The maximum acceptable uncertainty of the Test System is specified below for each test, where appropriate. The Test System shall enable the stimulus signals in the test case to be adjusted to within the specified range, and the equipment under test to be measured with an uncertainty not exceeding the specified values. All ranges and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95 % is the measurement uncertainty tolerance interval for a specific measurement that contains 95 % of the performance of a population of test equipment.

For RF tests it should be noted that the uncertainties in clause F.1 apply to the Test System operating into a nominal 50 ohm load and do not include system effects due to mismatch between the DUT and the Test System.

The downlink signal uncertainties apply at each receiver antenna connector.

F.1.1 Measurement of test environments

The measurement accuracy of the UE test environments defined in TS 36.508 subclause 4.1, Test environments shall be.

- Pressure ±5 kPa.
- Temperature ±2 degrees.
- Relative Humidity ±5 %.
- DC Voltage ±1,0 %.
- AC Voltage ±1,5 %.
- Vibration 10 %.
- Vibration frequency 0,1 Hz.

The above values shall apply unless the test environment is otherwise controlled and the specification for the control of the test environment specifies the uncertainty for the parameter.

F.1.2 Measurement of transmitter

Table F.1.2-1: Maximum Test System Uncertainty for transmitter tests

Subclause	Maximum Test System Uncertainty	Derivation of Test System Uncertainty
6.2.2 UE Maximum Output Power	±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz ±1.5 dB, 4.2GHz < f ≤ 6GHz	
6.2.2_1 Maximum Output Power for HPUE	±0.7 dB, f ≤ 3.0GHz	
6.2.2A.1 UE Maximum Output Power for CA (intra-band contiguous DL CA and UL CA)	Same as 6.2.2 for sum of powers of all CCs	
6.2.2A.2 UE Maximum Output Power for CA (inter-band DL CA and UL CA)	Same as 6.2.2 for sum of powers of all CCs	
6.2.2A.4 UE Maximum Output Power for CA (3UL CA)	Same as 6.2.2 for sum of powers of all CCs	
6.2.2B UE Maximum Output Power for UL-MIMO	Same as 6.2.2 for each antenna	
6.2.2E UE Maximum Output Power for UE category 0	Same as 6.2.2	
6.2.2EA UE Maximum Output Power for UE category M1	Same as 6.2.2	
6.2.2F UE Maximum Output Power for UE category NB1	Same as 6.2.2_1	
6.2.3 Maximum Power Reduction	±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz ±1.5 dB, 4.2GHz < f ≤ 6GHz	
6.2.3_1 Maximum Power Reduction (MPR) for HPUE	±0.7 dB, f ≤ 3.0GHz	
6.2.3A.1 Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA)	Same as 6.2.3 for sum of powers of all CCs	
6.2.3A.1_1 Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.2.3 for sum of powers of all CCs	
6.2.3A.2 Maximum Power Reduction (MPR) for CA (inter-band DL CA and UL CA)	Same as 6.2.3 for sum of powers of all CCs	
6.2.3A.2_1 Maximum Power Reduction (MPR) for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.2.3 for sum of powers of all CCs	
6.2.3A.3 Maximum Power Reduction (MPR) for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.2.3 for sum of powers of all CCs	
6.2.3A.3_1 Maximum Power Reduction (MPR) for CA (intra-band non-contiguous DL CA and UL CA) for UL 64QAM	Same as 6.2.3 for sum of powers of all CCs	
6.2.3B Maximum Power Reduction (MPR) for UL-MIMO	Same as 6.2.3 for each antenna	
6.2.3_2 Maximum Power Reduction (MPR) for Multi-Cluster PUSCH	Same as 6.2.3	

6.2.3E Maximum Power Reduction for UE category 0	Same as 6.2.3	
6.2.3EA Maximum Power Reduction for UE category M1	Same as 6.2.3	
6.2.3_3 Maximum Power Reduction (MPR) for UL 64QAM	Same as 6.2.3	
6.2.3_4 Maximum Power Reduction (MPR) for Multi-Cluster PUSCH with UL 64QAM	Same as 6.2.3	
6.2.4 UE Maximum Output Power with additional requirements	±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	
6.2.4_1 Additional Maximum Power Reduction (A-MPR) for HPUE	±0.7 dB, f ≤ 3.0GHz	
6.2.4_2 Additional Maximum Power Reduction (A-MPR) for UL 64QAM	Same as 6.2.4	
6.2.4_3 Additional Maximum Power Reduction (A-MPR) with PUSCH frequency hopping	Same as 6.2.4	
6.2.4A.1 Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA)	Same as 6.2.4 for sum of powers of all CCs	
6.2.4A.1_1 Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.2.4 for sum of powers of all CCs	
6.2.4A.2 Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA)	Same as 6.2.4 for sum of powers of all CCs	
6.2.4A.2_1 Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.2.4 for sum of powers of all CCs	
6.2.4B Additional Maximum Power Reduction (A-MPR) for UL-MIMO	Same as 6.2.4 for each antenna	
6.2.4E Additional Maximum Power Reduction (A-MPR) for UE category 0	Same as 6.2.4	
6.2.4EA Additional Maximum Power Reduction (A-MPR) for UE category M1	±0.7 dB	
6.2.5 Configured UE transmitted Output Power	±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	
6.2.5_1 Configured UE transmitted Output Power for HPUE	±0.7 dB, f ≤ 3.0GHz	
6.2.5A.1 Configured UE transmitted Output Power for CA (intra-band contiguous DL CA and UL CA)	Same as 6.2.5 for sum of powers of all CCs	
6.2.5A.3 Configured UE transmitted Output Power for CA (inter-band DL CA and UL CA)	Same as 6.2.5 for sum of powers of all CCs	

6.2.5A.4 Configured UE transmitted Output Power for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.2.5 for sum of powers of all CCs	
6.2.5B Configured UE transmitted output power for UL-MIMO	Same as 6.2.5 for each antenna	
6.2.5E Configured Transmitted Power for UE category 0	Same as 6.2.5	
6.2.5EA Configured UE transmitted Power for UE category M1	Same as 6.2.5	
6.2.5F Configured UE transmitted Output Power for UE category NB1	±0.7 dB, f ≤ 3.0GHz	
6.3.2 Minimum Output Power	±1.0 dB, f ≤ 3.0GHz ±1.3 dB, 3.0GHz < f ≤ 4.2GHz	
6.3.2A.1 Minimum Output Power for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.2 for each CC	
6.3.2B Minimum Output Power for UL-MIMO	Same as 6.3.2 for each antenna	
6.3.2E Minimum Output Power for UE category 0	Same as 6.3.2	
6.3.2EA Minimum Output Power for UE category M1	Same as 6.3.2	
6.3.2F Minimum Output Power for UE category NB1	±1.0 dB, f ≤ 3.0GHz	
6.3.2G.1 Minimum output power for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	Same as 6.3.2	
6.3.2G.2 Minimum output power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	Same as 6.3.2	
6.3.2G.3 Minimum output power for V2X Communication / Intra-band contiguous multi-carrier operation	Same as 6.3.2	
6.3.3 Transmission ON/OFF Power	Transmission OFF Power: ±1.5 dB, f ≤ 3.0GHz ±1.8 dB, 3.0GHz < f ≤ 4.2GHz	
6.3.3A.1 UE Transmit OFF power for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.3 for each CC	
6.3.3A.2 UE Transmit OFF power for CA (inter-band DL CA and UL CA)	Same as 6.3.3A.1	
6.3.3A.3 UE Transmit OFF power for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.3 for each CC	
6.3.3B UE Transmit OFF power for UL-MIMO	Same as 6.3.3 for each antenna	
6.3.3D UE Transmit OFF power for ProSe	Same as 6.3.3	
6.3.3E UE Transmit OFF Power for UE category 0	Same as 6.3.3	

6.3.3EA UE Transmit OFF power for UE category M1	Same as 6.3.3	
6.3.4.1 General ON/OFF time mask	Transmission ON/OFF Power: ±1.5 dB, f ≤ 3.0GHz ±1.8 dB, 3.0GHz < f ≤ 4.2GHz	
6.3.4.2 PRACH and SRS time mask	Transmission ON/OFF Power: ±1.5 dB, f ≤ 3.0GHz ±1.8 dB, 3.0GHz < f ≤ 4.2GHz	
6.3.4A.1.2 General ON/OFF time mask for CA (inter-band DL CA and UL CA)	Same as 6.3.4A.1.1	
6.3.4A.1.1 General ON/OFF time mask for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.4.1 for each CC	
6.3.4A.1.3 General ON/OFF time mask for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.4.1 for each CC	
6.3.4B.1 General ON/OFF time mask for UL-MIMO	Same as 6.3.4.1 for each antenna	
6.3.4C.1 General ON/OFF time mask for Dual Connectivity	Same as 6.3.4A.1.1	
6.3.4E.1 General ON/OFF time mask for UE category 0	Same as 6.3.4.1	
6.3.4E.2 PRACH and SRS time mask for UE category 0	Same as 6.3.4.2	
6.3.4EA.1 General ON/OFF time mask for UE category M1	Same as 6.3.4.1	
6.3.4EA.2 PRACH and SRS ON/OFF time mask for UE category M1	Same as 6.3.4.2	
6.3.4F.1 General ON/OFF time mask for category NB1	Transmission ON/OFF Power: ±1.5 dB, f ≤ 3.0GHz	
6.3.4F.2 NPRACH time mask for category NB1	Transmission ON/OFF Power: ±1.5 dB, f ≤ 3.0GHz	
6.3.5.1 Power Control Absolute power tolerance	±1.0 dB, f ≤ 3.0GHz ±1.4 dB, 3.0GHz < f ≤ 4.2GHz	Overall system uncertainty comprises two quantities: 1. Downlink signal level uncertainty 2. Uplink level measurement uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared. Test System uncertainty = [SQRT (DL level uncert ^{2} + UL measurement uncert ^{2})] f ≤ 3.0GHz DL signal level uncert ± 0.7dB UL meas't uncert ± 0.7dB 3.0GHz < f ≤ 4.2GHz DL signal level uncert ± 1.0dB UL meas't uncert ± 1.0dB
6.3.5.2 Power Control Relative power tolerance	±0.7 dB	
6.3.5.3 Aggregate power control tolerance	±0.7 dB	
6.3.5_1.1 Power Control Absolute power tolerance for HPUE	±1.0 dB, f ≤ 3.0GHz	
6.3.5_1.2 Power Control Relative power tolerance for HPUE	±0.7 dB	
6.3.5_1.3 Aggregate power control tolerance for HPUE	±0.7 dB	

6.3.5A.1.1 Power Control Absolute power tolerance for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.5.1 for each CC	
6.3.5A.1.2 Power Control Absolute power tolerance for CA (inter-band DL CA and UL CA)	Same as 6.3.5.1 for each CC	
6.3.5A.1.3 Power Control Absolute power tolerance for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.5.1 for each CC	
6.3.5A.2.1 Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA)	Absolute power ±1dB, f ≤ 4.2GHz Relative power ±0.7 dB Both requirements apply for each CC	Absolute power is used to check when power is near lower and upper limits of the range. Relative power is used to check step sizes.
6.3.5A.3.1 Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.5.3 for each CC	
6.3.5A.3.2 Aggregate power control tolerance for CA (inter-band DL CA and UL CA)	Same as 6.3.5.3 for each CC	

6.3.5A.3.3 Aggregate power control tolerance for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.5.3 for each CC	
6.3.5B.1 Power Control Absolute Power Tolerance for UL- MIMO	Same as 6.3.5.1 for each antenna	
6.3.5B.2 Power Control Relative power tolerance for UL-MIMO	Same as 6.3.5.2 for each antenna	
6.3.5B.3 Aggregate power control tolerance for UL-MIMO	Same as 6.3.5.3 for each antenna	
6.3.5C.2 Power Control Relative power tolerance for Dual Connectivity	Same as 6.3.5A.2.1	
6.3.5C.2_1 Power Control Relative power tolerance for asynchronous Dual Connectivity	Same as 6.3.5A.2.1	
6.3.5E.1 Power Control Absolute power tolerance for UE category 0	Same as 6.3.5.1	
6.3.5E.2 Power Control Relative power tolerance for UE category 0	Same as 6.3.5.2	
6.3.5E.3 Aggregate power control tolerance for UE category 0	Same as 6.3.5.3	
6.3.5EA.1 Power Control Absolute power tolerance for UE category M1	±1.0 dB, f ≤ 3.0GHz	Overall system uncertainty comprises two quantities: 1. Downlink signal level uncertainty 2. Uplink level measurement uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared. Test System uncertainty = [SQRT (DL level uncert ^{2} + UL measurement uncert ^{2})] f ≤ 3.0GHz DL signal level uncert ± 0.7dB UL meas't uncert ± 0.7dB
6.3.5EA.2 Power Control Relative power tolerance for UE category M1	±0.7 dB	
6.3.5EA.3 Aggregate power control tolerance for UE category M1	Same as 6.3.5.3	
6.3.5EA.3_1 Aggregate power control tolerance for UE category M1 (CE Mode B)	Same as 6.3.5.3	

6.3.5F.1 Power Control Absolute power tolerance for category NB1	±1.0 dB, f ≤ 3.0GHz	Overall system uncertainty comprises two quantities: 1. Downlink signal level uncertainty 2. Uplink level measurement uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared. Test System uncertainty = [SQRT (DL level uncert ^{2} + UL measurement uncert ^{2})] f ≤ 3.0GHz DL signal level uncert ± 0.7dB UL meas't uncert ± 0.7dB
6.3.5F.2 Power Control Relative power tolerance for category NB1	±0.7 dB	
6.5.1 Frequency Error	±15 Hz DL Signal level: ±0.7 dB, f ≤ 3.0GHz DL Signal level: ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	
6.5.1A.1 Frequency error for CA (intra-band contiguous DL CA and UL CA)	Same as 6.5.1 for each CC	
6.5.1A.2 Frequency error for CA (inter-band DL CA and UL CA)	Same as 6.5.1	
6.5.1A.3 Frequency error for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.5.1 for each CC	
6.5.1A.4 Frequency error for CA (3UL CA)	Same as 6.5.1 for each CC	
6.5.1B Frequency Error for UL-MIMO	Same as 6.5.1 for each antenna DL signal level same as 6.5.1	
6.5.1D.1 Frequency Error for ProSe Direct Discovery	±15 Hz Sidelink Signal level: ±0.7 dB, f ≤ 3.0GHz	
6.5.1D.2 Frequency Error for ProSe Direct Communication	Same as 6.5.1D.1	
6.5.1E Frequency Error for UE category 0	Same as 6.5.1	
6.5.1EA Frequency Error for UE category M1	Same as 6.5.1	
6.5.1F Frequency Error for category NB1	±15 Hz DL Signal level: ±0.7 dB, f ≤ 3.0GHz	
6.5.2.1 Error Vector Magnitude	PUSCH: ± 2.5% PUCCH: ± 2.5% PRACH: ± 2.5%	
6.5.2.1_1 Error Vector Magnitude (EVM) for UL 64QAM	Same as 6.5.2.1	
6.5.2A.1.1 Error Vector Magnitude (EVM) for CA (intra-band contiguous DL CA and UL CA)	Same as 6.5.2.1	
6.5.2A.1.2 Error Vector Magnitude (EVM) for CA (inter-band DL CA and UL CA)	Same as 6.5.2.1	
6.5.2A.1.2_1 EVM for CA (inter-band DL CA and UL CA) with UL 64QAM	Same as 6.5.2.1	

6.5.2A.1.3 Error Vector Magnitude (EVM) for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.5.2.1	
6.5.2A.1.1_1 EVM for CA (intra-band contiguous DL CA and UL CA) with UL 64QAM	Same as 6.5.2.1	
6.5.2A.1.3_1 Error Vector Magnitude (EVM) for CA (intra-band non-contiguous DL CA and UL CA) for UL 64QAM	Same as 6.5.2.1	
6.5.2A.1.4 Error Vector Magnitude (EVM) for CA (3UL CA)	Same as 6.5.2.1	
6.5.2B.1 Error Vector Magnitude (EVM) for UL-MIMO	Same as 6.5.2.1 for each antenna	
6.5.2.1A PUSCH-EVM with exclusion period	PUSCH : ± 2.5%	

6.5.2.1E.1 Error Vector Magnitude for UE category 0	Same as 6.5.2.1	
6.5.2.1E.2 PUSCH-EVM with exclusion period for UE category 0	Same as 6.5.2.1A	
6.5.2.1EA.1 Error Vector Magnitude for UE category M1	Same as 6.5.2.1	
6.5.2.1EA.2 PUSCH-EVM with exclusion period for UE category M1	Same as 6.5.2.1A	
6.5.2.1F.1 Error Vector Magnitude (EVM) for UE category NB1	Same as 6.5.2.1	
6.5.2.2 Carrier leakage	±0.8dB	
6.5.2A.2.1 Carrier leakage for CA (intra-band contiguous DL CA and UL CA)	Same as 6.5.2.2	
6.5.2A.2.2 Carrier leakage for CA (inter-band DL CA and UL CA)	±0.8dB	
6.5.2A.2.3 Carrier leakage for CA (intra-band non-contiguous DL CA and UL CA)	±0.8dB	
6.5.2.3 In-band emissions for non allocated RB	±0.8dB	
6.5.2.4 EVM equalizer Spectrum flatness	±1.4dB	
6.5.2A.3.1 In-band emissions for non allocated RB for CA (intra-band contiguous DL CA and UL CA)	Same as 6.5.2.3	
6.5.2A.3.2 In-band emissions for non allocated RB for CA (inter-band DL CA and UL CA)	Same as 6.5.2.3 for each CC	
6.5.2A.3.3 In-band emissions for non allocated RB for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.5.2.3 for each CC	
6.5.2A.3.4 In-band emissions for non allocated RB for CA (3UL CA)	Same as 6.5.2.3 for each CC	
6.5.2B.1 Error vector magnitude (EVM) for UL-MIMO	TBD	
6.5.2B.2 Carrier leakage for UL-MIMO	Same as 6.5.2.2 for each antenna	
6.5.2B.3 In-band emissions for non allocated RB for UL-MIMO	Same as 6.5.2.3 for each antenna	
6.5.2B.4 EVM equalizer spectrum flatness for UL-MIMO	Same as 6.5.2.4 for each antenna	
6.5.2.2E Carrier Leakage for UE category 0	Same as 6.5.2.2	
6.5.2.2EA Carrier Leakage for UE category M1	Same as 6.5.2.2	
6.5.2.2F Carrier leakage for UE category NB1	Same as 6.5.2.2	
6.5.2.3E In-band emissions for non allocated RB for UE category 0	Same as 6.5.2.3	

6.5.2.3EA In-band emissions for non allocated RB for UE category M1	Same as 6.5.2.3	
6.5.2.3F In-band emissions for non allocated RB for UE category NB1	Same as 6.5.2.3	
6.5.2.4E EVM equalizer spectrum flatness for UE category 0	Same as 6.5.2.4	
6.5.2.4EA EVM equalizer spectrum flatness for UE category M1	Same as 6.5.2.4	
6.6.1 Occupied bandwidth	1.4MHz, 3MHz: 30kHz 5MHz, 10MHz: 100kHz 15MHz, 20MHz: 300kHz	
6.6.1A.1 Occupied bandwidth for CA (intra-band contiguous DL CA and UL CA)	1.4MHz, 3MHz: 30kHz 5MHz, 10MHz: 100kHz 15MHz, 20MHz: 300kHz 20MHz < f ≤ 40MHz: 500kHz	
6.6.1A.2 Occupied bandwidth for CA (inter-band DL CA and UL CA)	Same as 6.6.1 for each CC	
6.6.1A.3 Occupied bandwidth for CA (intra-band non-contiguous DL CA and UL CA)	1.4MHz, 3MHz: 30kHz 5MHz, 10MHz: 100kHz 15MHz, 20MHz: 300kHz	
6.6.1B Occupied bandwidth for UL-MIMO	Same as 6.6.1 for each antenna	
6.6.1E Occupied bandwidth for UE category 0	Same as 6.6.1	
6.6.1EA Occupied bandwidth for UE category M1	Same as 6.6.1	
6.6.1G.1 Occupied bandwidth for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	Same as 6.6.1	
6.6.1G.2 Occupied bandwidth for V2X Communication / Non-concurrent with E-UTRA uplink transmission	Same as 6.6.1	
6.6.1F Occupied bandwidth for UE category NB1	200kHz: FFS	
6.6.2.1 Spectrum Emission Mask	±1.5 dB, f ≤ 3.0GHz ±1.8 dB, 3.0GHz < f ≤ 4.2GHz	
6.6.2.1_1 Spectrum Emission Mask for Multi-Cluster PUSCH	Same as 6.6.2.1	
6.6.2.1A.1 Spectrum emission mask for CA (intra-band contiguous DL CA and UL CA)	Same as 6.6.2.1	
6.6.2.1A.2 Spectrum Emission Mask for CA (inter-band DL CA and UL CA)	Same as 6.6.2.1 and 6.6.2.2	
6.6.2.1A.3 Spectrum Emission Mask for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.2.1	
6.6.2.1B Spectrum Emission Mask for UL-MIMO	Same as 6.6.2.1 for each antenna	
6.6.2.1E Spectrum Emission Mask for UE category 0	Same as 6.6.2.1	

6.6.2.1EA Spectrum Emission Mask for UE category M1	Same as 6.6.2.1	
6.6.2.1F Spectrum Emission Mask for UE category NB1	Same as 6.6.2.1	
6.6.2.2 Additional Spectrum Emission Mask	±1.5 dB, f ≤ 3.0GHz ±1.8 dB, 3.0GHz < f ≤ 4.2GHz	
6.6.2.2_1 Additional Spectrum Emission Mask for UL 64QAM	Same as 6.6.2.2	
6.6.2.2A.1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA)	±1.5 dB, f ≤ 3.0GHz ±1.8 dB, 3.0GHz < f ≤ 4.2GHz	
6.6.2.2E Additional Spectrum Emission Mask for UE category 0	Same as 6.6.2.2	
6.6.2.2EA Additional Spectrum Emission Mask for UE category M1	Same as 6.6.2.2	
6.6.2.2A.1_1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.6.2.2A	
6.6.2.2A.2 Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA)	Same as 6.6.2.2	
6.6.2.2A.2_1 Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.6.2.2	
6.6.2.2A.3 Additional Spectrum Emission Mask for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.2.2	
6.6.2.3_2 Adjacent Channel Leakage power Ratio for Multi-Cluster PUSCH	Same as 6.6.2.3	
6.6.2.3 Adjacent Channel Leakage power Ratio	±0.8 dB	
6.6.2.3_1 Adjacent Channel Leakage power Ratio for HPUE	±0.8 dB	
6.6.2.3A.1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA)	±0.8 dB	
6.6.2.3A.1_1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.6.2.3A.1	
6.6.2.3A.2 Adjacent Channel Leakage power Ratio for CA (inter-band DL CA and UL CA)	±0.8 dB	
6.6.2.3A.2_1 Adjacent Channel Leakage power Ratio for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.6.2.3A.2	
6.6.2.3A.3 Adjacent Channel Leakage power Ratio for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.2.3	

6.6.2.3A.3_1 Adjacent Channel Leakage power Ratio for CA (intra-band non-contiguous DL CA and UL CA) for UL 64QAM	Same as 6.6.2.3	
6.6.2.3B Adjacent Channel Leakage power Ratio for UL-MIMO	Same as 6.6.2.3 for each antenna	
6.6.2.3E Adjacent Channel Leakage power Ratio for UE category 0	Same as 6.6.2.3	Same as 6.6.2.3
6.6.2.3EA Adjacent Channel Leakage power Ratio for UE category M1	Same as 6.6.2.3	
6.6.2.3_3 Adjacent Channel Leakage power Ratio for UL 64QAM	Same as 6.6.2.3	
6.6.2.3_4 Adjacent Channel Leakage power Ratio for Multi-Cluster PUSCH with UL 64QAM	Same as 6.6.2.3	
6.6.2.3F Adjacent Channel Leakage power Ratio for UE category NB1	±0.8 dB	
6.6.2.4 Void	Void	
6.6.3.1 Transmitter Spurious emissions	9kHz < f ≤ 4 GHz: ± 2.0 dB 4 GHz < f ≤ 19 GHz: ± 4.0 dB	
6.6.3.1_1 Transmitter Spurious emissions for Multi-Cluster PUSCH	Same as 6.6.3.1	
6.6.3.1A.1 Transmitter Spurious emissions for CA (intra-band contiguous DL CA and UL CA)	Same as 6.6.3.1	
6.6.3.1A.2 Transmitter Spurious emissions for CA (inter-band DL CA and UL CA)	Same as 6.6.3.1	
6.6.3.1A.3 Transmitter Spurious emissions for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.3.1	
6.6.3B.1Transmitter Spurious emissions for UL-MIMO	Same as 6.6.3.1, at each antenna used for transmission	The overall UL power is the linear sum of the output powers over all Tx antenna connectors
6.6.3E.1 Transmitter Spurious emissions for UE category 0	Same as 6.6.3.1	
6.6.3EA.1 Transmitter Spurious emissions for UE category M1	Same as 6.6.3.1	
6.6.3.2 Spurious emission band UE co-existence	± 2.0 dB for results > -60 dBm, f ≤ 3.0GHz ±2.5 dB, 3.0GHz < f ≤ 4.2GHz ± 3.0 dB for results ≤ -60 dBm, f ≤ 3.0GHz ±3.6 dB, 3.0GHz < f ≤ 4.2GHz	
6.6.3.2A.1 Spurious emission band UE co-existence for CA (intra-band contiguous DL CA and UL CA)	Same as 6.6.3.2	
6.6.3.2A.2 Spurious emission band UE co-existence for CA (inter-band DL CA and UL CA)	Same as 6.6.3.2	

6.6.3.2A.3 Spurious emission band UE co-existence for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.3.2	
6.6.3.3 Additional spurious emissions	9kHz < f ≤ 4 GHz: ± 2.0 dB NS-07 769 ≤ f ≤ 775 MHz: ± 1.5 dB	
6.6.3.3_1 Additional spurious emissions for UL 64QAM	Same as 6.6.3.3	
6.6.3.3A.1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA)	9kHz < f ≤ 4 GHz: ± 2.0 dB	
6.6.3.3A.1_1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.6.3.3A.1	
6.6.3.3A.2 Additional spurious emissions for CA (inter-band DL CA and UL CA)	Same as 6.6.3.3	
6.6.3.3A.2_1 Additional spurious emissions for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.6.3.3	
6.6.3B.2 Spurious emission band UE co-existence for UL-MIMO	Same as 6.6.3.2 at each antenna used for transmission	
6.6.3B.3 Additional spurious emissions for UL-MIMO	Same as 6.6.3.3, at each antenna used for transmission	
6.6.3E.2 Spurious emission band UE co-existence for UE category 0	Same as 6.6.3.2	
6.6.3E.3 Additional spurious emissions for UE category 0	6.6.3.3	
6.6.3EA.2 Spurious emission band UE co-existence for UE category M1	Same as 6.6.3.2	
6.6.3EA.3 Additional spurious emissions for UE category M1	Same as 6.6.3.3	
6.6.3F.2 Spurious emission band UE co-existence for category NB1 UE	± 2.0 dB for results > -60 dBm, f ≤ 3.0GHz ± 3.0 dB for results ≤ -60 dBm, f ≤ 3.0GHz	

6.7 Transmit intermodulation	± 2.6 dB, f ≤ 3.0GHz ±3.6 dB, 3.0GHz < f ≤ 4.2GHz	Overall system uncertainty comprises four quantities: 1. Wanted signal setting error 2. CW Interferer level error 3. Wanted signal meas. error 4. Intermodulation product measurement error The relative level of the wanted signal and the CW interferer has 2 x effect on the intermodulation product. Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared to provide the combined effect. Test System uncertainty = SQRT [(2 x SQRT (Wanted setting_error^2 + CW_level_error^2)) ^{2} + Wanted_level_meas error^2 + Intermodulation product measurement error^2] f ≤ 3.0GHz Wanted signal setting ± 0.7dB CW Interferer level ± 1.0dB Wanted signal meas ± 0.7dB Intermodulation product measurement error ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal setting ± 1.0dB CW Interferer level ± 1.3dB Wanted signal meas ± 1.0dB Intermodulation product measurement error ± 1.0dB
6.7A.1 Transmit intermodulation for CA (intra-band contiguous DL CA and UL CA)	Same as 6.7, at each antenna used for transmission	
6.7A.2 Transmit intermodulation for CA (inter-band DL CA and UL CA)	Same as 6.7, at each antenna used for transmission	
6.7E Transmit intermodulation for UE category 0	Same as 6.7	
6.7EA Transmit intermodulation for UE category M1	Same as 6.7	
6.7F Transmit intermodulation for UE category NB1	Same as 6.7	
6.7G.1 Transmit intermodulation for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	Same as 6.7	
6.7G.2 Transmit intermodulation for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	Same as 6.7	

6.8B Time alignment error for UL-MIMO	±25 ns	

F.1.3 Measurement of receiver

Table F.1.3-1: Maximum Test System Uncertainty for receiver tests

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
7.3 Reference sensitivity power level	Downlink power ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	
7.3_1 Reference sensitivity level with 4 Rx antenna ports	Same as 7.3	
7.3A.1 Reference sensitivity level for CA (intra-band contiguous DL CA and UL CA)	Same as 7.3 for each CC	
7.3A.2 Reference sensitivity level for CA (intra-band contiguous DL CA without UL CA)	Same as 7.3A.1	
7.3A.3 Reference sensitivity level for CA (inter-band DL CA without UL CA)	Downlink power ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz ±1.5 dB, 4.2GHz < f ≤ 6GHz	
7.3A.4 Reference sensitivity level for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.3A.1	
7.3A.5 Reference sensitivity level for 3DL CA	Same as 7.3A.3	
7.3A.6 Reference sensitivity level for CA (inter-band DL CA and UL CA)	Same as 7.3A.1	
7.3A.7 Reference sensitivity level for CA (intra-band non-contiguous DL CA and UL CA)	Same as 7.3A.1	
7.3A.9 Reference sensitivity level for 4DL CA	Same as 7.3A.1	
7.3A.10 Reference sensitivity level for 5DL CA	Same as 7.3A.1	
7.3B Reference Sensitivity Level for UL-MIMO	Same as 7.3	
7.3D.1 Reference sensitivity level for ProSe Direct Discovery	Sidelink power ±0.7 dB, f ≤ 3.0GHz	
7.3D.2 Reference sensitivity level for ProSe Direct Communication	Same as 7.3D.1	
7.3E Reference Sensitivity Level for UE category 0	Same as 7.3	
7.3EA Reference Sensitivity Level for UE category M1	Same as 7.3	
7.3EB Reference sensitivity level for UE category 1bis	Same as 7.3	
7.3EC Reference Sensitivity Level for UE category M2	Same as 7.3	
7.3F.1 Reference sensitivity level without repetitions for UE category NB1	Downlink power ±0.7 dB, f ≤ 3.0GHz	
7.3F.2 Reference sensitivity level with repetitions for category NB1	Downlink power ±0.7 dB, f ≤ 3.0GHz	
7.4 Maximum input level	Downlink power ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	

7.4_1 Maximum input level with 4 Rx antenna ports	Same as 7.4	
7.4A.1 Maximum input level for CA (intra band contiguous DL CA and UL CA)	Same as 7.4 for each CC	Uncertainties apply for each CC
7.4A.1 H Maximum input level for SCE-L1 for CA (intra-band contiguous DL CA and UL CA)	Downlink power same as 7.4 for each CC Uplink power measurement same as 7.4	Uncertainties apply for each CC
7.4A.2 Maximum input level for CA (intra band contiguous DL CA without UL CA)	Downlink power same as 7.4 for each CC Uplink power measurement same as 7.4	Uncertainties apply for each CC
7.4A.2 H Maximum input level for SCE-L1 for CA (intra-band contiguous DL CA without UL CA)	Downlink power same as 7.4 for each CC Uplink power measurement same as 7.4	Uncertainties apply for each CC
7.4A.3 Maximum input level for CA (inter-band DL CA without UL CA)	Downlink power ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz ±1.5 dB, 4.2GHz < f ≤ 6GHz Uplink power measurement same as 7.4	Uncertainties apply for each CC
7.4A.4 Maximum input level for CA (intra band non-contiguous DL CA without UL CA)	Downlink power same as 7.4 for each CC Uplink power measurement same as 7.4	Uncertainties apply for each CC
7.4A.5 Maximum input level for 3DL CA	Downlink power same as 7.4A.3 for each CC Uplink power measurement same as 7.4	Uncertainties apply for each CC
7.4A.5_H Maximum input level for SCE-L1 for 3DL CA	Downlink power same as 7.4 for each CC Uplink power measurement same as 7.4	Uncertainties apply for each CC
7.4A.7 Maximum input level for 4DL CA	Downlink power same as 7.4 for each CC Uplink power measurement same as 7.4	Uncertainties apply for each CC
7.4B Maximum Input Level for UL-MIMO	Downlink power same as 7.4 Uplink power measurement same as 7.4, at each antenna connector used for transmission	The overall UL power is the linear sum of the output powers over all Tx antenna connectors
7.4D.1 Maximum input level for ProSe Direct Discovery	Sidelink power ±0.7 dB, f ≤ 3.0GHz	
7.4D.2 Maximum input level for ProSe Direct Communication	Same as 7.4D.1	
7.4E Maximum input level for UE category 0	Same as 7.4	
7.4EA Maximum input level for UE category M1	Same as 7.4	
7.4F Maximum input level for UE category NB1	Downlink power ±0.7 dB, f ≤ 3.0GHz	
7.4_H Maximum input level for SCE-L1	Same as 7.4	

7.5 Adjacent Channel Selectivity (ACS)	ACS value ±1.1 dB, f ≤ 3.0GHz ±1.5 dB, 3.0GHz < f ≤ 4.2GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	Overall ACS uncertainty comprises three quantities: 1. Wanted signal level error 2. Interferer signal level error 3. Additional impact of interferer ACLR Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The interferer ACLR effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect. f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB Interferer signal level ± 1.0dB f ≤ 4.2GHz Impact of interferer ACLR 0.1dB
7.5_1 Adjacent Channel Selectivity (ACS) with 4 Rx antenna ports	Same as 7.5	
7.5A.1 Adjacent Channel Selectivity (ACS) for CA (intra band contiguous DL CA and UL CA)	Same as 7.5 for each CC	Same as 7.5 The wanted signal level uncertainty applies for each CC. Overall ACS uncertainty calculation includes the uncertainty for wanted level error only once, as the uncertainty of other CCs is not expected to have any significant effect.
7.5A.2 Adjacent Channel Selectivity (ACS) for CA (intra band contiguous DL CA without UL CA)	Downlink power same as 7.5 Uplink power measurement same as 7.5	The wanted signal level uncertainty applies for each CC

7.5A.3 Adjacent Channel Selectivity (ACS) for CA (inter band DL CA without UL CA)	ACS value ±1.1 dB, f ≤ 3.0GHz ±1.5 dB, 3.0GHz < f ≤ 4.2GHz ±2.2 dB, 4.2GHz < f ≤ 6GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	The wanted signal level uncertainty applies for each CC Overall ACS uncertainty comprises three quantities: 1. Wanted signal level error 2. Interferer signal level error 3. Additional impact of interferer ACLR Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The interferer ACLR effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect. f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB Interferer signal level ± 1.0dB 4.2GHz < f ≤ 6GHz Wanted signal level ± 1.5dB Interferer signal level ± 1.5dB f ≤ 6GHz Impact of interferer ACLR 0.1dB
7.5A.4 Adjacent Channel Selectivity (ACS) for CA (intra-band non-contiguous DL CA without UL CA)	Downlink power same as 7.5 Uplink power measurement same as 7.5	The wanted signal level uncertainty applies for each CC
7.5A.5 Adjacent Channel Selectivity (ACS) for 3DL CA	Downlink power same as 7.5A.3 Uplink power measurement same as 7.5	The wanted signal level uncertainty applies for each CC
7.5A.7 Adjacent Channel Selectivity (ACS) for 4DL CA	Downlink power same as 7.5 Uplink power measurement same as 7.5	The wanted signal level uncertainty applies for each CC
7.5A.8 Adjacent Channel Selectivity (ACS) for 5DL CA	Downlink power same as 7.5 Uplink power measurement same as 7.5	The wanted signal level uncertainty applies for each CC
7.5B Adjacent Channel Selectivity (ACS) for UL-MIMO	ACS value same as 7.5 Uplink power measurement same as 7.5, at each antenna connector used for transmission	The overall UL power is the linear sum of the output powers over all Tx antenna connectors

7.5D.1 Adjacent channel selectivity (ACS) for ProSe Direct Discovery	ACS value ±1.1 dB, f ≤ 3.0GHz	Overall ACS uncertainty comprises three quantities: 1. Wanted signal level error 2. Interferer signal level error 3. Additional impact of interferer ACLR Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The interferer ACLR effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect. f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level ± 0.7dB f ≤ 4.2GHz Impact of interferer ACLR 0.1dB
7.5D.2 Adjacent channel selectivity (ACS) for ProSe Direct Communication	Same as 7.5D.1	Same as 7.5D.1
7.5E Adjacent Channel Selectivity (ACS) for UE category 0	Same as 7.5	Same as 7.5
7.5EA Adjacent Channel Selectivity (ACS) for UE category M1	Same as 7.5	Same as 7.5
7.5F Adjacent Channel Selectivity (ACS) for UE category NB1	ACS value ±1.1 dB, f ≤ 3.0GHz	Overall ACS uncertainty comprises three quantities: 1. Wanted signal level error 2. Interferer signal level error 3. Additional impact of interferer ACLR Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The interferer ACLR effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect. f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level ± 0.7dB Impact of interferer ACLR 0.1dB

7.6.1 In-band blocking	Blocking ±1.4 dB, f ≤ 3.0GHz ±1.8 dB, 3.0GHz < f ≤ 4.2GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	Overall blocking uncertainty can have these contributions: 1. Wanted signal level error 2. Interferer signal level error 3. Interferer ACLR 4. Interferer broadband noise Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The Interferer ACLR or Broadband noise effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect + Broadband noise effect. <u>In-band blocking, using modulated interferer:</u> f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB Interferer signal level ± 1.0dB f ≤ 4.2GHz Interferer ACLR 0.4dB Broadband noise not applicable
7.6.1_1 In-band blocking with 4 Rx antenna ports	Same as 7.6.1	Same as 7.6.1
7.6.1A.1 In-band blocking for CA (intra band contiguous DL CA and UL CA)	Same as 7.6.1 for each CC	Same as 7.6.1 The wanted signal level uncertainty applies for each CC. Overall blocking uncertainty calculation includes the uncertainty for wanted level error only once, as the uncertainty of other CCs is not expected to have any significant effect.
7.6.1A.2 In-band blocking for CA (intra band contiguous DL CA without UL CA)	Same as 7.6.1A.1	Same as 7.6.1A.1

7.6.1A.3 In-band blocking for CA (inter band DL CA without UL CA)	Blocking ±1.4 dB, f ≤ 3.0GHz ±1.8 dB, 3.0GHz < f ≤ 4.2GHz ±2.5 dB, 4.2GHz < f ≤ 6.0GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz *±1.0 dB, 3.0GHz < f ≤ 4.2GHz*	Overall blocking uncertainty can have these contributions: 1. Wanted signal level error 2. Interferer signal level error 3. Interferer ACLR 4. Interferer broadband noise Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The Interferer ACLR or Broadband noise effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect + Broadband noise effect. In-band blocking, using modulated interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB Interferer signal level ± 1.0dB 4.2GHz < f ≤ 6.0GHz Wanted signal level ± 1.5dB Interferer signal level ± 1.5dB f ≤ 6.0GHz Interferer ACLR 0.4dB Broadband noise not applicable
7.6.1A.4 In-band blocking for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1A.5 In-band blocking for 3DL CA	Same as 7.6.1A.3	Same as 7.6.1A.1
7.6.1A.7 In-band blocking for 4DL CA	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1A.8 In-band blocking for 5DL CA	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1B In-band blocking for UL-MIMO	Blocking same as 7.6.1 Uplink power measurement same as 7.6.1, at each antenna connector used for transmission	The overall UL power is the linear sum of the output powers over all Tx antenna connectors

7.6.1D.1 In-band blocking for ProSe Direct Discovery	Blocking ±1.4 dB, f ≤ 3.0GHz	Overall blocking uncertainty can have these contributions: 1. Wanted signal level error 2. Interferer signal level error 3. Interferer ACLR 4. Interferer broadband noise Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The Interferer ACLR or Broadband noise effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect + Broadband noise effect. <u>In-band blocking, using modulated interferer:</u> f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 0.7dB f ≤ 4.2GHz Interferer ACLR 0.4dB Broadband noise not applicable
7.6.1D.2 In-band blocking for ProSe Direct Communication	Same as 7.6.1D.1	Same as 7.6.1D.1
7.6.1E In-band blocking for UE category 0	Same as 7.6.1	Same as 7.6.1
7.6.1F In-band blocking for category NB1	Blocking ±1.4 dB, f ≤ 3.0GHz	Overall blocking uncertainty can have these contributions: 1. Wanted signal level error 2. Interferer signal level error 3. Interferer ACLR 4. Interferer broadband noise Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The Interferer ACLR or Broadband noise effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect + Broadband noise effect. <u>In-band blocking, using modulated interferer:</u> f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 0.7dB

7.6.1EA In-band blocking for UE category M1	Blocking ±1.4 dB, f ≤ 3.0GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz	Overall blocking uncertainty can have these contributions: 1. Wanted signal level error 2. Interferer signal level error 3. Interferer ACLR 4. Interferer broadband noise Items 1 and 2 are assumed to be uncorrelated so can be root sum squared to provide the ratio error of the two signals. The Interferer ACLR or Broadband noise effect is systematic, and is added arithmetically. Test System uncertainty = [SQRT (wanted_level_error^2 + interferer_level_error^2)] + ACLR effect + Broadband noise effect. In-band blocking, using modulated interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 0.7dB
7.6.2 Out-of-band blocking	Wanted signal f ≤ 3.0GHz Blocking, 1MHz < $f_{interferer}$ ≤ 3 GHz: ±1.3 dB Blocking, 3 GHz < $f_{interferer}$ ≤ 12.75 GHz: ±3.2 dB Uplink power measurement ±0.7 dB Wanted signal 3.0GHz < f ≤ 4.2GHz Blocking, 1MHz < $f_{interferer}$ ≤ 3 GHz: ±1.5 dB Blocking, 3 GHz < $f_{interferer}$ ≤ 12.75 GHz: ±3.3 dB Uplink power measurement ±1.0 dB	Out of band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB Interferer signal level: ± 1.0dB up to 3GHz ± 3.0dB up to 12.75GHz Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1
7.6.2_1 Out of-band blocking with 4 Rx antenna ports	Same as 7.6.2	Same as 7.6.2
7.6.2A.1 Out-of-band blocking for CA (intra band contiguous DL CA and UL CA)	Same as 7.6.2 for each CC	Same as 7.6.2 The wanted signal level uncertainty applies for each CC. Overall blocking uncertainty calculation includes the uncertainty for wanted level error only once, as the uncertainty of other CCs is not expected to have any significant effect.
7.6.2A.2 Out-of-band blocking for CA (intra band contiguous DL CA without UL CA)	Same as 7.6.2A.1	Same as 7.6.2A.1

7.6.2A.3 Out-of-band blocking for CA (inter band DL CA without UL CA)	Wanted signal f ≤ 3.0GHz Blocking, 1MHz < finterferer ≤ 3 GHz: ±1.3 dB Blocking, 3 GHz < finterferer ≤ 12.75 GHz: ±3.2 dB Uplink power measurement ±0.7 dB Wanted signal 3.0GHz < f ≤ 4.2GHz Blocking, 1MHz < finterferer ≤ 3 GHz: ±1.5 dB Blocking, 3 GHz < finterferer ≤ 12.75 GHz: ±3.3 dB Uplink power measurement ±1.0 dB Wanted signal 4.2GHz < f ≤ 6.0GHz Blocking, 1MHz < finterferer ≤ 3 GHz: ±1.9 dB Blocking, 3 GHz < finterferer ≤ 12.75 GHz: ±3.5 dB	Out of band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB 4.2GHz < f ≤ 6.0GHz Wanted signal level ± 1.5dB Interferer signal level: ± 1.0dB up to 3GHz ± 3.0dB up to 12.75GHz Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1
7.6.2A.4 Out-of-band blocking for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.6.2A.1	Same as 7.6.2A.1
7.6.2A.5 Out-of-band blocking for 3DL CA	Same as 7.6.2A.3	Same as 7.6.2A.1
7.6.2A.7 Out-of-band blocking for 4DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1
7.6.2A.8 Out-of-band blocking for 5DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1
7.6.2B Out-of-band blocking for UL-MIMO	Blocking same as 7.6.2 Uplink power measurement same as 7.6.2, at each antenna connector used for transmission	The overall UL power is the linear sum of the output powers over all Tx antenna connectors
7.6.2D.1 Out-of-band blocking for ProSe Direct Discovery	Wanted signal f ≤ 3.0GHz Blocking, 1MHz < $f_{interferer}$ ≤ 3 GHz: ±1.3 dB Blocking, 3 GHz < $f_{interferer}$ ≤ 12.75 GHz: ±3.2 dB ±0.7 dB	Out of band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 1.0dB up to 3GHz ± 3.0dB up to 12.75GHz Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1
7.6.2D.2 Out-of-band blocking for ProSe Direct Communication	Same as 7.6.2D.1	Same as 7.6.2D.1
7.6.2E Out of-band blocking for UE category 0	Same as 7.6.2	Same as 7.6.2
7.6.2F Out of-band blocking for category NB1	Wanted signal f ≤ 3.0GHz Blocking, 1MHz < $f_{interferer}$ ≤ 3 GHz: ±1.3 dB Blocking, 3 GHz < $f_{interferer}$ ≤ 12.75 GHz: ±3.2 dB	Out of band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 1.0dB up to 3GHz Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1

7.6.2EA Out-of-band blocking for UE category M1	Wanted signal f ≤ 3.0GHz Blocking, 1MHz < $f_{interferer}$ ≤ 3 GHz: ±1.3 dB Blocking, 3 GHz < $f_{interferer}$ ≤ 12.75 GHz: ±3.2 dB Uplink power measurement ±0.7 dB	Out of band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 1.0dB up to 3GHz ± 3.0dB up to 12.75GHz Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1
7.6.3 Narrow band blocking	Blocking ±1. 1 dB, f ≤ 3.0GHz ±1. 5 dB, 3.0GHz < f ≤ 4.2GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	Narrow band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB Interferer signal level ± 1.0dB Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1
7.6.3_1 Narrow band blocking with 4 Rx antenna ports	Same as 7.6.3	Same as 7.6.3
7.6.3A.1 Narrow band blocking for CA (intra band contiguous DL CA and UL CA)	Same as 7.6.3 for each CC	Same as 7.6.3 The wanted signal level uncertainty applies for each CC. Overall blocking uncertainty calculation includes the uncertainty for wanted level error only once, as the uncertainty of other CCs is not expected to have any significant effect.
7.6.3A.2 Narrow band blocking for CA (intra band contiguous DL CA without UL CA)	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.3 Narrow band blocking for CA (inter band DL CA without UL CA)	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.4 Narrow band blocking for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.5 Narrow band blocking for 3DL CA	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.7 Narrow band blocking for 4DL CA	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.8 Narrow band blocking for 5DL CA	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3B Narrow band blocking for UL-MIMO	Blocking same as 7.6.3 Uplink power measurement same as 7.6.3, at each antenna connector used for transmission	The overall UL power is the linear sum of the output powers over all Tx antenna connectors

7.6.3D.1 Narrow band blocking for ProSe Direct Discovery	Blocking ±1.1 dB, f ≤ 3.0GHz	Narrow band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 0.7dB Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1
7.6.3D.2 Narrow band blocking for ProSe Direct Communication	Same as 7.6.3D.1	Same as 7.6.3D.1
7.6.3E Narrow band blocking for UE category 0	Same as 7.6.3	Same as 7.6.3
7.6.3EA Narrow band blocking for UE category M1	Blocking ±1. 1 dB, f ≤ 3.0GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz	Narrow band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 0.7dB Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1
7.7 Spurious response	Same as 7.6.2	Same as 7.6.2.
7.7_1 Spurious response with 4 Rx antenna ports	Same as 7.6.2	Same as 7.6.2
7.7A.1 Spurious response for CA (intra band contiguous DL CA and UL CA)	Same as 7.6.2A.1	Same as 7.6.2A.1
7.7A.2 Spurious response for CA (intra band contiguous DL CA without UL CA)	Same as 7.6.2A.1	Same as 7.6.2A.1
7.7A.3 Spurious response for CA (inter band DL CA without UL CA)	Same as 7.6.2A.3	Same as 7.6.2A.1
7.7A.4 Spurious response for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.6.2A.1	Same as 7.6.2A.1
7.7A.5 Spurious response for 3DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1
7.7A.7 Spurious response for 4DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1
7.7A.8 Spurious response for 5DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1
7.7B Spurious response for UL-MIMO	Same as 7.7 Uplink power measurement same as 7.6.2, at each antenna connector used for transmission	The overall UL power is the linear sum of the output powers over all Tx antenna connectors
7.7D.1 Spurious response for ProSe Direct Discovery	Same as 7.6.2D.1	Same as 7.6.2D.1
7.7D.2 Spurious response for ProSe Direct Communication	Same as 7.6.2D.1	Same as 7.6.2D.1
7.7E Spurious response for UE category 0	Same as 7.7	Same as 7.7

7.7EA Spurious response for UE category M1	Same as 7.7	Same as 7.7
7.7F Spurious response for category NB1	Wanted signal f ≤ 3.0GHz Blocking, 1MHz < $f_{interferer}$ ≤ □3 GHz: ±1.3 dB Blocking, 3 GHz < $f_{interferer}$ ≤ □12.75 GHz: ±3.2 dB	Out of band blocking, using CW interferer: f ≤ 3.0GHz Wanted signal level ± 0.7dB Interferer signal level: ± 1.0dB up to 3GHz Interferer ACLR not applicable Impact of interferer Broadband noise 0.1dB Figures are combined to give Test System uncertainty, using formula given for 7.6.1
7.8.1 Wide band intermodulation	Intermodulation ±1.4 dB, f ≤ 3.0GHz ±2.6 dB, 3.0GHz < f ≤ 4.2GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	Overall intermodulation uncertainty comprises three quantities: 1. Wanted signal level error 2. CW Interferer level error 3. Modulated Interferer level error Effect of interferer ACLR has not been included as modulated interferer has larger frequency offset The effect of the closer CW signal has twice the effect. Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared to provide the combined effect of the three signals. Test System uncertainty = SQRT [(2 x CW_level_error)^2 +(mod interferer_level_error)^2 +(wanted signal_level_error)^2] f ≤ 3.0GHz Wanted signal level ± 0.7dB CW Interferer level ± 0.5dB Mod Interferer level ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB CW Interferer level ± 0.8dB Mod Interferer level ± 1.0dB
7.8.1_1 Wide band Intermodulation with 4 Rx antenna ports	Same as 7.8.1	Same as 7.8.1
7.8.1A.1 Wideband intermodulation for CA (intra band contiguous DL CA and UL CA)	Same as 7.8.1 for each CC	Same as 7.8.1 The wanted signal level uncertainty applies for each CC. Overall intermodulation uncertainty calculation includes the uncertainty for wanted level error only once, as the uncertainty of other CCs is not expected to have any significant effect.
7.8.1A.2 Wideband intermodulation for CA (intra band contiguous DL CA without UL CA)	Same as 7.8.1A.1	Same as 7.8.1A.1

7.8.1A.3 Wideband intermodulation for CA (inter band DL CA without UL CA)	Intermodulation ±1.4 dB, f ≤ 3.0GHz ±2.6 dB, 3.0GHz < f ≤ 4.2GHz ±3.8 dB, 4.2GHz < f ≤ 6GHz Uplink power measurement ±0.7 dB, f ≤ 3.0GHz ±1.0 dB, 3.0GHz < f ≤ 4.2GHz	Overall intermodulation uncertainty comprises three quantities: 1. Wanted signal level error 2. CW Interferer level error 3. Modulated Interferer level error Effect of interferer ACLR has not been included as modulated interferer has larger frequency offset The effect of the closer CW signal has twice the effect. Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared to provide the combined effect of the three signals. Test System uncertainty = SQRT [(2 x CW_level_error)^2 +(mod interferer_level_error)^2 +(wanted signal_level_error)^2] f ≤ 3.0GHz Wanted signal level ± 0.7dB CW Interferer level ± 0.5dB Mod Interferer level ± 0.7dB 3.0GHz < f ≤ 4.2GHz Wanted signal level ± 1.0dB CW Interferer level ± 0.8dB Mod Interferer level ± 1.0dB 4.2GHz < f ≤ 6GHz Wanted signal level ± 1.5dB CW Interferer level ± 1.3dB Mod Interferer level ± 1.5dB
7.8.1A.4 Wideband intermodulation for CA (intra band non-contiguous DL CA without UL CA)	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1A.5 Wideband intermodulation for 3DL CA	Same as 7.8.1A.3	Same as 7.8.1A.1
7.8.1A.7 Wideband intermodulation for 4DL CA	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1A.8 Wideband intermodulation for 5DL CA	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1B Wide band intermodulation for UL-MIMO	Intermodulation same as 7.8.1 Uplink power measurement same as 7.8.1, at each antenna connector used for transmission	The overall UL power is the linear sum of the output powers over all Tx antenna connectors

7.8.1D.1 Wide band Intermodulation for ProSe Direct Discovery	Intermodulation ±1.4 dB, f ≤ 3.0GHz ±2	Overall intermodulation uncertainty comprises three quantities: 1. Wanted signal level error 2. CW Interferer level error 3. Modulated Interferer level error Effect of interferer ACLR has not been included as modulated interferer has larger frequency offset The effect of the closer CW signal has twice the effect. Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared to provide the combined effect of the three signals. Test System uncertainty = SQRT [(2 x CW_level_error)^2 +(mod interferer_level_error)^2 +(wanted signal_level_error)^2] f ≤ 3.0GHz Wanted signal level ± 0.7dB CW Interferer level ± 0.5dB Mod Interferer level ± 0.7dB
7.8.1D.2 Wide band Intermodulation for ProSe Direct Communication	Same as 7.8.1D.2	Same as 7.8.1D.2
7.8.1E Wide band intermodulation for UE category 0	Same as 7.8.1	Same as 7.8.1
7.8.1EA Wide band Intermodulation for UE category M1	Same as 7.8.1	Same as 7.8.1
7.8.1F Wide band intermodulation for category NB1	Intermodulation ±1.4 dB, f ≤ 3.0GHz	Overall intermodulation uncertainty comprises three quantities: 1. Wanted signal level error 2. CW Interferer level error 3. Modulated Interferer level error Effect of interferer ACLR has not been included as modulated interferer has larger frequency offset The effect of the closer CW signal has twice the effect. Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared to provide the combined effect of the three signals. Test System uncertainty = SQRT [(2 x CW_level_error)2 +(mod interferer_level_error)2 +(wanted signal_level_error)2] f ≤ 3.0GHz Wanted signal level ± 0.7dB CW Interferer level ± 0.5dB Mod Interferer level ± 0.7dB
7.9 Spurious emissions	30MHz ≤ f ≤ 4.0GHz: ± 2.0 dB 4 GHz < f ≤ □19 GHz: ± 4.0 dB	

7.9_1 Spurious emissions with 4 Rx antenna ports	Same as 7.9	
7.9A Spurious emissions for CA	30MHz ≤ f ≤ 4.0GHz: ± 2.0 dB 4 GHz < f ≤ 19 GHz: ± 4.0 dB 19GHz < f ≤ 26 GHz: ± 6.0 dB	
7.9E Spurious emissions for UE category 0	Same as 7.9	
7.9F Spurious emissions for category NB1	Same as 7.9	
Note 1: Unless otherwise noted, only the Test System stimulus error is considered here. The effect of errors in the throughput measurements due to finite test duration is not considered.		

F.1.4 Measurement of performance requirements

Table F.1.4-1: Maximum Test System Uncertainty for Performance Requirements

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
8.2.1.1.1 Multiple PRBs - Propagation Condition EVA5 - Propagation Condition ETU70 - Propagation Condition ETU300	± 0.8 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB
8.2.1.1.1 Multiple PRBs - Propagation Condition HST	± 0.6 dB	Overall system uncertainty for HST condition comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Effect of AWGN flatness and signal flatness Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB AWGN flatness and signal flatness ±2.0 dB
8.2.1.1.1 Single PRB - Propagation Condition ETU70	± 0.8 dB	Overall system uncertainty for fading condition comprises three quantities: 1. Average Signal-to-noise ratio uncertainty 2. Signal-to noise ratio variation for single PRB 3. Fading profile power uncertainty Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Average signal-to-noise ratio uncertainty ^{2} + Signal-to-noise ratio variation^2 + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Signal-to-noise ratio variation ±0.5 dB Fading profile power uncertainty ±0.5 dB for single Tx
8.2.1.1.1_A.1	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.1.1.1_A.2	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.1.1.1_A.4	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC

8.2.1.1.1_A.5	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.1.1.1_1 Multiple PRBs - Propagation Condition EVA5 - Propagation Condition ETU70 - Propagation Condition ETU300	Same as 8.2.1.1.1 Multiple PRBs Propagation EVA5, ETU70, ETU300	
8.2.1.1.1_2 Multiple PRB - Propagation Condition EVA5	Same as 8.2.1.1.1 Multiple PRBs Propagation EVA5	
8.2.1.1.2 Single PRB	± 0.8 dB	Same as 8.2.1.1.1 Single PRB
8.2.1.2.1 - Propagation Condition EVA5	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB
8.2.1.2.1 - Propagation Condition HST	± 0.6 dB	Overall system uncertainty for HST condition comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Effect of AWGN flatness and signal flatness Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB AWGN flatness and signal flatness ±2.0 dB
8.2.1.2.1_1 - Propagation Condition EVA5	Same as 8.2.1.2.1 Propagation EVA5	
8.2.1.2.2	± 0.9 dB	Same as 8.2.1.2.1 Propagation Condition EVA5
8.2.1.2.2_1	Same as 8.2.1.2.2	

8.2.1.2.3_C.1	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: Cell 1 SNR uncertainty (E_{s1} / N_{oc2} ratio before fading) ±0.3 dB Cell 2 SNR uncertainty (E_{s2} / N_{oc2} ratio before fading) ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB

8.2.1.2.3_E.1 - Propagation Condition EVA5	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1dB $\hat{E}s_3/\hat{E}s_1$ ± 1.1dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) $\hat{E}s_3/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 3 SNR uncertainty ^{2} + Cell 3 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB
8.2.1.2.4	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*

8.2.1.2.5	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.2.1.2.6	Same as 8.2.1.2.5	Same as 8.2.1.2.5
8.2.1.3.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB
8.2.1.3.1_1	Same as 8.2.1.3.1	Same as 8.2.1.3.1
8.2.1.3.1_A.1	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.3.1_A.2 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (3DL CA)	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.3.1_A.3 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (4DL CA)	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.3.1_A.3	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.3.1_A.4	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.3.1A_A.1	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.3.1B	± 0.9 dB	Same as 8.2.1.3.1
8.2.1.3.1C	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.2.1.3.2	± 0.9 dB	Same as 8.2.1.3.1

8.2.1.3.3_C.1	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: Cell 1 SNR uncertainty (E_{s1} / N_{oc2} ratio before fading) ±0.3 dB Cell 2 SNR uncertainty (E_{s2} / N_{oc2} ratio before fading) ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB

8.2.1.3.3_C.2	Symbol #0 during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB Symbols #1..13 during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbol #0 during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) Symbols #1..13 during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: Cell 1 SNR uncertainty (E_{s1} / N_{oc2} ratio before fading) ±0.3 dB Cell 2 SNR uncertainty (E_{s2} / N_{oc2} ratio before fading) ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB

8.2.1.3.3_E.1 - Propagation Condition EVA5	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1dB $\hat{E}s_3/\hat{E}s_1$ ± 1.1dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) $\hat{E}s_3/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 3 SNR uncertainty ^{2} + Cell 3 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB
8.2.1.4.1	± 0.9 dB	Same as 8.2.1.3.1
8.2.1.4.1_1	Same as 8.2.1.4.1	

8.2.1.4.1_E.1 - Propagation Condition EPA5	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB $\hat{E}s_3/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) $\hat{E}s_3/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 3 SNR uncertainty ^{2} + Cell 3 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB
8.2.1.4.1_H FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 for SCE-L1	± 0.9 dB	Same as 8.2.1.4.1
8.2.1.4.2	± 0.9 dB	Same as 8.2.1.3.1
8.2.1.4.2_1	Same as 8.2.1.4.2	
8.2.1.4.2_A.1	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.4.2_A.2	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.4.2_A.3	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.4.2_A.4	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.4.2A	± 0.9 dB	Same as 8.2.1.3.1

8.2.1.4.3	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect
8.2.1.4.3A	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.1.4.4	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.2.1.7.1_A.1	TBD	TBD
8.2.2.1.1 Multiple PRBs - Propagation Condition EVA5 - Propagation Condition ETU70 - Propagation Condition ETU300	± 0.8 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB

8.2.2.1.1 Multiple PRBs - Propagation Condition HST	± 0.6 dB	Overall system uncertainty for HST condition comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Effect of AWGN flatness and signal flatness Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB AWGN flatness and signal flatness ±2.0 dB
8.2.2.1.1 Single PRB - Propagation Condition ETU70	± 0.8 dB	Overall system uncertainty for fading condition comprises three quantities: 1. Average Signal-to-noise ratio uncertainty 2. Signal-to noise ratio variation for single PRB 3. Fading profile power uncertainty Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Average signal-to-noise ratio uncertainty ^{2} + Signal-to-noise ratio variation^2 + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Signal-to-noise ratio variation ±0.5 dB Fading profile power uncertainty ±0.5 dB for single Tx
8.2.2.1.1_1 Multiple PRBs - Propagation Condition EVA5 - Propagation Condition ETU70 - Propagation Condition ETU300	Same as 8.2.2.1.1 Multiple PRBs Propagation EVA5, ETU70, ETU300	
8.2.2.1.1_2 Multiple PRB - Propagation Condition EVA5	Same as 8.2.2.1.1 Multiple PRBs Propagation EVA5	
8.2.2.1.1_A.1	Same as 8.2.2.1.1 Multiple PRBs for each CC	Same as 8.2.2.1.1 Multiple PRBs Calculation applies for each CC
8.2.2.1.1_A.2	Same as 8.2.2.1.1 Multiple PRBs for each CC	Same as 8.2.2.1.1 Multiple PRBs Calculation applies for each CC
8.2.2.1.1_A.3	Same as 8.2.2.1.1 Multiple PRBs for each CC	Same as 8.2.2.1.1 Multiple PRBs Calculation applies for each CC
8.2.2.1.2 Single PRB	± 0.8 dB	Same as 8.2.2.1.1 Single PRB
8.2.2.2.1 - Propagation Condition EVA5	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB

8.2.2.2.1 - Propagation Condition HST	± 0.6 dB	Overall system uncertainty for HST condition comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Effect of AWGN flatness and signal flatness Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB AWGN flatness and signal flatness ±2.0 dB
8.2.2.2.1_1 - Propagation Condition EVA5	Same as 8.2.2.2.1 Propagation EVA5	
8.2.2.2.2	± 0.9 dB	Same as 8.2.2.2.1 Propagation Condition EVA5
8.2.2.2.2_1	Same as 8.2.2.2.2	
8.2.2.2.3_C.1	Same as 8.2.1.2.3_C.1	Same as 8.2.1.2.3_C.1
8.2.2.2.3_E.1 - Propagation Condition EVA5	Same as 8.2.1.2.3_E.1	Same as 8.2.1.2.3_E.1
8.2.2.2.4	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.2.2.2.6	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.2.2.2.7	Same as 8.2.2.2.6	Same as 8.2.2.2.6

8.2.2.3.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB
8.2.2.3.1_1	Same as 8.2.2.3.1	Same as 8.2.2.3.1
8.2.2.3.1_A.1	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.2.3.1_A.2 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (3 DL CA)	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.2.3.1A_A.1	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.2.3.1B	± 0.9 dB	Same as 8.2.2.3.1
8.2.2.3.1C	Same as 8.2.1.3.1C	Same as 8.2.1.3.1C
8.2.2.3.2	± 0.9 dB	Same as 8.2.2.3.1
8.2.2.3.3_C.1	Same as 8.2.1.3.3_C.1	Same as 8.2.1.3.3_C.1
8.2.2.3.3_C.2	Same as 8.2.1.3.3_C.2	Same as 8.2.1.3.3_C.2
8.2.2.3.3_E.1 - Propagation Condition EVA5	Same as 8.2.1.3.3_E.1	Same as 8.2.1.3.3_E.1
8.2.2.4.1	± 0.9 dB	Same as 8.2.2.3.1
8.2.2.4.1_1	Same as 8.2.2.4.1	
8.2.2.4.1_E.1 - Propagation Condition EPA5	Same as 8.2.1.4.1_E.1	Same as 8.2.1.4.1_E.1
8.2.2.4.1_H TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 for SCE-L1	Same as 8.2.2.4.1	
8.2.2.4.2	± 0.9 dB	Same as 8.2.2.3.1
8.2.2.4.2_1	Same as 8.2.2.4.2	
8.2.2.4.2_A.1	Same as 8.2.2.4.2 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.2.4.2_A.2 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (3DL CA)	Same as 8.2.2.4.2 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.2.4.2_A.3 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (4DL CA)	Same as 8.2.2.4.2 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.2.4.2A	± 0.9 dB	Same as 8.2.2.3.1

8.2.2.4.3	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.2.2.4.4	Same as 8.2.2.4.2 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.2.4.5	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.2.2.7.1_A.1	TBD	TBD
8.2.3.1.1.1	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.3.1.1.2	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.3.1.1.3	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.3.1.1.4	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.3.1.2.1	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.3.1.2.2	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.3.1.2.3	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.3.1.2.4	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Same as 8.2.1.1.1 Multiple PRBs Calculation applies for each CC
8.2.3.2.1.1	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.3.2.1.2	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.3.2.1.3	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC

8.2.3.2.1.4	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.3.2.1A	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.3.2.2.1	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.3.2.2.2	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.3.2.2.3	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.3.2.2.4	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.3.2.2A	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.3.3.1.1	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.3.3.1.2	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.3.3.1.3	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.3.3.1.4	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.2.3.3.2.1	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.3.3.2.2	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.3.3.2.3	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.3.3.2.4	Same as 8.2.2.3.1 for each CC	Same as 8.2.2.3.1 Calculation applies for each CC
8.2.4.1.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB
8.2.4.1.2	Same as 8.2.4.1.1 for each CC	Same as 8.2.4.1.1 Calculation applies for each CC

8.3.1.1.1_D	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB
8.3.1.1.1_H FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO for SCE-L1	Same as 8.3.1.1.1_D	Same as 8.3.1.1.1_D
8.3.1.1.2_D	± 0.9 dB	Same as 8.3.1.1.1_D
8.3.1.1.3	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.3.1.1.4	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*

8.3.1.1.5	$\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) Component uncertainties: Cell 1 SNR uncertainty (E_{s1} / N_{oc} ratio before fading) ±0.3 dB Cell 2 SNR uncertainty (E_{s2} / N_{oc} ratio before fading) ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB
8.3.1.1.6	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.3.1.1.7	TBD	TBD
8.3.1.2.1_D	± 0.9 dB	Same as 8.3.1.1.1_D
8.3.1.2.1_D_1	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.3.1.2.2	± 0.9 dB	Same as 8.3.1.1.1_D

8.3.1.3.1_F	$\hat{E}s/N_{oc}$ ± 0.9 dB for each TP Time alignment error TP 2 relative to TP1: ±130 ns (±4Ts)	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB
8.3.1.3.2_F	$\hat{E}s/N_{oc}$ ± 0.9 dB for each TP Time alignment error TP 2 relative to TP1: ±130 ns (±4Ts)	Same as 8.3.1.3.1_F
8.3.1.3.3_F	$\hat{E}s/N_{oc}$ ± 0.9 dB for each TP	Same as 8.3.1.3.1_F
8.3.2.1.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB
8.3.2.1.1_1	± 0.9 dB	Same as 8.3.2.1.1
8.3.2.1.2	± 0.9 dB	Same as 8.2.2.3.1
8.3.2.1.2_D	± 0.9 dB	Same as 8.2.2.3.1
8.3.2.1.2_H TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO for SCE-L1	± 0.9 dB	Same as 8.2.2.3.1
8.3.2.1.3	± 0.9 dB	Same as 8.2.2.3.1
8.3.2.1.3_D	± 0.9 dB	Same as 8.2.2.3.1

8.3.2.1.4	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.3.2.1.5	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.3.2.1.6	$\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) <u>Component uncertainties:</u> Cell 1 SNR uncertainty (E_{s1} / N_{oc} ratio before fading) ±0.3 dB Cell 2 SNR uncertainty (E_{s2} / N_{oc} ratio before fading) ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB

8.3.2.1.7	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect*
8.3.2.1.8	TBD	TBD
8.3.2.2.1	± 0.9 dB	Same as 8.2.2.3.1
8.3.2.2.1_D	± 0.9 dB	Same as 8.2.2.3.1
8.3.2.2.1_D_1	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Same as 8.3.1.2.1_D_1
8.3.2.2.2	± 0.9 dB	Same as 8.2.2.3.1
8.3.2.4.1_F	$\hat{E}s/N_{oc}$ ± 0.9 dB for each TP Time alignment error TP 2 relative to TP1: ±130 ns (±4Ts)	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB
8.3.2.4.2_F	$\hat{E}s/N_{oc}$ ± 0.9 dB for each TP Time alignment error TP 2 relative to TP1: ±130 ns (±4Ts)	Same as 8.3.2.4.1_F
8.3.2.4.3_F	$\hat{E}s/N_{oc}$ ± 0.9 dB for each TP	Same as 8.3.2.4.1_F
8.3.3.1.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB

8.3.3.1.2	Same as 8.3.3.1.1	Same as 8.3.3.1.1
8.4.1.1	± 0.8 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.2 dB
8.4.1.2.1	± 1.0 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.4.1.2.1_1	Same as 8.4.1.2.1	
8.4.1.2.2	± 1.0 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB

8.4.1.2.2_1	Same as 8.4.1.2.2	
8.4.1.2.3_C.1	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB

8.4.1.2.3_C.2	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB

8.4.1.2.3_E.1 - Propagation Condition EVA5	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB $\hat{E}s_3/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) $\hat{E}s_3/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 3 SNR uncertainty ^{2} + Cell 3 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB
8.4.1.2.3_E.2 - Propagation Condition EVA5	Same as 8.4.1.2.3_E.1	Same as 8.4.1.2.3_E.1

8.4.2.1	± 0.8 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.2 dB
8.4.2.2.1	± 1.0 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.4.2.2.1_1	Same as 8.4.2.2.1	
8.4.2.2.2	± 1.0 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.4.2.2.2_1	Same as 8.4.2.2.2	

8.4.2.2.3_C.1	Same as 8.4.1.2.3_C.1	
8.4.2.2.3_C.2	Same as 8.4.1.2.3_C.2	
8.4.2.2.3_E.1 - Propagation Condition EVA5	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB $\hat{E}s_3/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) $\hat{E}s_3/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 3 SNR uncertainty ^{2} + Cell 3 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB
8.4.2.2.3_E.2 - Propagation Condition EVA5	Same as 8.4.2.2.3_E.1	Same as 8.4.2.2.3_E.1
8.4.3.1.1 LAA PCFICH/PDCCH Transmit Diversity 2x2 with FDD as Pcell	Same as 8.2.1.3.1 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC

8.5.1.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.5.1.2.1	± 1.1 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.6 dB
8.5.1.2.1_1	Same as 8.5.1.2.1	
8.5.1.2.2	± 1.0 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.5.1.2.2_1	Same as 8.5.1.2.2	

8.5.1.2.3_C.1	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB

8.5.1.2.3_E.1	Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ ± 0.9 dB $\hat{E}s_2/\hat{E}s_1$ ± 1.1 dB $\hat{E}s_3/\hat{E}s_1$ ± 1.1 dB Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ ± 1.0 dB All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ ± 1.0 dB	System uncertainties comprise a number of quantities which are selected according to their applicability in the equations below. Uncertainties are assumed to be uncorrelated, so can be root sum squared. AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Symbols #0, 4.. means 0, 4, 7, 11 Symbols #1, 2.. means 1-3, 5, 6, 8-10, 12, 13 Symbols #0, 4.. during ABS: $\hat{E}s_1/N_{oc2}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) $\hat{E}s_2/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 2 SNR uncertainty ^{2} + Cell 2 Fading profile power uncertainty ^{2}) $\hat{E}s_3/\hat{E}s_1$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + Cell 3 SNR uncertainty ^{2} + Cell 3 Fading profile power uncertainty ^{2}) Symbols #1, 2.. during ABS: $\hat{E}s_1/N_{oc1}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc1}/N_{oc2} uncertainty ^{2}) All symbols during non-ABS: $\hat{E}s_1/N_{oc3}$ uncertainty = SQRT (Cell 1 SNR uncertainty ^{2} + Cell 1 Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + N_{oc3}/N_{oc2} uncertainty ^{2}) Component uncertainties: SNR uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB N_{oc1}/N_{oc2} and N_{oc3}/N_{oc2} uncertainty ±0.3 dB

8.5.2.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.5.2.2.1	± 1.1 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.6 dB
8.5.1.2.2_1	Same as 8.5.2.2.1	
8.5.2.2.2	± 1.0 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for MIMO AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.5.2.2.2_1	Same as 8.5.2.2.2	

8.5.2.2.3_C.1	Same as 8.5.1.2.3_C.1	
8.5.2.2.3_E.1	Same as 8.5.1.2.3_E.1	
8.7.1.1	Downlink absolute power uncertainty, averaged over BW_{Config} ±1.0 dB Downlink EVM ≤ 3%	3% EVM is equivalent to a Test system downlink SNR of 30.5dB. The noise from the Test system is then sufficiently below that required for the UE to demodulate the signal with the required % success rate. Under these conditions the UE throughput is limited by the Reference measurement channel and the UE capability, and not by the Test system EVM.
8.7.1.1_1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.1.1_2	Same as 8.7.1.1	Same as 8.7.1.1
8.7.1.1_A.1	Same as 8.7.1.1 for each CC	Same as 8.7.1.1 Calculation applies for each CC
8.7.1.1_A.2	Same as 8.7.1.1 for each CC	Same as 8.7.1.1 Calculation applies for each CC
8.7.1.1_A.4	Same as 8.7.1.1 for each CC	Same as 8.7.1.1 Calculation applies for each CC
8.7.1.1_A.5	Same as 8.7.1.1 for each CC	Same as 8.7.1.1 Calculation applies for each CC
8.7.1.1_H.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.1.1_H.2	Same as 8.7.1.1 for each CC	Same as 8.7.1.1 Calculation applies for each CC
8.7.1.1_H.3	Same as 8.7.1.1 for each CC	Same as 8.7.1.1 Calculation applies for each CC
8.7.2.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.2.1_1	Same as 8.7.2.1	Same as 8.7.2.1
8.7.2.1_1	Same as 8.7.2.1	Same as 8.7.2.1
8.7.2.1_A.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1 Calculation applies for each CC
8.7.2.1_A.2	Same as 8.7.2.1 for each CC	Same as 8.7.2.1 Calculation applies for each CC
8.7.2.1_A.3	Same as 8.7.2.1 for each CC	Same as 8.7.2.1 Calculation applies for each CC
8.7.2.1_H.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.2.1_H.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1 Calculation applies for each CC
8.7.2.1_H.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1 Calculation applies for each CC
8.7.3.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.4.1	Same as 8.7.3.1	Same as 8.7.3.1
8.7.5.1.1 TDD FDD CA Sustained data rate performance for FDD PCell (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.5.1.2 TDD FDD CA Sustained data rate performance for FDD PCell (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.5.1.3 TDD FDD CA Sustained data rate performance for FDD PCell (4DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.5.1.4 TDD FDD CA Sustained data rate performance for FDD PCell (5DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.5.1_H.1 TDD FDD CA Sustained data rate performance for FDD PCell for SCE-L1 (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.5.1_H.2 TDD FDD CA Sustained data rate performance for FDD PCell for SCE-L1 (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.5.2.1 TDD FDD CA Sustained data rate performance for TDD PCell (2DL CA)	Same as 8.7.2.1	Same as 8.7.2.1
8.7.5.2.2 TDD FDD CA Sustained data rate performance for TDD PCell (3DL CA)	Same as 8.7.2.1	Same as 8.7.2.1
8.7.5.2.3 TDD FDD CA Sustained data rate performance for TDD PCell (4DL CA)	Same as 8.7.2.1	Same as 8.7.2.1
8.7.5.2_H.1 TDD FDD CA Sustained data rate performance for TDD PCell for SCE-L1 (2DL CA)	Same as 8.7.2.1	Same as 8.7.2.1
8.7.5.2_H.2 TDD FDD CA Sustained data rate performance for TDD PCell for SCE-L1 (3DL CA)	Same as 8.7.2.1	Same as 8.7.2.1

8.7.5.2_H.3 TDD FDD CA Sustained data rate performance for TDD PCell for SCE-L1 (4DL CA)	Same as 8.7.2.1	Same as 8.7.2.1
8.7.6.1 FDD sustained data rate performance for Dual Connectivity 64QAM	Same as 8.7.1.1	Same as 8.7.1.1
8.7.6.2 FDD sustained data rate performance for Dual Connectivity 256QAM	Same as 8.7.1.1	Same as 8.7.1.1
8.7.7.1 TDD sustained data rate performance for Dual Connectivity 64QAM	Same as 8.7.2.1	Same as 8.7.2.1
8.7.7.2 TDD sustained data rate performance for Dual Connectivity 256QAM	Same as 8.7.2.1	Same as 8.7.2.1
8.7.9.2 FDD sustained data rate performance for 4 layer MIMO (single carrier)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.9.3 FDD sustained data rate performance for 4 layer MIMO (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.9.4 FDD sustained data rate performance for 4 layer MIMO (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.9.5 FDD sustained data rate performance for 4 layer MIMO (4DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.9.6 FDD sustained data rate performance for 4 layer MIMO (5DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.2 TDD sustained data rate performance for 4 layer MIMO (single carrier)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.3 TDD sustained data rate performance for 4 layer MIMO (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.4 TDD sustained data rate performance for 4 layer MIMO (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.5 TDD sustained data rate performance for 4 layer MIMO (4DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.6 TDD sustained data rate performance for 4 layer MIMO (5DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.11.2 TDD FDD CA sustained data rate performance for 4 layer MIMO (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.11.3 TDD FDD CA sustained data rate performance for 4 layer MIMO (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.11.4 TDD FDD CA sustained data rate performance for 4 layer MIMO (4DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.7.11.5 TDD FDD CA sustained data rate performance for 4 layer MIMO (5DL CA)	Same as 8.7.1.1	Same as 8.7.1.1
8.8.1.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.2 dB
8.8.1.2	Same as 8.8.1.1	Same as 8.8.1.1
8.8.2.1	Same as 8.8.1.1	Same as 8.8.1.1

8.8.2.2	Same as 8.8.1.1	Same as 8.8.1.1
8.8.3.1	Same as 8.8.1.1	Same as 8.8.1.1
8.8.3.2	Same as 8.8.1.1	Same as 8.8.1.1
8.9.1.1.1	± 0.8 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2 + (0.25 x AWGN flatness and signal flatness) 2) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB
8.9.1.1.2	Same as 8.9.1.1.1	Same as 8.9.1.1.1
8.9.1.1.3	Same as 8.9.1.1.1	Same as 8.9.1.1.1
8.9.1.1.3_1	Same as 8.9.1.1.1	Same as 8.9.1.1.,1
8.9.1.1.1_1 FDD PDSCH Transmit Diversity 2x1 for UE category 1bis	± 0.8 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2 + (0.25 x AWGN flatness and signal flatness) 2) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB
8.9.1.1.2_1 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x1 for UE Category 1bis	Same as 8.9.1.1.1_1	Same as 8.9.1.1.1_1
8.9.1.2.1	Same as 8.9.1.1.1	Same as 8.9.1.1.1
8.9.1.2.1_1 TDD PDSCH Transmit Diversity 2x1 for UE category 1bis	± 0.8 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2 + (0.25 x AWGN flatness and signal flatness) 2) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB
8.9.1.2.2	Same as 8.9.1.1.1	Same as 8.9.1.1.1

8.9.1.2.3	Same as 8.9.1.1.1	Same as 8.9.1.1.1
8.9.1.2.2_1 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x1 for UE Category 1bis	Same as 8.9.1.1.1_1	Same as 8.9.1.1.1_1
8.9.2.1.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.9.2.1.1_1	Same as 8.9.2.1.1	Same as 8.9.2.1.1
8.9.2.2.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.4 dB
8.10.1.1.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB

8.10.1.1.2	Same as 8.10.1.1.1	Same as 8.10.1.1.1
8.10.1.1.3	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect
8.10.1.1.4	Same as 8.10.1.1.1	Same as 8.10.1.1.1
8.10.1.1.5	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect
8.10.1.1.6	Same as 8.3.1.2.1_D_1	Same as 8.3.1.2.1_D_1
8.10.1.1.7 FDD Open-loop spatial multiplexing, 3 Layer Multiplexing with 4 Tx Antenna Ports	Same as 8.2.1.3.1	Same as 8.2.1.3.1
8.10.1.1.8 FDD Closed-loop spatial multiplexing performance, 4 Layers spatial multiplexing 4 Tx antennas	Same as 8.2.1.3.1	Same as 8.2.1.3.1
8.10.1.1.9 FDD 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)	Same as 8.2.1.3.1	Same as 8.2.1.3.1
8.10.1.2.1	Same as 8.10.1.1.1	Same as 8.10.1.1.1
8.10.1.2.2	Same as 8.10.1.1.1	Same as 8.10.1.1.1
8.10.1.2.3	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for 2 Tx AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect
8.10.1.2.4	Same as 8.10.1.1.1	Same as 8.10.1.1.1

8.10.1.2.5	$\hat{E}s/N_{oc}$ ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for 2 Tx AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect
8.10.1.2.6	Same as 8.3.2.2.1_D_1	Same as 8.3.2.2.1_D_1
8.10.1.2.7 TDD Open-loop spatial multiplexing, 3 Layer Multiplexing with 4 Tx Antenna Ports	Same as 8.2.2.3.1	Same as 8.2.2.3.1
8.10.1.2.8 TDD Closed-loop spatial multiplexing performance, 4 Layers spatial multiplexing 4 Tx antennas	Same as 8.2.2.3.1	Same as 8.2.2.3.1
8.10.1.2.9 TDD 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)	Same as 8.2.2.3.1	Same as 8.2.2.3.1
8.10.2.1.1 FDD PCFICH/PDCCH Single-antenna Port Performance 1x4	Same as 8.4.1.1	
8.10.2.1.2 FDD PCFICH/PDCCH Transmit Diversity 2x4	Same as 8.4.1.2.1	
8.10.2.1.3 FDD PCFICH/PDCCH Transmit Diversity 4x4	Same as 8.4.1.2.1	
8.10.2.2.1 TDD PCFICH/PDCCH Single-antenna Port Performance 1x4	Same as 8.4.2.1	
8.10.2.2.2 TDD PCFICH/PDCCH Transmit Diversity 2x4	Same as 8.4.2.2.1	
8.10.2.2.3 TDD PCFICH/PDCCH Transmit Diversity 4x4	Same as 8.4.2.2.1	
8.10.3.1.1 FDD PHICH Single-antenna Port Performance 1x4	Same as 8.5.1.1	
8.10.3.1.2 FDD PHICH Transmit Diversity 2x4	Same as 8.5.1.2.1	
8.10.3.1.3 FDD PHICH Transmit Diversity 4x4	Same as 8.5.1.2.2	
8.10.3.2.1 TDD PHICH Single-antenna Port Performance 1x4	Same as 8.5.2.1	
8.10.3.2.2 TDD PHICH Transmit Diversity 2x4	Same as 8.5.2.2.1	
8.10.3.2.3 TDD PHICH Transmit Diversity 4x4	Same as 8.5.2.2.2	

8.10.4.1.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.2 dB
8.10.4.1.2	Same as 8.10.4.1.1	Same as 8.10.4.1.1
8.10.4.2.1	Same as 8.10.4.1.1	Same as 8.10.4.1.1
8.10.4.2.2	Same as 8.10.4.1.1	Same as 8.10.4.1.1
8.11.1.1.2 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1	Same as 8.11.1.1.1	Same as 8.11.1.1.1
8.11.1.1.3.1 FDD PDSCH Transmit Diversity 2x1 for UE category M1	Same as 8.11.1.1.1	Same as 8.11.1.1.1
8.11.1.1.3.1_1 FDD PDSCH Transmit Diversity 2x1 for UE category M1 (CEModeB)	Same as 8.11.1.1.1	Same as 8.11.1.1.1
8.11.1.2.1 TDD Closed-loop spatial multiplexing performance for UE category M1 (Cell-Specific Reference Symbols)	Same as 8.11.1.1.1	Same as 8.11.1.1.1
8.11.1.2.2 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1	Same as 8.11.1.1.1	Same as 8.11.1.1.1
8.11.1.2.3.1 TDD PDSCH Transmit Diversity for UE category M1	Same as 8.11.1.1.1	Same as 8.11.1.1.1
8.11.1.2.3.1_1 TDD PDSCH Transmit Diversity for UE category M1 (CEModeB)	Same as 8.11.1.1.1	Same as 8.11.1.1.1
8.11.2.1.1 FDD and HD-FDD demodulation of MPDCCH in CE Mode A	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.2 dB
8.11.2.1.2 FDD and half-duplex FDD demodulation of MPDCCH in CE Mode B	Same as 8.11.2.1.1	Same as 8.11.2.1.1

8.11.2.2.1 TDD demodulation of MPDCCH in CE Mode A	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.2 dB
8.11.2.2.2 TDD demodulation of MPDCCH in CE Mode B	Same as 8.11.2.2.1	Same as 8.11.2.2.1
8.12.1.1.1 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in In-band mode for category NB1	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB
8.12.1.1.2 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in standalone and Guard-band mode for category NB1	± 0.8 dB	Same as 8.2.1.1.1
8.12.2.1.1 Demodulation of NPDCCH single-antenna performance for category NB1	± 0.8 dB	Same as 8.4.1.1

8.12.2.1.2 Demodulation of NPDCCH Transmit diversity performance for category NB1	± 0.9 dB	Overall system uncertainty for fading conditions comprises four quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness 4. Result variation due to finite test time Items 1, 2, 3 and 4 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2} + variation due to finite test time ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB Result variation due to finite test time ±0.2 dB
8.13.1.2.2	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.13.1.2.3	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.13.1.2.4	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
8.13.1.2.5	Same as 8.2.1.4.2 for each CC	Same as 8.2.1.3.1 Calculation applies for each CC
10.1	± 0.9 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB
10.2	± 0.9 dB	Same as 10.1

14.2	± 0.8 dB	Overall system uncertainty for fading conditions comprises three quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty 3. Effect of AWGN flatness and signal flatness Items 1, 2 and 3 are assumed to be uncorrelated so can be root sum squared: AWGN flatness and signal flatness has x 0.25 effect on the required SNR, so use sensitivity factor of x 0.25 for the uncertainty contribution. Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2} + (0.25 x AWGN flatness and signal flatness) ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.5 dB for single Tx AWGN flatness and signal flatness ±2.0 dB
14.3	± 0.8 dB	Same as 14.2
[Other tests FFS]		
In addition, the following Test System uncertainties and related constraints apply:		
AWGN Bandwidth		≥ 1.08MHz, 2.7MHz, 4.5MHz, 9MHz, 13.5MHz, 18MHz; N_{RB} x 180kHz according to BW_{Config}
AWGN absolute power uncertainty, averaged over BW_{Config} Note 4		±3 dB
AWGN flatness and signal flatness, max deviation for any Resource Block, relative to average over BW_{Config}		±2 dB
AWGN peak to average ratio		≥10 dB @0.001%
Signal-to noise ratio uncertainty, averaged over downlink transmission Bandwidth		±0.3 dB (includes uncertainty in precoding applied by the test system, where applicable)
Signal-to noise ratio variation for any resource block, relative to average over downlink transmission Bandwidth		±0.5 dB
N_{oc2} absolute power uncertainty, averaged over BW_{Config} Note 5		±3 dB
N_{oc1} / N_{oc2} ratio uncertainty, averaged over BW_{Config} Note 5		±0.3 dB
N_{oc3} / N_{oc2} ratio uncertainty, averaged over BW_{Config} Note 5		±0.3 dB
E_s / N_{oc2} ratio (SNR) uncertainty, averaged over downlink transmission Bandwidth Note 5		±0.3 dB (includes uncertainty in precoding applied by the test system, where applicable)
Fading profile power uncertainty		Test-specific
Fading profile delay uncertainty, relative to frame timing		±5 ns (excludes absolute errors related to baseband timing)
CA, DC and LAA performance requirements only: Relative frequency error between carriers		30Hz, measured over a 1ms period, and maximum carrier spacing 80MHz
enhanced performance requirement Type B only: Frequency error on the frequency offset to cell 1		30Hz, measured over a 1ms period
Note 1: Only the overall stimulus error is considered here. The effect of errors in the throughput measurements due to finite test duration is not considered. Note 2: The AWGN or N_{ocx} parameters apply to all test cases except 8.7.1 and 8.7.2. The fading parameters apply to test cases using fading Note 3: In CA, DC and LAA test cases using multiple component carriers (CCs), the uncertainties and related constraints apply for each CC. Note 4: Applies for test cases which specify Noc, a single value that remains constant with time. Note 5: Applies for test cases which specify Noc1, Noc2 and Noc3, that are symbol or subframe specific.		

F.1.5 Measurement of Channel State Information reporting

Table F.1.5-1: Maximum Test System Uncertainty for Channel State Information reporting

Subclause	Maximum Test System Uncertainty[1]	Derivation of Test System Uncertainty
9.2.1.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0	± 0.3 dB	Signal-to-noise ratio uncertainty ±0.3 dB *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.2.1.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-0	± 0.3 dB	Same as 9.2.1.1
9.2.1.3_C.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for eICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2}	N_{oc2}, N_{oc} ratios and E_s / N_{oc2} ratios are generic values as specified at end of this table
9.2.1.4_C.1 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for eICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2}	N_{oc2}, N_{oc} ratios and E_s / N_{oc2} ratios are generic values as specified at end of this table
9.2.1.5_E.1 FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2} Cell 3 E_s / N_{oc2}	N_{oc2}, N_{oc} ratios and Es / N_{oc2} ratios are generic values as specified at end of this table
9.2.1.6_E.1 TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2} Cell 3 E_s / N_{oc2}	N_{oc2}, N_{oc} ratios and Es / N_{oc}2 ratios are generic values as specified at end of this table
9.2.1.7 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 256QAM in DL	± 0.3 dB	Same as 9.2.1.1
9.2.1.8 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 256QAM in DL	± 0.3 dB	Same as 9.2.1.1
9.2.2.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1	± 0.3 dB	Signal-to-noise ratio uncertainty ±0.3 dB *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.2.2.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1	± 0.3 dB	Same as 9.2.1.1
9.2.3.1_D FDD CQI Reporting under AWGN conditions – PUCCH 1-1 for eDL-MIMO	± 0.3 dB	Same as 9.2.2.1
9.2.3.2_D TDD CQI Reporting under AWGN conditions – PUCCH 1-1 for eDL-MIMO	± 0.3 dB	Same as 9.2.2.1
9.2.4.1_F FDD CQI Reporting under AWGN conditions - Single CSI Process for CoMP	± 0.3 dB	Same as 9.2.2.1
9.2.4.2_F TDD CQI Reporting under AWGN conditions - Single CSI Process for CoMP	± 0.3 dB	Same as 9.2.2.1
9.2.6.1 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with FDD as Pcell (PUSCH 3-0)	± 0.3 dB	Same as 9.2.2.1

9.2.6.2 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with TDD as Pcell (PUSCH 3-0)	± 0.3 dB	Same as 9.2.2.1
9.2.7.1 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with FDD as Pcell (PUSCH 3-1)	± 0.3 dB	Same as 9.2.1.1
9.2.7.2 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with TDD as Pcell (PUSCH 3-1)	± 0.3 dB	Same as 9.2.1.1
9.3.1.1.1 FDD CQI Reporting under fading conditions – PUSCH 3-0	± 0.6 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.3.1.1.2 TDD CQI Reporting under fading conditions – PUSCH 3-0	± 0.6 dB	Same as 9.3.1.1.1
9.3.1.2.1_D FDD CQI Reporting under fading conditions – PUSCH 3-1 for eDL-MIMO	± 0.6 dB	Same as 9.3.1.1.1
9.3.1.2.2_D TDD CQI Reporting under fading conditions – PUSCH 3-1 for eDL-MIMO	± 0.6 dB	Same as 9.3.1.1.1
9.3.1.2.3 FDD CQI Reporting under fading conditions – PUSCH 3-1 for 256QAM in DL	± 0.6 dB	Same as 9.3.1.1.1
9.3.1.2.4 TDD CQI Reporting under fading conditions – PUSCH 3-1 for 256QAM in DL	± 0.6 dB	Same as 9.3.1.1.1
9.3.1.3.1_E.1 FDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2} Cell 3 E_s / N_{oc2} Fading profile power uncertainty ±0.5 dB	N_{oc2}, N_{oc} ratios and E_s / N_{oc2} ratios are generic values as specified at end of this table
9.3.1.3.2_E.1 TDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2} Cell 3 E_s / N_{oc2} Fading profile power uncertainty ±0.5 dB	N_{oc2}, N_{oc} ratios and E_s / N_{oc2} ratios are generic values as specified at end of this table

9.3.2.1.1 FDD CQI Reporting under fading conditions – PUCCH 1-0	± 0.6 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.3.2.1.1_1 FDD CQI Reporting under fading conditions – PUCCH 1-0	± 0.6 dB	Same as 9.3.2.1.1
9.3.2.1.2 TDD CQI Reporting under fading conditions – PUCCH 1-0	± 0.6 dB	Same as 9.3.2.1.1
9.3.2.1.2_1 TDD CQI Reporting under fading conditions – PUCCH 1-0	± 0.6 dB	Same as 9.3.2.1.1
9.3.2.2.1_D FDD CQI Reporting under fading conditions – PUCCH 1-1 for eDL-MIMO	± 0.6 dB	Same as 9.3.2.1.1
9.3.2.2.2_D TDD CQI Reporting under fading conditions – PUCCH 1-1 for eDL-MIMO	± 0.6 dB	Same as 9.3.2.1.1
9.3.3.1.1 FDD CQI Reporting under fading conditions and frequency-selective interference – PUSCH 3-0	± 1.2 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Ior/Iot ratio uncertainty ±1.0 dB 2. Fading profile power uncertainty ±0.5 dB Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Ior/Iot ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *Ior absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.3.3.1.2 TDD CQI Reporting under fading conditions and frequency-selective interference – PUSCH 3-0	± 1.2 dB	Same as 9.3.3.1.1
9.3.4.1.1 FDD CQI Reporting under fading conditions – PUSCH 2-0	± 0.6 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.3.4.1.2 TDD CQI Reporting under fading conditions – PUSCH 2-0	± 0.6 dB	Same as 9.3.4.1.1
9.3.4.2.1 FDD CQI Reporting under fading conditions – PUCCH 2-0	± 0.6 dB	Same as 9.3.4.1.1
9.3.4.2.2 TDD CQI Reporting under fading conditions – PUCCH 2-0	± 0.6 dB	Same as 9.3.4.1.1

9.3.5.1.1 FDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A	$\hat{E}s_1/N_{oc}$ ± 0.6 dB $\hat{E}s_2/N_{oc}$ ± 0.3 dB	Overall system uncertainty for fading conditions on Cell 1 comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB for single Tx Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.3.5.1.2 TDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A	Same as 9.3.5.1.1	Same as 9.3.5.1.1
9.3.5.2.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A	$\hat{E}s_1/N_{oc}$ ± 0.8 dB $\hat{E}s_2/N_{oc}$ ± 0.3 dB	Overall system uncertainty for fading conditions on Cell 1 comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB for two Tx antennas. Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.3.5.2.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A	Same as 9.3.5.2.1	Same as 9.3.5.2.1
9.3.6.1_F.1 FDD CQI Reporting under fading conditions Single CSI processes for CoMP	$\hat{E}s/N_{oc}$ ± 0.8 dB	Overall system uncertainty for fading conditions on TP1 and TP2 comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.7 dB for multiple Tx Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.3.6.1_F.2 FDD CQI Reporting under fading conditions Three CSI processes for CoMP	Same as 9.3.6.1_F.1	Same as 9.3.6.1_F.1
9.3.6.1_F.3 FDD CQI Reporting under fading conditions Four CSI processes for CoMP	Same as 9.3.6.1_F.1	Same as 9.3.6.1_F.1

9.3.6.2_F.1 TDD CQI Reporting under fading conditions Single CSI processes for CoMP	Ês/Noc ± 0.8 dB	Overall system uncertainty for fading conditions on TP1 and TP2 comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.7 dB for multiple Tx Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2) AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect
9.3.6.2_F.2 TDD CQI Reporting under fading conditions Three CSI processes for CoMP	Same as 9.3.6.2_F.1	Same as 9.3.6.2_F.1
9.3.6.2_F.3 TDD CQI Reporting under fading conditions Four CSI processes for CoMP	Same as 9.3.6.2_F.1	Same as 9.3.6.2_F.1
9.3.7.1 FDD CQI Reporting under fading conditions - PUSCH 3-2 for eDL MIMO Enhancement	± 0.8 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.7 dB for multiple Tx Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.3.7.2 TDD CQI Reporting under fading conditions - PUSCH 3-2 for eDL MIMO Enhancement	± 0.8 dB	Same as 9.3.7.1
9.3.8.1.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 (Cell Specific Reference Symbols) TM4 - Enhanced Performance Receiver Type B	Ês/N_{oc} ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*

9.3.8.1.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 (Cell Specific Reference Symbols) TM4 - Enhanced Performance Receiver Type B	Same as 9.3.8.1.1	Same as 9.3.8.1.1
9.3.8.2.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM9 - Enhanced Receiver Type B	Ês/Noc ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect
9.3.8.2.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM9 - Enhanced Receiver Type B	Same as 9.3.8.2.1	Same as 9.3.8.2.1
9.3.8.3.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM10 with TM9 interference - Enhanced Receiver Type B	Ês/Noc ± 0.8 dB for each cell	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty 2. Fading profile power uncertainty Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty 2 + Fading profile power uncertainty 2) Signal-to-noise ratio uncertainty ±0.3 dB Fading profile power uncertainty ±0.7 dB for Tx Diversity AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect
9.3.8.3.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM10 with TM9 interference - Enhanced Receiver Type B	Same as 9.3.8.3.1	Same as 9.3.8.3.1
9.4.1.1.1 FDD PMI Reporting – PUSCH 3-1 (Single PMI)	± 0.6 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.4.1.1.2 TDD PMI Reporting – PUSCH 3-1 (Single PMI)	± 0.6 dB	Same as 9.4.1.1.1

9.4.1.2.1 FDD PMI Reporting – PUCCH 2-1 (Single PMI)	± 0.6 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.4.1.2.2 TDD PMI Reporting – PUCCH 2-1 (Single PMI)	± 0.6 dB	Same as 9.4.1.2.1
9.4.1.3.1_D FDD Reporting of PMI – PUSCH 3-1 (Single PMI) for eDL-MIMO	± 0.6 dB	Same as 9.4.1.1.1
9.4.1.3.2_D TDD Reporting of PMI – PUSCH 3-1 (Single PMI) for eDL-MIMO	± 0.6 dB	Same as 9.4.1.1.1
9.4.1.4.1 FDD PMI Reporting with 4Tx enhanced codebook – PUCCH 1-1 (Single PMI) for eDL MIMO Enhancement	± 0.8 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.7 dB for multiple Tx Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.4.1.4.2 TDD PMI Reporting with 4Tx enhanced codebook – PUCCH 1-1 (Single PMI) for eDL MIMO Enhancement	± 0.8 dB	Same as 9.4.1.4.1
9.4.2.1.1 FDD PMI Reporting – PUSCH 1-2 (Multiple PMI)	± 0.6 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.4.2.1.1_1 FDD PMI Reporting – PUSCH 1-2 (Multiple PMI)	± 0.6 dB	Same as 9.4.2.1.1
9.4.2.1.2 TDD PMI Reporting – PUSCH 1-2 (Multiple PMI)	± 0.6 dB	Same as 9.4.2.1.1
9.4.2.1.2_1 TDD PMI Reporting – PUSCH 1-2 (Multiple PMI)	± 0.6 dB	Same as 9.4.2.1.1
9.4.2.2.1 FDD PMI Reporting – PUSCH 2-2 (Multiple PMI)	± 0.6 dB	Same as 9.4.2.1.1

9.4.2.2.2 TDD PMI Reporting – PUSCH 2-2 (Multiple PMI)	± 0.6 dB	Same as 9.4.2.1.1
9.4.2.3.1_D FDD PMI Reporting – PUSCH 1-2 (Multiple PMI) for eDL-MIMO	± 0.6 dB	Same as 9.4.2.1.1
9.4.2.3.2_D TDD PMI Reporting – PUSCH 1-2 (Multiple PMI) for eDL-MIMO	± 0.6 dB	Same as 9.4.2.1.1
9.4.2.3.3 TDD PMI Reporting with 4Tx enhanced codebook - PUSCH 1-2 (Multiple PMI) for eDL-MIMO Enhancement	± 0.8 dB	Same as 9.4.1.4.1
9.4.2.3.4 TDD PMI Reporting with 4Tx enhanced codebook - PUSCH 1-2 (Multiple PMI) for eDL-MIMO Enhancement	± 0.8 dB	Same as 9.4.1.4.1
9.5.1.1 FDD RI Reporting– PUCCH 1-1	± 0.8 dB	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.7 dB for MIMO Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.5.1.1_1 FDD RI Reporting– PUCCH 1-1 (Release 10)	± 0.8 dB	Same as 9.5.1.1
9.5.1.1_2 FDD RI Reporting– PUCCH 1-1 (Release 11)	± 0.8 dB	Same as 9.5.1.1
9.5.1.2 TDD RI Reporting– PUSCH 3-1	± 0.8 dB	Same as 9.5.1.1
9.5.1.2_1 TDD RI Reporting– PUSCH 3-1 (Release 10)	± 0.8 dB	Same as 9.5.1.1
9.5.1.2_2 TDD RI Reporting– PUSCH 3-1 (Release 11)	± 0.8 dB	Same as 9.5.1.1
9.5.2.1_D FDD RI Reporting – PUCCH 1-1 for eDL-MIMO	± 0.8 dB	Same as 9.5.1.1
9.5.2.2_D TDD RI Reporting – PUCCH 1-1 for eDL-MIMO	± 0.8 dB	Same as 9.5.1.1
9.5.3.1_C.1 FDD RI Reporting – PUCCH 1-0 for eICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2} Fading profile power uncertainty ±0.7 dB for MIMO	N_{oc2}, N_{oc} ratios and E_s / N_{oc2} ratios are generic values as specified at end of this table
9.5.3.2_C.1 TDD RI Reporting – PUCCH 1-0 for eICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2} Fading profile power uncertainty ±0.7 dB for MIMO	N_{oc2}, N_{oc} ratios and E_s / N_{oc2} ratios are generic values as specified at end of this table

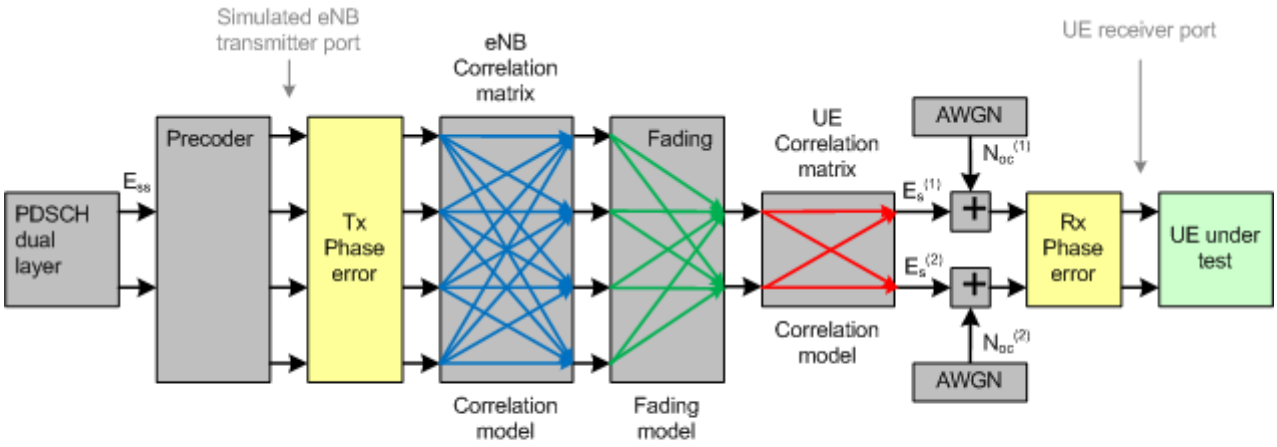
9.5.4.1_E.1 FDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2} Cell 3 E_s / N_{oc2} Fading profile power uncertainty ±0.7 dB for MIMO	N_{oc2}, N_{oc} ratios and E_s / N_{oc2} ratios are generic values as specified at end of this table
9.5.4.2_E.1 TDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	N_{oc2} N_{oc1} / N_{oc2} N_{oc3} / N_{oc2} Cell 1 E_s / N_{oc2} Cell 2 E_s / N_{oc2} Cell 3 E_s / N_{oc2} Fading profile power uncertainty ±0.7 dB for MIMO	N_{oc2}, N_{oc} ratios and E_s / N_{oc2} ratios are generic values as specified at end of this table
9.5.5.1_F.1 FDD RI Reporting with Single CSI process for CoMP	± 0.8 dB for each TP	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.7 dB for MIMO Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.5.5.1_F.2 FDD RI Reporting with Multiple CSI processes for CoMP	± 0.8 dB for each TP	Overall system uncertainty for fading conditions comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.7 dB for MIMO Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.5.5.2_F.1 TDD RI Reporting with Single CSI process for CoMP	± 0.8 dB for each TP	Same as 9.5.5.1_F.1
9.5.5.2_F.2 TDD RI Reporting with Multiple CSI processes for CoMP	± 0.8 dB for each TP	Same as 9.5.5.1_F.2
9.6.1.1_A.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (2DL CA)	± 0.3 dB for each CC	Signal-to-noise ratio uncertainty ±0.3 dB *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*

9.6.1.1_A.2 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 (3DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.1_A.4 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 (5DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.2_A.1 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 2DL CA	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.2_A.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (3DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.2_A.3 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (4DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.2_A.4 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (5DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.3.1 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (2DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.3.2 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (3DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.3.3 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (4DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.3.4 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (5DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.4.1 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (2DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.4.2 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (3DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.4.3 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (4DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.4.4 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (5DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.7.1.1 FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category 0	± 0.3 dB	Same as 9.2.1.1
9.7.1.2 TDD CQI reporting definition under AWGN conditions for UE category 0	± 0.3 dB	Same as 9.2.1.1
9.7.2.1 FDD and Half duplex FDD CQI reporting definition under fading conditions for UE category 0	± 0.6 dB	Same as 9.3.1.1.1
9.7.2.2 TDD CQI reporting definition under fading conditions for UE category 0	± 0.6 dB	Same as 9.3.1.1.1
9.8.1.1 FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category M1	± 0.3 dB	Same as 9.2.1.1
9.8.1.2 TDD CQI reporting definition under AWGN conditions for UE category M1	± 0.3 dB	Same as 9.2.1.1
9.8.2.1 FDD and Half duplex FDD CQI reporting definition under fading conditions for UE category M1	± 0.6 dB	Same as 9.3.1.1.1
9.8.2.2 TDD CQI reporting definition under fading conditions for UE category M1	± 0.6 dB	Same as 9.3.1.1.1
9.9.1.1.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 with Rank 1 1x4	± 0.3 dB	Same as 9.2.1.1
9.9.1.1.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 with Rank 1 1x4	± 0.3 dB	Same as 9.2.1.1
9.9.1.2.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 2 4x4	± 0.3 dB	Same as 9.2.1.1

9.9.1.2.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 2 8x4	± 0.3 dB	Same as 9.2.1.1
9.9.1.3.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 4 4x4	± 0.3 dB	Same as 9.2.1.1
9.9.1.3.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 4 4x4	± 0.3 dB	Same as 9.2.1.1
9.9.1.4.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 3 4x4	± 0.3 dB	Same as 9.2.1.1
9.9.1.4.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 3 8x4	± 0.3 dB	Same as 9.2.1.1
9.9.2.1.1 FDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A 1x4	Ês1/Noc ± 0.6 dB Ês2/Noc ± 0.3 dB	Overall system uncertainty for fading conditions on Cell 1 comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.5 dB for single Tx Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.9.2.1.2 TDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A 1x4	Ês1/Noc ± 0.6 dB Ês2/Noc ± 0.3 dB	Same as 9.9.2.1.1
9.9.2.2.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A 2x4	Ês1/Noc ± 0.8 dB Ês2/Noc ± 0.3 dB	Overall system uncertainty for fading conditions on Cell 1 comprises two quantities: 1. Signal-to-noise ratio uncertainty ±0.3 dB 2. Fading profile power uncertainty ±0.7 dB for two Tx antennas. Items 1 and 2 are assumed to be uncorrelated so can be root sum squared: Test System uncertainty = SQRT (Signal-to-noise ratio uncertainty ^{2} + Fading profile power uncertainty ^{2}) *AWGN flatness and signal flatness ±2.0 dB not expected to have any significant effect* *AWGN absolute power uncertainty ±3.0 dB not expected to have any significant effect*
9.9.2.2.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A 2x4	Ês1/Noc ± 0.8 dB Ês2/Noc ± 0.3 dB	Same as 9.9.2.2.1
9.9.3.1.1 TDD PMI Reporting – PUSCH 3-1 (Single PMI) 8x4	± 0.6 dB	Same as 9.4.1.1.1
9.9.4.1.1 FDD RI Reporting– PUCCH 1-1 4x4	± 0.8 dB	Same as 9.5.1.1
9.9.4.1.2 TDD RI Reporting– PUSCH 3-1 4x4	± 0.8 dB	Same as 9.5.1.1
9.9.4.2.1 FDD RI Reporting- PUCCH 1-1 for eDL-MIMO 1x4	± 0.8 dB	Same as 9.5.1.1
9.9.4.2.2 TDD RI Reporting- PUCCH 1-1 for eDL-MIMO 1x4	± 0.8 dB	Same as 9.5.1.1
In addition, the following Test System uncertainties and related constraints apply:		

AWGN Bandwidth	≥ 1.08MHz, 2.7MHz, 4.5MHz, 9MHz, 13.5MHz, 18MHz; N_{RB} x 180kHz according to BW_{Config}
AWGN absolute power uncertainty, averaged over BW_{Config} Note 4	±3 dB
AWGN flatness and signal flatness, max deviation for any Resource Block, relative to average over BW_{Config}	±2 dB
AWGN peak to average ratio	≥10 dB @0.001%
Signal-to noise ratio uncertainty, averaged over downlink transmission Bandwidth	±0.3 dB (includes uncertainty in precoding applied by the test system, where applicable)
Signal-to noise ratio variation for any resource block, relative to average over downlink transmission Bandwidth	±0.5 dB
N_{oc2} absolute power uncertainty, averaged over BW_{Config} Note 5	±3 dB
N_{oc1} / N_{oc2} ratio uncertainty, averaged over BW_{Config} Note 5	±0.3 dB
N_{oc3} / N_{oc2} ratio uncertainty, averaged over BW_{Config} Note 5	±0.3 dB
E_s / N_{oc2} ratio (SNR) uncertainty, averaged over downlink transmission Bandwidth Note 5	±0.3 dB (includes uncertainty in precoding applied by the test system, where applicable)
Fading profile power uncertainty	Test-specific
Fading profile delay uncertainty, relative to frame timing	±5 ns (excludes absolute errors related to baseband timing)
Downlink channel matrix uncertainties:	
Tx phase error, as shown in Figure F.1.5-1	$\Theta_{Tx} = \begin{bmatrix} e^{j\theta_1} & 0 & \cdots & 0 \\ 0 & e^{j\theta_2} & \ddots & 0 \\ \vdots & \ddots & \ddots & \vdots \\ 0 & 0 & \cdots & e^{j\theta_{N_{Tx}}} \end{bmatrix}$ θ_n is defined for each Tx antenna up to N_{Tx} $\theta_n \in (-\theta_{MAX}, \theta_{MAX})$ θ_{MAX} ≤ 10° θ_n is constant for the duration of the test
Rx phase error, as shown in Figure F.1.5-1	$\Theta_{Rx} = \begin{bmatrix} e^{j\theta_1} & 0 & \cdots & 0 \\ 0 & e^{j\theta_2} & \ddots & 0 \\ \vdots & \ddots & \ddots & \vdots \\ 0 & 0 & \cdots & e^{j\theta_{N_{Tx}}} \end{bmatrix}$ θ_n is defined for each Rx antenna up to N_{Rx} There is no constraint on the value of θ_n except that it is constant for the duration of the test

Note 1: Only the overall stimulus error is considered. The effect of errors in the throughput measurements due to finite test duration is not considered.
Note 2: The AWGN parameters apply to all test cases except 9.3.3.1.1 and 9.3.3.1.2. The fading parameters apply to test cases using fading
Note 3: Downlink channel matrix uncertainties apply to eDL-MIMO CSI test cases
Note 4: Applies for test cases which specify Noc, a single value that remains constant with time.
Note 5: Applies for test cases which specify Noc1, Noc2 and Noc3, that are symbol or subframe specific.



Example for dual layer PDSCH, 4Tx antennas x 2Rx antennas, fading propagation, with correlation and AWGN

Figure F.1.5-1: Location of Tx Phase error and Rx Phase error for eDL-MIMO (Informative)

F.2 Interpretation of measurement results (normative)

The measurement results returned by the Test System are compared – without any modification – against the Test Requirements as defined by the shared risk principle.

The Shared Risk principle is defined in ETR 273-1-2 clause 6.5.

The actual measurement uncertainty of the Test System for the measurement of each parameter shall be included in the test report.

The recorded value for the Test System uncertainty shall be, for each measurement, equal to or lower than the appropriate figure in clause F.1 of the present document.

If the Test System for a test is known to have a measurement uncertainty greater than that specified in clause F.1, it is still permitted to use this apparatus provided that an adjustment is made value as follows:

Any additional uncertainty in the Test System over and above that specified in clause F.1 shall be used to tighten the Test Requirement, making the test harder to pass. For some tests, for example receiver tests, this may require modification of stimulus signals. This procedure will ensure that a Test System not compliant with clause F.1does not increase the chance of passing a device under test where that device would otherwise have failed the test if a Test System compliant with clause F.1 had been used.

F.3 Test Tolerance and Derivation of Test Requirements (informative)

The Test Requirements in the present document have been calculated by relaxing the Minimum Requirements of the core specification using the Test Tolerances defined in this clause. When the Test Tolerance is zero, the Test Requirement will be the same as the Minimum Requirement. When the Test Tolerance is non-zero, the Test Requirements will differ from the Minimum Requirements, and the formula used for the relaxation is given in this clause.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.).

The downlink Test Tolerances apply at each receiver antenna connector.

F.3.1 Measurement of test environments

The UE test environments are set to the values defined in TS 36.508 subclause 4.1, without any relaxation. The applied Test Tolerance is therefore zero.

F.3.2 Measurement of transmitter

Table F.3.2-1: Derivation of Test Requirements (Transmitter tests)

Test	Minimum Requirement in TS 36.101	Test Tolerance (TT)	Test Requirement in TS 36.521-1
6.2.2 UE Maximum Output Power	f ≤ 3.0GHz Power class 1: [FFS] Power class 2: [FFS] Power class 3: 23dBm ±2 dB Power class 4: [FFS] 3.0GHz < f ≤ 4.2GHz Power class 3: 23dBm +2/-3 dB 3.0GHz < f ≤ 4.2GHz Power class 3: 23dBm +2/-3 dB	 0.7 dB 0.7 dB 0.7 dB 0.7 dB 1.0 dB 1.5 dB	Formula: Upper limit + TT, Lower limit - TT Power class 1: [FFS] Power class 2: [FFS] Power class 3: 23dBm ±2.7 dB Power class 4: [FFS] Power class 3: 23dBm +3.0/-4.0 dB Power class 3: 23dBm +3.5/-4.5 dB
6.2.2_1 UE Maximum Output Power for HPUE	f ≤ 3.0GHz Power class 1: 31dBm +2/-3dB	 0.7dB	Formula: Upper limit + TT, Lower limit - TT Power class 1: 31dBm +2.7/-3.7dB
6.2.2A.1 UE Maximum Output Power for CA (intra-band contiguous DL CA and UL CA)	Same as 6.2.2	Same as 6.2.2	Same as 6.2.2
6.2.2A.2 UE Maximum Output Power for CA (inter-band DL CA and UL CA)	Same as 6.2.2	Same as 6.2.2	Same as 6.2.2
6.2.2B UE Maximum Output Power for UL-MIMO	f ≤ 3.0GHz Power class 1: [FFS] Power class 2: [FFS] Power class 3: 23dBm +2/-3 dB Power class 4: [FFS] 3.0GHz < f ≤ 4.2GHz Power class 3: 23dBm +2/-4 dB	Same as 6.2.2	Formula: Upper limit +TT, Lower limit - TT Power class 1: [FFS] Power class 2: [FFS] Power class 3: 23dBm +2.7/-3.7 dB Power class 4: [FFS] Power class 3: 23dBm +3.0/-5.0 dB Uplink power measurement applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.2.2E UE Maximum Output Power UE category 0	Same as 6.2.2	Same as 6.2.2	Same as 6.2.2
6.2.2EA UE Maximum Output Power UE category M1	 Power class 3: 23dBm ±2 dB Power class 5: 20dBm ±2 dB	 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit - TT Power class 3: 23dBm ±2.7 dB Power class 5: 20dBm ±2.7 dB
6.2.2F UE Maximum Output Power for UE category NB1	f ≤ 3.0GHz Power class 1: [FFS] Power class 2: [FFS] Power class 3: 23dBm ±2 dB Power class 4: [FFS] Power class 5: 20dBm ±2 dB	 0.7 dB 0.7 dB 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit - TT Power class 1: [FFS] Power class 2: [FFS] Power class 3: 23dBm ±2.7 dB Power class 4: [FFS] Power class 5: 20dBm ±2.7 dB
6.2.3 Maximum Power Reduction	Power class 3 f ≤ 3.0GHz		Formula: Upper limit + TT, Lower limit – MPR – TT Power class 3:

	QPSK: MPR ≤ 1dB 16QAM: MPR ≤ 1dB 16QAM: MPR ≤ 2dB 3.0GHz < f ≤ 4.2GHz QPSK: MPR ≤ 1dB 16QAM: MPR ≤ 1dB 16QAM: MPR ≤ 2dB	0.7 dB 0.7 dB 0.7 dB 1.0 dB 1.0 dB 1.0 dB	QPSK: 23dBm +2.7 / - 3.7dB 16QAM: 23dBm +2.7 / - 3.7dB 16QAM: 23dBm +2.7 / - 4.7dB QPSK: 23dBm +3.0 / - 5.0dB 16QAM: 23dBm +3.0 / - 5.0dB 16QAM: 23dBm +3.0 / - 6.0dB
6.2.3_1 Maximum Power Reduction for HPUE	Power class 1 f ≤ 3.0GHz QPSK: MPR ≤ 1dB 16QAM: MPR ≤ 1dB 16QAM: MPR ≤ 2dB	 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit – MPR – TT Power class 1: QPSK: 31dBm +2.7 / - 4.7dB 16QAM: 31dBm +2.7 / - 4.7dB 16QAM: 31dBm +2.7 / - 5.7dB
6.2.3_2 UE Maximum Output Power for Multi-Cluster PUSCH	Same as 6.2.2	Same as 6.2.2	Same as 6.2.2
6.2.3_3 Maximum Power Reduction (MPR) for UL 64QAM	Power class 3 f ≤ 3.0GHz 64QAM: MPR ≤ 2dB 64QAM: MPR ≤ 3dB 3.0GHz < f ≤ 4.2GHz 64QAM: MPR ≤ 2dB 64QAM: MPR ≤ 3dB	 0.7 dB 0.7 dB 1.0 dB 1.0 dB	Formula: Upper limit + TT, Lower limit – MPR – TT Power class 3: 64QAM: 23dBm +2.7 / - 4.7dB 64QAM: 23dBm +2.7 / - 6.2dB 64QAM: 23dBm +3.0 / - 5.0dB 64QAM: 23dBm +3.0 / - 6.5dB
6.2.3_4 Maximum Power Reduction (MPR) for Multi-Cluster PUSCH with UL 64QAM	Same as 6.2.3_3	Same as 6.2.3_3	Same as 6.2.3_3
6.2.3A.1 Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA)	Power class 3 f ≤ 3.0GHz MPR = 0dB MPR = 1dB MPR = 2dB MPR = 3dB MPR = 8.5dB 3.0GHz < f ≤ 4.2GHz MPR = 0dB MPR = 1dB MPR = 2dB MPR = 3dB MPR = 8.5dB	 0.7 dB 0.7 dB 0.7 dB 0.7 dB 0.7 dB 1.0 dB 1.0 dB 1.0 dB 1.0 dB 1.0 dB	Formula: Upper limit: $+T(P_{CMAX_H})$ + TT, Lower limit: $-T(P_{CMAX_L})$ – MPR – TT $P_{CMAX_H} = P_{PowerClass}$ $P_{CMAX_L} = P_{PowerClass}$-MPR Power class 3: 23dBm +2.7 / - 2.7dB 23dBm +2.7 / - 3.7dB 23dBm +2.7 / - 4.7dB 23dBm +2.7 / - 6.2dB 23dBm +2.7 / - 14.2dB 23dBm +3.0 / - 4.0dB (+2/-3 limit for B42) 23dBm +3.0 / - 4.0dB 23dBm +3.0 / - 5.0dB 23dBm +3.0 / - 6.5dB 23dBm +3.0 / - 14.5dB
6.2.3A.1_1 Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Power class 3 f ≤ 3.0GHz MPR = 2dB MPR = 3dB 3.0GHz < f ≤ 4.2GHz MPR = 2dB MPR = 3dB	 0.7 dB 0.7 dB 1.0 dB 1.0 dB	Formula: Upper limit: $+T(P_{CMAX_H})$ + TT, Lower limit: $-T(P_{CMAX_L})$ – MPR – TT $P_{CMAX_H} = P_{PowerClass}$ $P_{CMAX_L} = P_{PowerClass}$-MPR Power class 3: 23dBm +2.7 / - 4.7dB 23dBm +2.7 / - 6.2dB 23dBm +3.0 / - 5.0dB 23dBm +3.0 / - 6.5dB
6.2.3A.2 Maximum Power	Power class 3		Formula:

Reduction (MPR) for CA (inter-band DL CA and UL CA)	 <u>f ≤ 3.0GHz</u> MPR = 0dB MPR = 1dB MPR = 2dB <u>4.2GHz < f ≤ 6GHz</u> MPR = 0dB MPR = 1dB MPR = 2dB	 0.7 dB 0.7 dB 0.7 dB 1.5 dB 1.5 dB 1.5 dB	Upper limit: +T(P_{CMAX_H}) + TT, Lower limit: -T(P_{CMAX_L}) – MPR – TT P_{CMAX_H} = $P_{PowerClass}$ P_{CMAX_L} = MIN(linear sum of $P_{PowerClass}$ – MPR_c -·$\Delta T_{C,c}$, 23 dBm) Power class 3: 23dBm +2.7 / - 3.7 dB 23dBm +2.7 / - 3.7 dB 23dBm +2.7 / - 3.7 dB 23dBm +3.5 / - 4.5 dB 23dBm +3.5 / - 5.5 dB 23dBm +3.5 / - 6.5 dB
6.2.3A.2_1 Maximum Power Reduction (MPR) for CA (inter-band DL CA and UL CA) for UL 64QAM	Power class 3 <u>f ≤ 3.0GHz</u> MPR = 2dB MPR = 3dB	 0.7 dB 0.7 dB	Formula: Upper limit: +T(P_{CMAX_H}) + TT, Lower limit: -T(P_{CMAX_L}) – TT P_{CMAX_H} = $P_{PowerClass}$ P_{CMAX_L} = MIN(linear sum of $P_{PowerClass}$ – MPR_c -·$\Delta T_{C,c}$, 23 dBm) Power class 3: 23dBm +2.7 / - 5.7 dB 23dBm +2.7 / - 6.7 dB
6.2.3A.3 Maximum Power Reduction (MPR) for CA (intra-band non-contiguous DL CA and UL CA)	Power class 3 <u>f ≤ 3.0GHz</u> MPR = 7 dB MPR = 12 dB MPR = 18 dB	 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit: +T(P_{CMAX_H}) + TT, Lower limit: -T(P_{CMAX_L}) – MPR – TT P_{CMAX_H} = $P_{PowerClass}$ P_{CMAX_L} = $P_{PowerClass}$ – MPR -·ΔT_C dBm) Power class 3: 23dBm +2.7 / - 12.7 dB 23dBm +2.7 / - 18.7 dB 23dBm +2.7 / - 25.7 dB
6.2.3A.3_1 Maximum Power Reduction (MPR) for CA (intra-band non-contiguous DL CA and UL CA) for UL 64QAM	Power class 3 <u>f ≤ 3.0GHz</u> MPR = 7 dB MPR = 12 dB MPR = 18 dB	 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit: +T(P_{CMAX_H}) + TT, Lower limit: -T(P_{CMAX_L}) – MPR – TT P_{CMAX_H} = $P_{PowerClass}$ P_{CMAX_L} = $P_{PowerClass}$ – MPR -·ΔT_C dBm) Power class 3: 23dBm +2.7 / - 12.7 dB 23dBm +2.7 / - 18.7 dB 23dBm +2.7 / - 25.7 dB
6.2.3B Maximum Power Reduction (MPR) for UL-MIMO	Same as 6.2.3	Same as 6.2.3	Same as 6.2.3 Uplink power measurement applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.2.3E Maximum Power Reduction for UE category 0	Same as 6.2.3E	Same as 6.2.3E	Same as 6.2.3E
6.2.3EA Maximum Power Reduction for UE category M1	 Power class 3 MPR ≤ 1dB MPR ≤ 2dB	 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit – MPR – TT 23dBm +2.7 / - 3.7dB 23dBm +2.7 / - 4.7dB

	Power class 5 MPR ≤ 1dB MPR ≤ 2dB	 0.7 dB 0.7 dB	 20dBm +2.7 / - 3.7dB 20dBm +2.7 / - 4.7dB
6.2.3F Maximum Power Reduction (MPR) for UE category NB1	 Power class 3: f ≤ 3.0GHz BPSK: MPR = 0dB QPSK: MPR = 0dB QPSK: MPR ≤ 0.5dB QPSK: MPR ≤ 1dB QPSK: MPR ≤ 2dB Power class 5: f ≤ 3.0GHz BPSK: MPR = 0dB QPSK: MPR = 0dB QPSK: MPR ≤ 0.5dB QPSK: MPR ≤ 1dB QPSK: MPR ≤ 2dB	 0.7 dB 0.7 dB 0.7 dB 0.7 dB 0.7 dB 0.7 dB 0.7 dB 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit – MPR – TT Power class 3: BPSK: 23dBm +2.7 / - 2.7dB QPSK: 23dBm +2.7 / - 2.7dB QPSK: 23dBm +2.7 / - 3.2dB QPSK: 23dBm +2.7 / - 3.7dB QPSK: 23dBm +2.7 / - 4.7dB Power class 5: BPSK: 20dBm +2.7 / - 3.2dB QPSK: 20dBm +2.7 / - 3.2dB QPSK: 20dBm +2.7 / - 4.7dB QPSK: 20dBm +2.7 / - 5.2dB QPSK: 20dBm +2.7 / - 6.7dB
6.2.4 UE Maximum Output Power with additional requirements	For the UE maximum output power modified by MPR and A-MPR, the power limits specified in TS 36.101 [2] clause 6.2.5 apply. For transmission bandwidths (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB. Power class 3: QPSK: MPR ≤ 1dB 16QAM: Depending on the number RB allocated: 16QAM: MPR ≤ 1dB 16QAM: MPR ≤ 2dB For network signalled value NS_03 , NS_04 (5MHz only), NS_05, to NS_06: A-MPR ≤ 1dB For network signalled value NS-04; Depending on the RB_start and RB allocation (10MHz, 15MHz and 20MHz): For 10MHz Region A with RB_start=0 – 12: A-MPR ≤ 3dB. Region B with RB_start=13 – 36 : A-MPR ≤ 2dB. Region C with RB_start=37 – 49 : A-MPR ≤ 3dB.	0.7 dB	Formula: Upper limit + TT, A: Lower limit – TT, B: (UE Maximum Output Power from 6.2.2) - T(P_{CMAX}) – MPR – TT, C: (UE Maximum Output Power from 6.2.2) - T(P_{CMAX}) – A-MPR – TT, D: (UE Maximum Output Power from 6.2.2) - T(P_{CMAX}) – A-MPR – MPR – TT Power class 3: Test Requirement Configuration ID versus Formula Above Network signalled value NS_03: [A]:2, 5, 10, 15, 20, 25 [B]:1, 3, 7 [C]:9, 14, 19, 24 [D]:4, 6, 8, 11, 12, 13, 16, 17, 18, 21, 22, 23, 26, 27 Network signalled value NS_04 (5, 10, 15, 20MHz): [A] 3 [B] 10, 11, 19, 20, 28, 29 [C] 2, 6, 7, 13, 14, 15, 16, 23, 24, 25, 32 [D] 1, 4, 5, 8, 9, 12, 17, 18, 21, 22, 26, 27, 30, 31 Network signalled value NS_05:

	For 15MHz Region A with RB_start=0 – 18: A-MPR ≤ 3dB. Region B with RB_start=19 – 55 : A-MPR ≤ 2dB. Region C with RB_start=56 – 74 : A-MPR ≤ 3dB. For 20MHz Region A with RB_start=0 – 24: A-MPR ≤ 3dB. Region B with RB_start=25 – 74 : A-MPR ≤ 2dB. Region C with RB_start=75 – 99 : A-MPR ≤ 3dB. For network signalled value NS-11; Depending on the RB_start and RB allocation (15MHz and 20MHz): For 15MHz Fc < 2012.5 Region A with RB_start=0 – 4: A-MPR ≤ 15dB. Region B with RB_start=5 – 21: A-MPR ≤ 7dB (L_{CRB}=7-50) or ≤ 10dB (L_{CRB}=0-6 & ≥50). Region C with RB_start=22 – 56: A-MPR ≤ 0dB (L_{CRB}=≤25) or ≤ 6dB (L_{CRB}>25). Region D with RB_start=57 – 74: A-MPR ≤ 15dB. For 15MHz Fc = 2012.5 Region A with RB_start=0 – 12: A-MPR ≤ 10dB. Region B with RB_start=13 – 39: A-MPR ≤ 6dB (L_{CRB}=≥ 30) or ≤ 0dB (L_{CRB}=< 30). Region C with RB_start=40 – 65: A-MPR ≤ 2dB. Region D with RB_start=66 – 74: A-MPR ≤ 6.5dB. For 20MHz Region A with RB_start=0 – 12: A-MPR ≤ 15dB. Region B with RB_start=13 – 29: A-MPR ≤ 7dB (L_{CRB}=10-60) or ≤ 10dB (L_{CRB}=1-9 & > 60). Region C with RB_start=30 – 68:		[A] 1, 3, 4, 8, 9, 14, 15, [B] 2, 5, 10, 11, 16, 17 [C] None [D] 6, 7, 12, 13, 18, 19 Network signalled value NS_06: [A]:2, 5, 8, 11, 14, 17 [B]:1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18 [C]:None [D]:None Network signalled value NS_07: [A]:3, 8, 12 [B]:7, 9 [C]:1, 2, 5, 13, 15 [D]:4, 6, 10, 11, 14, 16 Network signalled value NS_08: [A]:1, 2, 4, 5, 12 [B]:3, 6, 11, 13 [C]:None [D]:7, 8, 9, 10, 14, 15, 16, 17 Network signalled value NS_11: [A]: 5c, 6b, 10c, 11c, 25 [B]:8b, 12c, 13c, 14c, 17a, 17b, 21a, 21b, 28 [C]:5a, 5b, 6a, 6c, 10a, 10b, 11, 11b, 15a, 15b, 16a, 16b, 24 [D]: 1a, 1b, 2a, 2b, 3a, 3b, 4a, 4b ,, 7a,7b,7c, 8a, 8c, 9a, 9b,9c, 12a, 12b, 13a, 13b, 14a, 14b, 18a, 18b, 19a, 19b, 20a, 20b, 22a, 22b, 23a, 23b, 26, 27, 29, 30 Network signalled value NS_12: [A]: 3, 8, 13 [B]: None [C]: 1, 4, 6, 11 [D]: 2, 5, 7, 9, 10, 12, 14, 15 Network signalled value NS_13: [A]: None [B]: 3, 4 [C]: 1 [D]: 2, 5 Network signalled value NS_14: [A]: None [B]: 2, 4, 7, 9 [C]: 1, 6 [D]: 3, 5, 8, 10 Network signalled value NS_15: [A]: 1, 7, 14 [B]: 3, 6, 10, 15, 19, 21, 22, 25 [C]: 12, 13 [D]: 2, 4, 5, 8, 9, 11, 16, 17, 18, 20,

	A-MPR ≤ 0dB (L_{CRB}=1-24) or ≤ 7dB (L_{CRB}= ≥ 25). Region D with RB_start=69 – 99: A-MPR ≤ 15dB. For network signalled value NS-20; Depending on the RB_start and RB allocation (5MHZ, 10MHz, 15MHz and 20MHz): For 5MHz Region A with RB_start=≤24: A-MPR ≤ 17dB. Region B with RB_start=0 – 3: A-MPR ≤ 1dB (L_{CRB}=15-19) or ≤ 4dB (L_{CRB}= ≥ 20). Region C with RB_start=4 – 6: A-MPR ≤ 2dB. Region D with RB_start=≤24: A-MPR ≤ 0dB. For 10MHz Fc = 2005 Region A with RB_start=0 – 25: A-MPR ≤ 16dB. Region B with RB_start=26 – 34: A-MPR ≤ 2dB (L_{CRB}=8-15) or ≤ 5dB (L_{CRB}= > 15). Region C with RB_start=35 – 49: A-MPR ≤ 6dB. For 10MHz Fc = 2015 Region A with RB_start=0 – 5: A-MPR ≤ 4dB. Region B with RB_start=6 – 10: A-MPR ≤ 2dB. For 15MHz Region A with RB_start=0 – 14: A-MPR ≤ 11dB (L_{CRB}=1-9 & 40-5) or ≤ 6dB (L_{CRB}= 10-39). Region B with RB_start=15 – 24: A-MPR ≤ 1dB (L_{CRB}=24-29) or ≤ 7dB (L_{CRB}=≥30). Region C with RB_start=25 – 39: A-MPR ≤ 5dB. Region D with RB_start=61 – 74: A-MPR ≤ 6dB. For 20MHz Region A with RB_start=0 – 21: A-MPR ≤ 17dB. Region B with RB_start=22 – 31: A-MPR ≤ 12dB (L_{CRB}=1-9 & 31-75) or ≤ 6dB (L_{CRB}=10-30). Region C with RB_start=32 – 38:		23, 24, 26 Network signalled value NS_20: [A]: 1b, 1c, 1d, 6b, 7b [B]: 2d, 3d, 4d, 5d, 9b [C]: 1a, 6a, 7a, 11, 18, 19 [D]: 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 8a, 8b, 9a, 10a, 11b, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26 Network signalled value NS_27: TBD

	A-MPR ≤ 9dB. Region D with RB_start=39 – 49: A-MPR ≤ 7dB. Region E with RB_start=50 – 69: A-MPR ≤ 5dB. Region F with RB_start=70 – 99: A-MPR ≤ 16dB. For network signalled value NS-27; Depending on the RB_start and RB allocation (15MHz and 20MHz): For 15MHz With L_{CRB} ≤15, LRB_start=0 – 6 or RB_end=68-74: A-MPR ≤ 4dB. With L_{CRB} ≥ 60, LRB_start≥0: A-MPR ≤ 2dB. For 20MHz With L_{CRB} ≤20, LRB_start=0 – 12 or RB_end=87-99: A-MPR ≤ 4dB. With L_{CRB} ≤3, LRB_start=13 – 15 or RB_end=84-86: A-MPR ≤ 1dB. With L_{CRB} ≥ 60, LRB_start≥0: A-MPR ≤ 3dB.		
6.2.4_1 Additional Maximum Power Reduction (A-MPR) for HPUE	For the UE maximum output power modified by MPR and A-MPR, the power limits specified in TS 36.101 [2] clause 6.2.5 apply. For transmission bandwidths (Figure 5.4.2-1) confined within FUL_low and FUL_low + 4 MHz or FUL_high – 4 MHz and FUL_high, the power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB. Power class 1: QPSK: MPR ≤ 1dB 16QAM: Depending on the number RB allocated: 16QAM: MPR ≤ 1dB 16QAM: MPR ≤ 2dB Power class 1: For network signalled value NS_06: A-MPR 0dB	0.7dB	Formula: Upper limit + TT, (UE Maximum Output Power from 6.2.2) - T(P_{CMAX}) – A-MPR – MPR – TT
6.2.4_2 Additional Maximum Power Reduction (A-MPR) for UL 64QAM	Same as 6.2.4	Same as 6.2.4	Same as 6.2.4
6.2.4_3 Additional Maximum Power Reduction	Same as 6.2.4	Same as 6.2.4	Same as 6.2.4

(A-MPR) with PUSCH frequency hopping			
6.2.4A.1 Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA)	A-MPR values as detailed in core requirement	Same as 6.2.4	Formula: Upper limit: +T(P_{CMAX_H}) + TT, Lower limit: -T(P_{CMAX_L})– A-MPR – TT P_{CMAX_H} = $P_{PowerClass}$ P_{CMAX_L} = $P_{PowerClass}$-A-MPR
6.2.4A.1_1 Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.2.4A.1	Same as 6.2.4A.1	Same as 6.2.4A.1
6.2.4A.2 Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA)	Same as 6.2.4	Same as 6.2.4	Formula: Upper limit: +T(P_{CMAX_H}) + TT, Lower limit: -T(P_{CMAX_L}) – MPR – AMPR – TT P_{CMAX_H} = $P_{PowerClass}$ P_{CMAX_L} = $P_{PowerClass}$ – MPR – AMPR - ΔT_C
6.2.4A.2_1 Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.2.4	Same as 6.2.4	Formula: Upper limit: +T(P_{CMAX_H}) + TT, Lower limit: -T(P_{CMAX_L}) – MPR – AMPR – TT P_{CMAX_H} = $P_{PowerClass}$ P_{CMAX_L} = $P_{PowerClass}$ – MPR – AMPR - ΔT_C
6.2.4B Additional Maximum Power Reduction (A-MPR) for UL-MIMO	Same as 6.2.4	Same as 6.2.4	Same as 6.2.4 Uplink power measurement applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.2.4E Additional Maximum Power Reduction (A-MPR) for UE category 0	Same as 6.2.4	Same as 6.2.4	Same as 6.2.4
6.2.4EA Additional Maximum Power Reduction (A-MPR) for UE category M1	A-MPR values as detailed in core requirement	Same as 6.2.4	Formula: Upper limit: +T(P_{CMAX_H}) + TT, Lower limit: -T(P_{CMAX_L})– A-MPR – TT P_{CMAX_H} = $P_{PowerClass}$ P_{CMAX_L} = $P_{PowerClass}$-A-MPR
6.2.5 Configured UE transmitted Output Power	 <u>f ≤ 3.0GHz</u> 13 ≤ PCMAX < 18 ± 5.0 8 ≤ PCMAX < 13 ± 6.0 -40 ≤ PCMAX < 8 ± 7.0 <u>3.0GHz < f ≤ 4.2GHz</u> 13 ≤ PCMAX < 18 ± 5.0 8 ≤ PCMAX < 13 ± 6.0 -40 ≤ PCMAX < 8 ± 7.0	 0.7 dB 0.7 dB 0.7 dB 1.0 dB 1.0 dB 1.0 dB	Formula: Upper limit + TT, Lower limit – TT 13 ≤ PCMAX < 18 ± 5.7 8 ≤ PCMAX < 13 ± 6.7 -40 ≤ PCMAX < 8 ± 7.7 13 ≤ PCMAX < 18 ± 6.0 8 ≤ PCMAX < 13 ± 7.0 -40 ≤ PCMAX < 8 ± 8.0
6.2.5_1 Configured UE transmitted Output Power for HPUE	 <u>f ≤ 3.0GHz</u> 23 ≤ PCMAX < 33 ± 2.0 13 ≤ PCMAX < 18 ± 5.0 8 ≤ PCMAX < 13 ± 6.0 -40 ≤ PCMAX < 8 ± 7.0	 0.7 dB 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit – TT 23 ≤ PCMAX < 33 ± 2.7 13 ≤ PCMAX < 18 ± 5.7 8 ≤ PCMAX < 13 ± 6.7 -40 ≤ PCMAX < 8 ± 7.7
6.2.5A.1 Configured UE transmitted Output Power for CA (intra-band contiguous DL CA and UL CA)	 <u>f ≤ 3.0GHz</u> 13 ≤ PCMAX < 18 ± 5.0 8 ≤ PCMAX < 13 ± 6.0 -40 ≤ PCMAX < 8 ± 7.0 <u>3.0GHz < f ≤ 4.2GHz</u>	 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit – TT 13 ≤ PCMAX < 18 ± 5.7 8 ≤ PCMAX < 13 ± 6.7 -40 ≤ PCMAX < 8 ± 7.7

	13 ≤ PCMAX < 18 ± 5.0 8 ≤ PCMAX < 13 ± 6.0 -40 ≤ PCMAX < 8 ± 7.0	1.0 dB 1.0 dB 1.0 dB	13 ≤ PCMAX < 18 ± 6.0 8 ≤ PCMAX < 13 ± 7.0 -40 ≤ PCMAX < 8 ± 8.0
6.2.5A.3 Configured UE transmitted Output Power for CA (inter-band DL CA and UL CA)	 f ≤ 3.0GHz 16 ≤ PCMAX < 20 ± 5.0 11≤ PCMAX < 16 ± 6.0 -40 ≤ PCMAX < 11 ± 7.0	 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit – TT 16 ≤ PCMAX < 20 ± 5.7 11 ≤ PCMAX < 16 ± 6.7 -40 ≤ PCMAX < 11 ± 7.7
6.2.5A.4 Configured UE transmitted Output Power for CA (intra-band non-contiguous DL CA and UL CA)	 f ≤ 3.0GHz 13 ≤ PCMAX < 18 ± 5.0 8 ≤ PCMAX < 13 ± 6.0 -40 ≤ PCMAX < 8 ± 7.0	 0.7 dB 0.7 dB 0.7 dB	Formula: Upper limit + TT, Lower limit – TT 13 ≤ PCMAX < 18 ± 5.7 8 ≤ PCMAX < 13 ± 6.7 -40 ≤ PCMAX < 8 ± 7.7
6.2.5B Configured UE transmitted output power for UL-MIMO	 f ≤ 3.0GHz [16] ≤ PCMAX < [20] ± [5.0] [11] ≤ PCMAX < [16] ± [6.0] [-40] ≤ PCMAX < [11] ± [7.0] 3.0GHz < f ≤ 4.2GHz [16] ≤ PCMAX < [20] ± [5.0] [11] ≤ PCMAX < [16] ± [6.0] [-40] ≤ PCMAX < [11] ± [7.0]	 Same as 6.2.5	Formula: Upper limit + TT, Lower limit – TT [16] ≤ PCMAX < [20] ± [5.7] [11] ≤ PCMAX < [16] ± [6.7] [-40] ≤ PCMAX < [11] ± [7.7] [16] ≤ PCMAX < [20] ± [6.0] [11] ≤ PCMAX < [16] ± [7.0] [-40] ≤ PCMAX < [11] ± [8.0] Uplink power measurement applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.2.5E Configurated Transmitted Power for UE category 0	Same as 6.2.5	Same as 6.2.5	Same as 6.2.5
6.2.5EA Configured UE transmitted Power for UE category M1	Same as 6.2.5	Same as 6.2.5	Same as 6.2.5
6.2.5F Configured UE transmitted Output Power for UE category NB1	Tolerances as described in core requirements	0.7 dB	Formula: Upper limit + TT, Lower limit – TT
6.3.2 Minimum Output Power	 f ≤ 3.0GHz -40 dBm 3.0GHz < f ≤ 4.2GHz -40 dBm	 1.0 dB 1.3 dB	Formula: Minimum Requirement + TT UE min. output power =–39 dBm UE min. output power =–38.7 dBm
6.3.2A.1 Minimum Output Power for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.2	Same as 6.3.2	[Same as 6.3.2
6.3.2B Minimum Output Power for UL-MIMO	Same as 6.3.2	Same as 6.3.2	Same as 6.3.2 Uplink power measurement applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.3.2E Minimum Output Power for UE category 0	Same as 6.3.2	Same as 6.3.2	Same as 6.3.2
6.3.2EA Minimum Output Power for UE category M1	Same as 6.3.2	Same as 6.3.2	Same as 6.3.2
6.3.2F Minimum Output Power for UE category NB1	-40 dBm	1.0 dB	Formula: Minimum Requirement + TT UE min. output power =–39 dBm
6.3.2G.1 Minimum output power for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	Same as 6.3.2	Same as 6.3.2	Same as 6.3.2

6.3.2G.2 Minimum output power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	Same as 6.3.2	Same as 6.3.2	Same as 6.3.2
6.3.2G.3 Minimum output power for V2X Communication / Intra-band contiguous multi-carrier operation	Same as 6.3.2	Same as 6.3.2	Same as 6.3.2
6.3.3 Transmission ON/OFF Power	f ≤ 3.0GHz ≤ -50 dBm 3.0GHz < f ≤ 4.2GHz ≤ -50 dBm	 1.5 dB 1.8 dB	Formula: Minimum Requirement + TT UE OFF Power ≤ -48.5 dBm UE OFF Power ≤ -48.2 dBm
6.3.3A.1 UE Transmit OFF power for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.3	Same as 6.3.3	Same as 6.3.3
6.3.3A.2 Transmit OFF Power for CA (inter-band DL CA and UL CA)	Same as 6.3.3	Same as 6.3.3	Same as 6.3.3
6.3.3A.3 UE Transmit OFF power for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.3	Same as 6.3.3	Same as 6.3.3
6.3.3B UE Transmit OFF power for UL-MIMO	Same as 6.3.3	Same as 6.3.3	Same as 6.3.3 Uplink power measurement applies to each Tx antenna connector
6.3.3D UE Transmit OFF power for ProSe	Same as 6.3.3	Same as 6.3.3	Same as 6.3.3
6.3.3E UE Transmit OFF Power for UE category 0	Same as 6.3.3	Same as 6.3.3	Same as 6.3.3
6.3.3EA UE Transmit OFF power for UE category M1	Same as 6.3.3	Same as 6.3.3	Same as 6.3.3
6.3.4.1 General ON/OFF time mask	f ≤ 3.0GHz OFF Power ≤ -50 dBm ON Power BW dependent 3.0GHz < f ≤ 4.2GHz OFF Power ≤ -50 dBm ON Power BW dependent Transmission ON Power value depends on the test parameters. In the particular test case parameters the ON power measurement has minimum requirements of ±6.0 dB	 1.5 dB 1.5 dB 1.8 dB 1.8 dB	Formulae: OFF Power Minimum Req't + TT ON Power Upper limit + TT, Lower limit – TT UE OFF Power ≤ -48.5 dBm UE ON Power: Test value ± 7.5 dB UE OFF Power ≤ -48.2 dBm UE ON Power: Test value ± 7.8 dB
6.3.4.2 PRACH and SRS time mask	f ≤ 3.0GHz OFF Power ≤ -50 dBm ON Power BW dependent 3.0GHz < f ≤ 4.2GHz OFF Power ≤ -50 dBm ON Power BW dependent	 1.5 dB 1.5 dB 1.8 dB 1.8 dB	Formulae: OFF Power Minimum Req't + TT ON Power Upper limit + TT, Lower limit – TT UE OFF Power ≤ -48.5 dBm UE ON Power: Test value ± 7.5 dB UE OFF Power ≤ -48.2 dBm UE ON Power: Test value ± 7.8 dB

	Transmission ON Power value depends on the test parameters. In the particular test case parameters the ON power measurement has minimum requirements of ±6.0 dB		
6.3.4A.1.1 General ON/OFF time mask for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.4.1 for each CC	Same as 6.3.4.1	Same as 6.3.4.1 for each CC
6.3.4A.1.2 General ON/OFF time mask for CA (inter-band DL CA and UL CA)	Same as 6.3.4.1	Same as 6.3.4.1	Same as 6.3.4.1
6.3.4A.1.3 General ON/OFF time mask for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.4.1 for each CC	Same as 6.3.4.1	Same as 6.3.4.1 for each CC
6.3.4B.1 General ON/OFF time mask for UL-MIMO	Same as 6.3.4.1	Same as 6.3.4.1	Same as 6.3.4.1 Uplink OFF power measurement applies to each Tx antenna connector Uplink ON power measurement applies to [FFS]
6.3.4C.1 General ON/OFF time mask for Dual Connectivity	Same as 6.3.4.1	Same as 6.3.4.1	Same as 6.3.4.1
6.3.4E.1 General ON/OFF time mask for UE category 0	Same as 6.3.4.1	Same as 6.3.4.1	Same as 6.3.4.1
6.3.4E.2 PRACH and SRS time mask for UE category 0	Same as 6.3.4.2	Same as 6.3.4.2	Same as 6.3.4.2
6.3.4EA.1 General ON/OFF time mask for UE category M1	Same as 6.3.4.1	Same as 6.3.4.1	Same as 6.3.4.1
6.3.4EA.2 PRACH and SRS ON/OFF time mask for UE category M1	Same as 6.3.4.2	Same as 6.3.4.2	Same as 6.3.4.2
6.3.4F.1 General ON/OFF time mask for category NB1	Same as 6.3.4.1	Same as 6.3.4.1	Same as 6.3.4.1
6.3.4F.2 NPRACH time mask for category NB1	Same as 6.3.4.2	Same as 6.3.4.2	Same as 6.3.4.2
6.3.5.1 Power Control Absolute power tolerance	 f ≤ 3.0GHz Normal conditions ± 9.0 dB Extreme conditions ± 12.0 dB 3.0GHz < f ≤ 4.2GHz Normal conditions ± 9.0 dB Extreme conditions ± 12.0 dB	 1.0 dB 1.0 dB 1.4 dB 1.4 dB	Formula: Upper limit + TT, Lower limit – TT Normal conditions ± 10.0 dB Extreme conditions ± 13.0 dB Normal conditions ± 10.4 dB Extreme conditions ± 13.4 dB
6.3.5.2 Power Control Relative power tolerance	TS 36.101 [2] clause 6.3.5.1 All combinations of PUSCH and PUCCH transitions: ΔP < 2; ±2.5 dB 2 ≤ ΔP < 3; ±3.0 dB 3 ≤ ΔP < 4; ±3.5 dB 4 ≤ ΔP ≤ 10; ±4.0 dB 10 ≤ ΔP < 15; ±5.0 dB 15 ≤ ΔP; ±6.0 dB	0.7 dB	Formula: Upper limit + TT, Lower limit – TT All combinations of PUSCH and PUCCH transitions: ΔP < 2; ±3.2 dB 2 ≤ ΔP < 3; ±3.7 dB 3 ≤ ΔP < 4; ±4.2 dB 4 ≤ ΔP < 10; ±4.7 dB 10 ≤ ΔP < 15; ±5.7 dB 15 ≤ ΔP; ±6.7 dB
6.3.5.3 Aggregate power	Aggregate power control	0.7 dB	Formula:

control tolerance	tolerance within 21 ms: PUCCH = ±2.5 dB PUSCH = ±3.5 dB		Upper limit + TT, Lower limit - TT PUCCH = ±3.2 dB PUSCH = ±4.2 dB
6.3.5_1.1 Power Control Absolute power tolerance for HPUE	 <u>f ≤ 3.0GHz</u> Normal conditions ± 9.0 dB Extreme conditions ± 12.0 dB	 1.0 dB 1.0 dB	Formula: Upper limit + TT, Lower limit – TT Normal conditions ± 10.0 dB Extreme conditions ± 13.0 dB
6.3.5_1.2 Power Control Relative power tolerance for HPUE	Same as 6.3.5.2	Same as 6.3.5.2	Same as 6.3.5.2
6.3.5_1.3 Aggregate power control tolerance for HPUE	Same as 6.3.5.3	Same as 6.3.5.3	Same as 6.3.5.3
6.3.5A.1.1 Power Control Absolute power tolerance for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.5.1	Same as 6.3.5.1	Same as 6.3.5.1
6.3.5A.1.2 Power Control Absolute power tolerance for CA (inter-band DL CA and UL CA)	Same as 6.3.5.1	Same as 6.3.5.1	Same as 6.3.5.1
6.3.5A.1.3 Power Control Absolute power tolerance for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.5.1	Same as 6.3.5.1	Same as 6.3.5.1
6.3.5A.2.1 Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA)	TS 36.101 [2] clause 6.3.5A.2 refers to Table 6.3.5.2.1-1. All combinations of PUSCH and PUCCH transitions: <u>SCC power increase</u> PCC 0dB (ΔP ≤ 1dB): Normal 0 ±1.0dB Exceptions: 0 ±6.0dB SCC +9dB (4 ≤ ΔP ≤ 10): Normal +9 ±4.0dB Exceptions: +9 ±6.0dB <u>SCC power decrease</u> PCC 0dB (ΔP ≤ 1dB): Normal 0 ±1.0dB Exceptions: 0 ±6.0dB SCC -9dB (4 ≤ ΔP ≤ 10): Normal -9 ±4.0dB Exceptions: -9 ±6.0dB <u>PCC and SCC power increase</u> PCC +9dB (4 ≤ ΔP ≤ 10): Normal +9 ±4.0dB Exceptions: +9 ±6.0dB SCC +9dB (4 ≤ ΔP ≤ 10): Normal +9 ±4.0dB Exceptions: +9 ±6.0dB <u>PCC and SCC power decrease</u> PCC -9dB (4 ≤ ΔP ≤ 10):	 <

	Normal -9 ±4.0dB Exceptions: -9 ±6.0dB SCC -9dB (4 ≤ ΔP ≤ 10): Normal -9 ±4.0dB Exceptions: -9 ±6.0dB Each CC can have exceptions	-0.8, +0.7dB -0.8, +0.7dB -0.8, +0.7dB -0.8, +0.7dB	Normal -13.8, -4.3dB Exceptions: -15.8, -2.3dB SCC: Normal -13.8, -4.3dB Exceptions: -15.8, -2.3dB The analysis is recorded in 3GPP TR 36.904 [17] When setting SCC power for the next step, three factors are relevant: 1. Uplink Relative level measurement uncertainty 2. IQ image Leakage onto weaker CC at -25dBc is allowed for the UE 3) TPC step 1dB ±1dB is allowed for the UE These are added arithmetically, giving an extra margin of (1+0.7+0.17) = 1.87dB (2dB is allowed) to avoid the same power step exception being counted twice.
6.3.5A.2.2 Power Control Relative power tolerance for CA (inter-band DL CA and UL CA)	Same as 6.3.5.2 on both PCC and SCC separately.	Same as 6.3.5.2 on both PCC and SCC separately.	Same as 6.3.5.2 on both PCC and SCC separately.
6.3.5A.2.3 Power Control Relative power tolerance for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.5A.2.1	Same as 6.3.5A.2.1	Same as 6.3.5A.2.1
6.3.5A.3.1 Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA)	Same as 6.3.5.3	Same as 6.3.5.3	Same as 6.3.5.3
6.3.5A.3.2 Aggregate power control tolerance for CA (inter-band DL CA and UL CA)	Same as 6.3.5.3	Same as 6.3.5.3	Same as 6.3.5.3
6.3.5A.3.3 Aggregate power control tolerance for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.3.5.3	Same as 6.3.5.3	Same as 6.3.5.3
6.3.5B.1 Power Control Absolute Power Tolerance for UL- MIMO	Same as 6.3.5.1	Same as 6.3.5.1	Same as 6.3.5.1 Uplink power measurement applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.3.5B.2 Power Control Relative power tolerance for UL-MIMO	Same as 6.3.5.2	Same as 6.3.5.2	Same as 6.3.5.2 Uplink power measurement applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.3.5B.3 Aggregate power control tolerance for UL-MIMO	Same as 6.3.5.3	Same as 6.3.5.3	Same as 6.3.5.3 Uplink power measurement applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.3.5C.2 Power Control Relative power tolerance for Dual Connectivity	Same as 6.3.5.2 on both PCC and SCC separately.	Same as 6.3.5.2 on both PCC and SCC separately.	Same as 6.3.5.2 on both PCC and SCC separately.

6.3.5C.2_1 Power Control Relative power tolerance for asynchronous Dual Connectivity	Same as 6.3.5.2 on both PCC and SCC separately.	Same as 6.3.5.2 on both PCC and SCC separately.	Same as 6.3.5.2 on both PCC and SCC separately.
6.3.5E.1 Power Control Absolute power tolerance for UE category 0	Same as 6.3.5.1	Same as 6.3.5.1	Same as 6.3.5.1
6.3.5E.2 Power Control Relative power tolerance for UE category 0	Same as 6.3.5.2	Same as 6.3.5.2	Same as 6.3.5.2
6.3.5E.3 Aggregate power control tolerance for UE category 0	Same as 6.3.5.3	Same as 6.3.5.3	Same as 6.3.5.3
6.3.5EA.1 Power Control Absolute power tolerance for UE category M1	 <u>f ≤ 3.0GHz</u> Normal conditions ± 9.0 dB Extreme conditions ± 12.0 dB	 1.0 dB 1.0 dB	Formula: Upper limit + TT, Lower limit – TT Normal conditions ± 10.0 dB Extreme conditions ± 13.0 dB
6.3.5EA.2 Power Control Relative power tolerance for UE category M1	TS 36.101 [2] clause 6.3.5.1 All combinations of PUSCH and PUCCH transitions: ΔP < 2; ±2.5 dB 2 ≤ ΔP < 3; ±3.0 dB 3 ≤ ΔP < 4; ±3.5 dB 4 ≤ ΔP ≤ 10; ±4.0 dB 10 ≤ ΔP < 15; ±5.0 dB 15 ≤ ΔP; ±6.0 dB	0.7 dB	Formula: Upper limit + TT, Lower limit – TT All combinations of PUSCH and PUCCH transitions: ΔP < 2; ±3.2 dB 2 ≤ ΔP < 3; ±3.7 dB 3 ≤ ΔP < 4; ±4.2 dB 4 ≤ ΔP < 10; ±4.7 dB 10 ≤ ΔP < 15; ±5.7 dB 15 ≤ ΔP; ±6.7 dB
6.3.5EA.3 Aggregate power control tolerance for UE category M1	Same as 6.3.5.3	Same as 6.3.5.3	Same as 6.3.5.3
6.3.5EA.3_1 Aggregate power control tolerance for UE category M1 (CE Mode B)	Same as 6.3.5.3	Same as 6.3.5.3	Same as 6.3.5.3
6.3.5F.1 Power Control Absolute power tolerance for category NB1	<u>f ≤ 3.0GHz</u> Normal conditions ± 9.0 dB Extreme conditions ± 12.0 dB	1.0 dB 1.0 dB	Formula: Upper limit + TT, Lower limit – TT Normal conditions ± 10.0 dB Extreme conditions ± 13.0 dB
6.3.5F.2 Power Control Relative power tolerance for UE category NB1	TS 36.101 [2] clause 6.3.5F.2 NPRACH transitions: ΔP = 0; ±1.5 dB ΔP = 2; ±2.0 dB ΔP = 4; ±3.5 dB ΔP = 6; ±4.0 dB	0.7 dB	Formula: Upper limit + TT, Lower limit – TT NPRACH transitions: ΔP = 0; ±2.2 dB ΔP = 2; ±2.7 dB ΔP = 4; ±4.2 dB ΔP = 6; ±4.7 dB
6.5.1 Frequency Error	 Modulated carrier, f ≤ 4.2GHz Within ±0.1 ppm compared to the received carrier frequency <u>f ≤ 3.0GHz</u> DL power: Refsens <u>3.0GHz < f ≤ 4.2GHz</u> DL power: Refsens	 15 Hz 0.7 dB 1.0 dB	Formula: Modulated carrier frequency: Upper limit + TT, Lower limit – TT DL power: Refsens + TT Modulated carrier frequency error = ±(0.1 ppm + 15 Hz) Refsens +0.7dB Refsens +1.0dB
6.5.1A.1 Frequency error for CA (intra-band contiguous DL CA and UL CA)	Same as 6.5.1	Same as 6.5.1	Same as 6.5.1

6.5.1A.2 Frequency Error for CA (inter-band DL CA and UL CA)	Same as 6.5.1 per CC	Same as 6.5.1 per CC	Same as 6.5.1 per CC
6.5.1A.3 Frequency Error for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.5.1 per CC	Same as 6.5.1 per CC	Same as 6.5.1 per CC
6.5.1B Frequency Error for UL-MIMO	Same as 6.5.1	Same as 6.5.1	Same as 6.5.1
6.5.1D.1 Frequency Error for ProSe Direct Discovery	Modulated carrier, f ≤ 4.2GHz Within ±0.1 ppm compared to the received carrier frequency f ≤ 3.0GHz Sidelink power: Refsens	15 Hz 0.7 dB	Formula: Modulated carrier frequency: Upper limit + TT, Lower limit – TT Sidelink power: Refsens + TT Modulated carrier frequency error = ±(0.1 ppm + 15 Hz) Refsens +0.7dB
6.5.1D.2 Frequency Error for ProSe Direct Communication	Same as 6.5.1D.1	Same as 6.5.1D.1	Same as 6.5.1D.1
6.5.1E Frequency Error for UE category 0	Same as 6.5.1	Same as 6.5.1	Same as 6.5.1
6.5.1EA Frequency Error for UE category M1	Same as 6.5.1	Same as 6.5.1	Same as 6.5.1
6.5.1F Frequency Error for category NB1	Modulated carrier, f ≤ 3.0GHz Within ±0.1 ppm compared to the received carrier frequency f ≤ 3.0GHz DL power: Refsens	15 Hz 0.7 dB	Formula: Modulated carrier frequency: Upper limit + TT, Lower limit – TT DL power: Refsens + TT Modulated carrier frequency error = ±(0.1 ppm + 15 Hz) Refsens +0.7dB
6.5.2.1 Error Vector Magnitude	EVM limit: BPSK :17.5 % QPSK: 17.5 % 16QAM: 12.5 %	0%	Formula: Minimum Requirement + TT
6.5.2.1_1 Error Vector Magnitude (EVM) for UL 64QAM	EVM limit: 64QAM: 8.0 %	0%	Formula: Minimum Requirement + TT
6.5.2.1A PUSCH-EVM with exclusion period	EVM limit: QPSK: 17.5 % 16QAM: 12.5 %	0%	Formula: Minimum Requirement + TT
6.5.2A.1.1 Error Vector Magnitude (EVM) for CA (intra-band contiguous DL CA and UL CA)	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1
6.5.2A.1.1_1 EVM for CA (intra-band contiguous DL CA and UL CA) with UL 64QAM	Same as 6.5.2.1_1	Same as 6.5.2.1_1	Same as 6.5.2.1_1
6.5.2A.1.2 Error Vector Magnitude (EVM) for CA (inter-band DL CA and UL CA)	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1
6.5.2A.1.2_1 EVM for CA (inter-band DL CA and UL CA) with UL 64QAM	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1
6.5.2A.1.3 Error Vector Magnitude (EVM) for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1
6.5.2A.1.3_1 EVM for CA (intra-band non-contiguous DL CA and UL CA) with UL	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1

64QAM			
6.5.2A.1.4 Error Vector Magnitude (EVM) for CA (3UL CA)	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1
6.5.2B.1 Error Vector Magnitude (EVM) for UL-MIMO	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.5.2.1E.1 Error Vector Magnitude for UE category 0	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1
6.5.2.1E.2 PUSCH-EVM with exclusion period for UE category 0	Same as 6.5.2.1A	Same as 6.5.2.1A	
6.5.2.1EA.1 Error Vector Magnitude for UE category M1	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1
6.5.2.1EA.2 PUSCH-EVM with exclusion period for UE category M1	Same as 6.5.2.1A	Same as 6.5.2.1A	
6.5.2.1F.1 Error Vector Magnitude (EVM) for UE category NB1	Same as 6.5.2.1	Same as 6.5.2.1	Same as 6.5.2.1
6.5.2.2 Carrier leakage	For Output power >0 dBm -25dBc For -30 dBm ≤ Output power ≤0 dBm -20dBc For -40 dBm ≤ Output power < -30 dBm -10dBc	0.8dB	Formula: Minimum Requirement + TT
6.5.2.2F Carrier leakage for UE category NB1	Same as 6.5.2.2	Same as 6.5.2.2	Same as 6.5.2.2
6.5.2.3 In-band emissions for non allocated RB	For general emissions: $\max\{ -25-10\cdot\log_{10}(N_{RB}/L_{CRB}$ $20\cdot\log_{10} EVM -3-5\cdot(\lvert\Delta_{RB}\rvert-1)$ $-57\ dBm/180\ kHz - P_{RB}\}$ For IQ image: -25dB For Carrier leakage: Output power >0 dBm -25dBc -30 dBm ≤ Output power ≤0 dBm -20dBc -40 dBm ≤ Output power < -30 dBm -10dBc For each evaluated RB, the test requirement is calculated as the higher of $P_{RB}-30$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage)	0.8dB	Formula: Minimum Requirement + TT
6.5.2.4 EVM equalizer Spectrum flatness	Normal conditions. If (F-FUL_low ≥ [3MHz])&(FUL_high-F≥ [3MHz]) 4 dB	1.4dB	Formula: Minimum Requirement + TT

	else
	8 dB
	
	maximum coefficient in Range 1 - the minimum coefficient in Range 2
	5 dB
	the maximum coefficient in Range 2 - the minimum coefficient in Range
	7 dB
	Extreme conditions:
	
	If (F-FUL_low ≥ [5MHz])&(FUL_high-F≥ [5MHz])
	4 dB
	else
	12 dB
	
	maximum coefficient in Range 1 - the minimum coefficient in Range 2
	6 dB
	the maximum coefficient in Range 2 - the minimum coefficient in Range
	10 dB		

6.5.2A.2.1 Carrier leakage for CA (intra-band contiguous DL CA and UL CA)	Same as 6.5.2.2	Same as 6.5.2.2	Same as 6.5.2.2
6.5.2A.2.2 Carrier leakage for CA (inter-band DL CA and UL CA)	For Output power >0 dBm -25dBc For -30 dBm ≤ Output power ≤0 dBm -20dBc For -40 dBm ≤ Output power < -30 dBm -10dBc	0.8dB	Formula: Minimum Requirement + TT
6.5.2A.2.3 Carrier leakage for CA (intra-band non-contiguous DL CA and UL CA)	For Output power >0 dBm -25dBc For -30 dBm ≤ Output power ≤0 dBm -20dBc For -40 dBm ≤ Output power < -30 dBm -10dBc	0.8dB	Formula: Minimum Requirement + TT
6.5.2A.2.4 Carrier leakage for CA (3UL CA)	Same as 6.5.2.2	Same as 6.5.2.2	Same as 6.5.2.2
6.5.2A.3.1 In-band emissions for non allocated RB for CA (intra-band contiguous DL CA and UL CA)	Same as 6.5.2.3	Same as 6.5.2.3	Same as 6.5.2.3
6.5.2A.3.2 In-band emissions for non allocated RB for CA (inter-band DL CA and UL CA)	Same as 6.5.2.3	Same as 6.5.2.3	Same as 6.5.2.3
6.5.2A.3.3 In-band emissions for non allocated RB for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.5.2.3	Same as 6.5.2.3	Same as 6.5.2.3
6.5.2A.3.4 In-band	Same as 6.5.2.3	Same as	Same as 6.5.2.3

emissions for non allocated RB for CA (3UL CA)		6.5.2.3	
6.5.2B.1 Error vector magnitude (EVM) for UL-MIMO	TBD	TBD	TBD
6.5.2B.2 Carrier leakage for UL-MIMO	Same as 6.5.2.2	Same as 6.5.2.2	Same as 6.5.2.2 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.5.2B.3 In-band emissions for non allocated RB for UL-MIMO	Same as 6.5.2.3	Same as 6.5.2.3	Same as 6.5.2.3 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
6.5.2B.4 EVM equalizer spectrum flatness for UL-MIMO	Same as 6.5.2.4	Same as 6.5.2.4	Same as 6.5.2.4
6.5.2.2E Carrier Leakage for UE category 0	Same as 6.5.2.2	Same as 6.5.2.2	Same as 6.5.2.2
6.5.2.2EA Carrier Leakage for UE category M1	Same as 6.5.2.2	Same as 6.5.2.2	Same as 6.5.2.2
6.5.2.3E In-band emissions for non allocated RB for UE category 0	Same as 6.5.2.3	Same as 6.5.2.3	Same as 6.5.2.3
6.5.2.3EA In-band emissions for non allocated RB for UE category M1	Same as 6.5.2.3	Same as 6.5.2.3	Same as 6.5.2.3
6.5.2.3F In-band emissions for non allocated RB for UE category NB1	For general emissions: $\max\{ -15-10\cdot\log_{10}(N_{tone}/L_{C}$ $-18-5\cdot(\lvert\Delta_{tone}\rvert-1)/L_{Ctone}$, $-57\ dBm/(3.75kHz\ or\ 15kHz)-$ For IQ image: -25dB For Carrier leakage: Output power >0 dBm -25dBc -30 dBm ≤ Output power ≤0 dBm -20dBc -40 dBm ≤ Output power < -30 dBm -10dBc For each evaluated tone, the test requirement is calculated as the higher of $P_{tone}-30$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage)	Same as 6.5.2.3	Same as 6.5.2.3
6.5.2.4E EVM equalizer spectrum flatness for UE category 0	Same as 6.5.2.4	Same as 6.5.2.4	Same as 6.5.2.4
6.5.2.4EA EVM equalizer spectrum flatness for UE category M1	Same as 6.5.2.4	Same as 6.5.2.4	Same as 6.5.2.4
6.6.1 Occupied bandwidth	For 1.4 MHz channel bandwidth: Occupied channel bandwidth = 1.4 MHz For 3.0 MHz channel bandwidth:	0kHz	Formula: Minimum Requirement + TT

	Occupied channel bandwidth = 3.0 MHz For 5 MHz channel bandwidth: Occupied channel bandwidth = 5 MHz For 10 MHz channel bandwidth: Occupied channel bandwidth = 10 MHz For 15 MHz channel bandwidth: Occupied channel bandwidth = 15 MHz For 20 MHz channel bandwidth: Occupied channel bandwidth = 20 MHz		
6.6.1A.1 Occupied bandwidth for CA (intra-band contiguous DL CA and UL CA)	For 25(20+5) MHz channel bandwidth: Occupied channel bandwidth = 24.95 MHz For 30(20+10) MHz channel bandwidth: Occupied channel bandwidth = 29.90 MHz For 30(15+15) MHz channel bandwidth: Occupied channel bandwidth = 30.00 MHz For 35(20+15)MHz channel bandwidth: Occupied channel bandwidth = 34.85 MHz For 40(20+20) MHz channel bandwidth: Occupied channel bandwidth = 39.80 MHz	Same as 6.6.1	Same as 6.6.1
6.6.1A.2 Occupied bandwidth for CA (inter-band DL CA and UL CA)	Same as 6.6.1 per CC	Same as 6.6.1 per CC	Same as 6.6.1 per CC
6.6.1A.3	Same as 6.6.1 for each CC	Same as 6.6.1	Same as 6.6.1 for each CC
6.6.1B Occupied bandwidth for UL-MIMO	Same as 6.6.1	Same as 6.6.1	Same as 6.6.1
6.6.1E Occupied bandwidth for UE category 0	Same as 6.6.1	Same as 6.6.1	Same as 6.6.1
6.6.1EA Occupied bandwidth for UE category M1	Same as 6.6.1	Same as 6.6.1	Same as 6.6.1
6.6.1F Occupied bandwidth for UE category NB1	Occupied channel bandwidth = 200KHz	0kHz	Formula: Minimum Requirement + TT
6.6.1G.1 Occupied bandwidth for V2X Communication / Non-concurrent with E-UTRA uplink transmission	Same as 6.6.1	Same as 6.6.1	Same as 6.6.1
6.6.1G.2 Occupied bandwidth for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	Same as 6.6.1	Same as 6.6.1	Same as 6.6.1
6.6.2.1 Spectrum Emission	For 1.4 MHz BW:	All cases:	Formula:

Mask	-10 dBm / 30kHz -25dBm to -10dBm / 1MHz For 3 MHz BW: -13 dBm / 30kHz -25dBm to -10dBm / 1MHz For 5 MHz BW: -15dBm / 30kHz -25dBm to -10dBm / 1MHz For 10 MHz BW: -18dBm / 30kHz -25dBm to -10dBm / 1MHz For 15 MHz BW: -20dBm / 30kHz -25dBm to -10dBm / 1MHz For 20 MHz BW: -21dBm / 30kHz -25dBm to -10dBm / 1MHz	f ≤ 3.0GHz 1.5dB 3.0GHz < f ≤ 4.2GHz 1.8dB	Minimum Requirement + TT Note: The Test Tolerance would be 0dB for Δf_{OOB} ≥ 2 x Channel Bandwidth, but taking into account the filter position, the Test requirements specified all have Δf_{OOB} < 2 x Channel Bandwidth
6.6.2.1_1 Spectrum Emission Mask for Multi-Cluster PUSCH	Same as 6.6.2.1	Same as 6.6.2.1	Same as 6.6.2.1
6.6.2.1A.1 Spectrum emission mask for CA (intra-band contiguous DL CA and UL CA)	For 24.95 MHz BW: -22 dBm / 30kHz -25 dBm to - 10 dBm / 1 MHz For 29.9 MHz BW: -22.5 dBm / 30kHz -25dBm to -10dBm / 1MHz For 30 MHz BW: -22.5 dBm / 30kHz -25dBm to -10dBm / 1MHz For 34.85 MHz BW: -23.5dBm / 30kHz -25dBm to -10dBm / 1MHz For 39.8 MHz BW: -24dBm / 30kHz -25dBm to -10dBm / 1MHz	Same as 6.6.2.1	Same as 6.6.2.1
6.6.2.1A.2 Spectrum emission mask for CA (inter-band DL CA and UL CA)	Same as 6.6.2.1 per CC	Same as 6.6.2.1 per CC	Same as 6.6.2.1 per CC
6.6.2.1A.3 Spectrum Emission Mask for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.2.1 for each CC	Same as 6.6.2.1	Same as 6.6.2.1 for each CC
6.6.2.1B Spectrum Emission Mask for UL-MIMO	Same as 6.6.2.1	Same as 6.6.2.1	Same as 6.6.2.1
6.6.2.1E Spectrum Emission Mask for UE category 0	Same as 6.6.2.1	Same as 6.6.2.1	Same as 6.6.2.1
6.6.2.1EA Spectrum Emission Mask for UE category M1	Same as 6.6.2.1	Same as 6.6.2.1	Same as 6.6.2.1
6.6.2.1F Spectrum Emission Mask for UE category NB1	For all frequencies -35dBm to 26dBm / 30kHz For frequencies that are Foffset away from edge of NB1 channel edge as defined in Table 6.6.2.1F.3-2, same as 6.6.2.1	All cases: f ≤ 3.0GHz 1.5dB	For all frequencies interpolated Minimum Requirement + TT
6.6.2.2 Additional Spectrum Emission Mask	For 1.4 MHz BW: NS_03, NS_04 -10 dBm / 30 kHz -25 dBm to -13 dBm / 1MHz NS_06 or NS_07 -13 dBm / 30 kHz -13 dBm / 100 kHz -25 dBm to -13 dBm / 1MHz	All cases: f ≤ 3.0GHz 1.5dB 3.0GHz < f ≤ 4.2GHz 1.8dB	Formula: Minimum Requirement + TT Note: The Test Tolerance would be 0dB for Δf_{OOB} ≥ 2 x Channel Bandwidth, but taking into account the filter position, the Test requirements specified all have Δf_{OOB} < 2 x Channel Bandwidth

	For 3 MHz BW: NS_03, NS_04 -13 dBm / 30 kHz -25 dBm to -13 dBm / 1 MHz NS_06 or NS_07 -13 dBm / 30 kHz -13 dBm / 100kHz -25 dBm to -13 dBm / 1 MHz For 5 MHz BW: NS_03, NS_04 -15 dBm / 30 kHz -25 dBm to -13 dBm / 1 MHz NS_06 or NS_07 -15 dBm / 30 kHz -13 dBm / 100 kHz -25 dBm to -13 dBm / 1 MHz For 10 MHz BW: NS_03, NS_04, -18 dBm / 30 kHz -25 dBm to - 13dBm / 1 MHz NS_06 or NS_07 -18 dBm / 30 kHz -13 dBm / 100 kHz -25 dBm to - 13dBm / 1 MHz For 15 MHz BW: NS_03, NS_04 -20 dBm / 30kHz -25 dBm to -13 dBm / 1 MHz For 20 MHz BW: NS_03, NS_04 -21 dBm / 30 kHz -25 dBm to -13 dBm / 1 MHz		
6.6.2.2_1 Additional Spectrum Emission Mask for UL 64QAM	Same as 6.6.2.2	Same as 6.6.2.2	Same as 6.6.2.2
6.6.2.2A-1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA)	For network signalled value CA_NS_04: -21dBm/30kHz to -22.5dBm/kHz, BW-dependent, for 0-1MHz -13dBm/1MHz for 1MHz-5.5MHz -25dBm/1MHz beyond 5.5MHz	Same as 6.6.2.2	Same as 6.6.2.2
6.6.2.2A.1_1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.6.2.2A.1	Same as 6.6.2.2A.1	Same as 6.6.2.2A.1
6.6.2.2A.2 Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA)	Same as 6.6.2.2	Same as 6.6.2.2	Same as 6.6.2.2
6.6.2.2A.2_1 Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.6.2.2	Same as 6.6.2.2	Same as 6.6.2.2
6.6.2.2A.3 Additional Spectrum Emission Mask for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.2.2	Same as 6.6.2.2	Same as 6.6.2.2
6.6.2.2B Additional	Same as 6.6.2.2	Same as	Same as 6.6.2.2

Spectrum Emission Mask for UL-MIMO		6.6.2.2	
6.6.2.2E Additional Spectrum Emission Mask for UE category 0	Same as 6.6.2.2	Same as 6.6.2.2	Same as 6.6.2.2
6.6.2.2EA Additional Spectrum Emission Mask for UE category M1	Same as 6.6.2.2	Same as 6.6.2.2	Same as 6.6.2.2
6.6.2.3 Adjacent Channel Leakage power Ratio	If the adjacent channel power is greater than –50 dBm then the ACLR shall be higher than the values specified below. E-UTRA ACLR: 30 dB UTRA ACLR: 33 dB for UTRA ACLR 1 36 dB for UTRA ACLR 2	0 dB 0.8 dB 0.8 dB 0.8 dB	Formula: ACLR Minimum Requirement + TT Formula: ACLR Minimum Requirement - TT E-UTRA ACLR: 29.2 dB UTRA ACLR: 32.2 dB for UTRA ACLR 1 35.2 dB for UTRA ACLR 2
6.6.2.3_1 Adjacent Channel Leakage power Ratio for HPUE	If the adjacent channel power is greater than –50 dBm then the ACLR shall be higher than the values specified below. E-UTRA ACLR for Power Class 1: 37 dB E-UTRA ACLR for Power Class 2: 31 dB	0dB 0.8dB	Formula: ACLR Minimum Requirement + TT Formula: ACLR Minimum Requirement - TT E-UTRA ACLR for Power Class 1: 36.2 dB E-UTRA ACLR for Power Class 2: 30.2 dB
6.6.2.3_2 Adjacent Channel Leakage power Ratio for Multi-Cluster PUSCH	Same as 6.6.2.3	Same as 6.6.2.3	Same as 6.6.2.3
6.6.2.3_3 Adjacent Channel Leakage power Ratio for UL 64QAM	Same as 6.6.2.3	Same as 6.6.2.3	Same as 6.6.2.3
6.6.2.3_4 Adjacent Channel Leakage power Ratio for Multi-Cluster PUSCH with UL 64QAM	Same as 6.6.2.3	Same as 6.6.2.3	Same as 6.6.2.3
6.6.2.3A.1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA)	If the adjacent channel power is greater than –50 dBm then the ACLR shall be higher than the values specified below. UTRA ACLR: 33 dB for UTRA ACLR 1 36 dB for UTRA ACLR 2 E-UTRA ACLR: 30 dB	0 dB 0.8 dB 0.8 dB 0.8 dB	Formula: ACLR Minimum Requirement + TT Formula: ACLR Minimum Requirement - TT UTRA ACLR: 32.2 dB for UTRA ACLR 1 35.2 dB for UTRA ACLR 2 E-UTRA ACLR: 29.2 dB
6.6.2.3A.1_1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.6.2.3A.1	Same as 6.6.2.3A.1	Same as 6.6.2.3A.1
6.6.2.3A.2 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA)	Same as 6.6.2.3 per component carrier	Same as 6.6.2.3 per component carrier	Same as 6.6.2.3 per component carrier
6.6.2.3A.2_1 Adjacent Channel Leakage power Ratio for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.6.2.3 per component carrier	Same as 6.6.2.3 per component carrier	Same as 6.6.2.3 per component carrier
6.6.2.3A.3 Adjacent	Same as 6.6.2.3	Same as	Same as 6.6.2.3

Channel Leakage power Ratio for CA (intra-band non-contiguous DL CA and UL CA)		6.6.2.3	
6.6.2.3A.3_1 Adjacent Channel Leakage power Ratio for CA (intra-band non-contiguous DL CA and UL CA) for UL 64QAM	Same as 6.6.2.3	Same as 6.6.2.3	Same as 6.6.2.3
6.6.2.3B Adjacent Channel Leakage power Ratio for UL-MIMO	Same as 6.6.2.3	Same as 6.6.2.3	Same as 6.6.2.3
6.6.2.3E Adjacent Channel Leakage power Ratio for UE category 0	Same as 6.6.2.3	Same as 6.6.2.3	Same as 6.6.2.3
6.6.2.3EA Adjacent Channel Leakage power Ratio for UE category M1	Same as 6.6.2.3	Same as 6.6.2.3	Same as 6.6.2.3
6.6.2.3F Adjacent Channel Leakage power Ratio for UE category NB1	If the adjacent channel power is greater than –50 dBm then the ACLR shall be higher than the values specified below. GSM ACLR: 20 dB UTRA ACLR: 37 dB for UTRA ACLR	0 dB 0.8 dB 0.8 dB	Formula: ACLR Minimum Requirement + TT Formula: ACLR Minimum Requirement - TT GSM ACLR: 19.2 dB UTRA ACLR: 36.2 dB for UTRA ACLR
6.6.2.4 Additional ACLR requirements	If the adjacent channel power is greater than –50 dBm then the ACLR shall be higher than the values specified below. E-UTRA ACLR: 43 dB for UTRA ACLR 2	0 dB 0.8 dB	Formula: ACLR Minimum Requirement + TT Formula: ACLR Minimum Requirement – TT E-UTRA ACLR: 42.2 dB for UTRA ACLR 2
6.6.3.1 Transmitter Spurious emissions	9 kHz ≤ f < 150 kHz: -36dBm / 1kHz 150 kHz ≤ f < 30 MHz: -36dBm / 10kHz 30 MHz ≤ f < 1 GHz: -36dBm / 100kHz 1 GHz ≤ f < 12.75 GHz: -30dBm / 1MHz 12.75 GHz ≤ f < 19 GHz: -30dBm / 1MHz	0 dB	Formula: Minimum Requirement + TT
6.6.3.1_1Transmitter Spurious emissions for Multi-Cluster PUSCH	Same as 6.6.3.1	Same as 6.6.3.1	Formula: Minimum Requirement + TT
6.6.3.1A.1 Transmitter Spurious emissions for CA (intra-band contiguous DL CA and UL CA)	Same as 6.6.3.1	Same as 6.6.3.1	Same as 6.6.3.1
6.6.3.1A.2 Transmitter Spurious emissions for CA (inter-band DL CA and UL CA)	Same as 6.6.3.1 per CC	Same as 6.6.3.1 per CC	Same as 6.6.3.1 per CC
6.6.3.1A.3 Transmitter Spurious emissions for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.3.1 per CC	Same as 6.6.3.1 per CC	Same as 6.6.3.1 per CC
6.6.3B.1Transmitter Spurious emissions for UL-MIMO	Same as 6.6.3.1	Same as 6.6.3.1	Formula: Minimum Requirement + TT
6.6.3E.1 Transmitter	Same as 6.6.3.1	Same as	Same as 6.6.3.1

Spurious emissions for UE category 0		6.6.3.1	
6.6.3F.1 Transmitter Spurious emissions for UE category NB1	Same as 6.6.3.1	Same as 6.6.3.1	Same as 6.6.3.1
6.6.3EA.1 Transmitter Spurious emissions for UE category M1	Same as 6.6.3.1	Same as 6.6.3.1	Same as 6.6.3.1
6.6.3.2 Spurious emission band UE co-existence	-35 dBm / 6.25kHz -36 dBm / 100kHz -41 dBm / 300kHz -37 dBm / 1MHz -40 dBm / 1MHz -50 dBm / 1MHz Frequencies as detailed in core requirement	0 dB	Formula: Minimum Requirement + TT
6.6.3.2A.1 Spurious emission band UE co-existence for CA (intra-band contiguous DL CA and UL CA)	-35 dBm / 6.25kHz -36 dBm / 100kHz -41 dBm / 300kHz -37 dBm / 1MHz -40 dBm / 1MHz -50 dBm / 1MHz -15.5 dBm / 5MHz +1.6 dBm /5MHz Frequencies as detailed in core requirement	0 dB	Formula: Minimum Requirement + TT
6.6.3.2A.3 Spurious emission band UE co-existence for CA (intra-band non-contiguous DL CA and UL CA)	Same as 6.6.3.2	Same as 6.6.3.2	Formula: Minimum Requirement + TT
6.6.3.3 Additional spurious emissions	NS_05 1884.5MHz ≤ f ≤ 1915.7MHz: -41dBm / 300kHz NS_07 769MHz ≤ f ≤ 775MHz -57dBm / 6.25kHz NS_08 860MHz ≤ f ≤ 895MHz -40dBm / 1MHz NS_09 1475.9MHz ≤ f ≤ 1510.9MHz -35dBm / 1MHz	 0 dB 1.5dB 0 dB 0 dB	Formula: Minimum Requirement + TT -41dBm / 300kHz -55.5 dBm / 6.25kHz -40dBm / 1MHz -35dBm / 1MHz
6.6.3.3_1 Additional spurious emissions for UL 64QAM	Same as 6.6.3.3	Same as 6.6.3.3	Same as 6.6.3.3
6.6.3.3A.1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA)	CA_NS_01 E-UTRA band 34: -50dBm / 1MHz 1884.5MHz ≤ f ≤ 1915.7MHz: -41dBm / 300kHz CA_NS_02 E-UTRA band 33: -50dBm / 1MHz E-UTRA band 34: -50dBm / 1MHz	 0 dB 0 dB 0 dB 0 dB	Formula: Minimum Requirement + TT -50 MHz / 1MHz -41 dBm / 300kHz -50 MHz / 1MHz -50 MHz / 1MHz

	CA_NS_03 E-UTRA band 34: -50dBm / 1MHz E-UTRA band 39: -50dBm / 1MHz	0 dB 0 dB	-50 MHz / 1MHz -50 MHz / 1MHz
6.6.3.3A.1_1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	Same as 6.6.3.3A.1	Same as 6.6.3.3A.1	Same as 6.6.3.3A.1
6.6.3.3A.2 Additional spurious emissions for CA (inter-band DL CA and UL CA)	Same as 6.6.3.3	Same as 6.6.3.3	Same as 6.6.3.3
6.6.3.3A.2_1 Additional spurious emissions for CA (inter-band DL CA and UL CA) for UL 64QAM	Same as 6.6.3.3	Same as 6.6.3.3	Same as 6.6.3.3
6.6.3B.2 Spurious emission band UE co-existence for UL-MIMO	Same as 6.6.3.2	Same as 6.6.3.2	Formula: Minimum Requirement + TT
6.6.3B.3 Additional spurious emissions for UL-MIMO	Same as 6.6.3.3	Same as 6.6.3.3	Formula: Minimum Requirement + TT
6.6.3E.2 Spurious emission band UE co-existence for UE category 0	Same as 6.6.3.2	Same as 6.6.3.2	
6.6.3E.3 Additional spurious emissions for UE category 0	Same as 6.6.3.3	Same as 6.6.3.3	Same as 6.6.3.3
6.6.3EA.2 Spurious emission band UE co-existence for UE category M1	Same as 6.6.3.2	Same as 6.6.3.2	
6.6.3EA.3 Additional spurious emissions for UE category M1	Same as 6.6.3.3	Same as 6.6.3.3	Same as 6.6.3.3
6.6.3F.2 Spurious emission band UE co-existence for category NB1 UE	Same as 6.6.3.2	Same as 6.6.3.2	Formula: Minimum Requirement + TT
6.7 Transmit intermodulation	Intermodulation Product 5MHz -29 dBc 10MHz -35 dBc CW Interferer level = -40 dBc	0 dB	Formula: CW interferer Minimum Requirement– TT Intermod Products limits remain unchanged. CW interferer level = -40 dBc
6.7A.1 Transmit intermodulation for CA (intra-band contiguous DL CA and UL CA)	Same as 6.7	Same as 6.7	Same as 6.7
6.7A.2 Transmit intermodulation for CA (inter-band DL CA and UL CA)	Same as 6.7	Same as 6.7	Same as 6.7
6.7B Transmit intermodulation for UL-MIMO	Same as 6.7	Same as 6.7	Same as 6.7
6.7E Transmit intermodulation for UE category 0	Same as 6.7	Same as 6.7	Same as 6.7
6.7EA Transmit intermodulation for UE category M1	Same as 6.7	Same as 6.7	Same as 6.7
6.7F Transmit intermodulation for UE	Same as 6.7	Same as 6.7	Same as 6.7

category NB1			
6.7G.1 Transmit intermodulation for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	Same as 6.7	Same as 6.7	Same as 6.7
6.7G.2 Transmit intermodulation for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	Same as 6.7	Same as 6.7	Same as 6.7
6.8B Time alignment error for UL-MIMO	The Time Alignment Error (TAE) shall not exceed 130 ns	25 ns	Formula: Minimum Requirement+ TT

F.3.3 Measurement of receiver

Table F.3.3-1: Derivation of Test Requirements (Receiver tests)

Test	Minimum Requirement in TS 36.101	Test Tolerance (TT)	Test Requirement in TS 36.521-1
7.3 Reference sensitivity power level	Reference sensitivity power level: For 1.4MHz -102.2dBm -103.2dBm -105.2dBm -106.2dBm For 3MHz -99.2dBm -100.2dBm -102.2dBm For 5MHz -97dBm -98dBm -98.5dBm -99dBm -100dBm -96.5dBm Band 9 with Multi band For 10MHz -94dBm -95dBm -95.5dBm -96dBm -97dBm -93.5dBm Band 9 with Multi band For 15MHz -92.2dBm -93.2dBm -93.7dBm -94.2dBm -95.2dBm -91.7dBm Band 9 with Multi band For 20MHz -91dBm -92dBm -93dBm -94dBm -90.5dBm Band 9 with Multi band T-put limit = 95% of maximum for the Ref Meas channel	All cases: f ≤ 3.0GHz 0.7dB 3.0GHz < f ≤ 4.2GHz 1.0 dB	Formula: Reference sensitivity power level + TT T-put limit unchanged
7.3_1 Reference sensitivity level with 4 Rx antenna ports	Same as 7.3	Same as 7.3	Same as 7.3
7.3A.1 Reference sensitivity level for CA (intra-band contiguous DL CA and UL CA)	PCC and SCC Value in Table 7.3.1-1 PCC and SCC values are each increased by $\Delta R_{IB,c}$ in Table	Same as 7.3	PCC and SCC Value in TS 36.101 Table 7.3.1-1+TT PCC and SCC values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A

	7.3.3-1A or Table 7.3.1-1B where applicable T-put limit = 95% of maximum for the Ref Meas channel		where applicable T-put limit unchanged
7.3A.2 Reference sensitivity level for CA (intra-band contiguous DL CA without UL CA)	Same as 7.3A.1	Same as 7.3	Same as 7.3A.1
7.3A.3 Reference sensitivity level for CA (inter-band DL CA without UL CA)	PCC and SCC Value in Table 7.3.1-1 Exceptions in Tables 7.3.1A-0a, 7.3.1A-0bA, 7.3.1A-0d, 7.3.1A-0eA PCC and SCC values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A or Table 7.3.1-1B where applicable T-put limit = 95% of maximum for the Ref Meas channel	All cases: f ≤ 3.0GHz 0.7dB 3.0GHz < f ≤ 4.2GHz 1.0 dB 4.2GHz < f ≤ 6.0GHz 1.5 dB	PCC and SCC Value in TS 36.101 Table 7.3.1-1+TT Exceptions in TS 36.101 Tables 7.3.1A-0a, 7.3.1A-0bA, 7.3.1A-0d, 7.3.1A-0eA +TT PCC and SCC values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A where applicable T-put limit unchanged
7.3A.4 Reference sensitivity level for CA (intra-band non-contiguous DL CA without UL CA)	PCC Value in Table 7.3.1-1 SCC Value in Table 7.3.1-1 +ΔR_{IBNC} in Table 7.3.1A-3 PCC and SCC values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A or Table 7.3.1-1B where applicable T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.3	PCC Value in TS 36.101 Table 7.3.1-1+TT SCC Value in TS 36.101 Table 7.3.1-1+TT +ΔR_{IBNC} in TS 36.101 Table 7.3.1A-3 PCC and SCC values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A where applicable T-put limit unchanged
7.3A.5 Reference sensitivity level for 3DL CA	PCC and SCCs Value in Table 7.3.1-1 Exceptions in Tables 7.3.1A-0a, 7.3.1A-0bC, 7.3.1A-0d PCC and SCCs values are each increased by $\Delta R_{IB,c}$ in Table 7.3.1A-3, 7.3.1-1B or/and ΔR_{IBNC} in Table 7.3.1A-3 where applicable T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.3A.3	PCC and SCC Value in TS 36.101 Table 7.3.1-1+TT Exceptions in TS 36.101 Tables 7.3.1A-0a, 7.3.1A-0bC, 7.3.1A-0d +TT PCC and SCCs values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B or/and ΔR_{IBNC} in TS 36.101 Table 7.3.1A-3 where applicable T-put limit unchanged
7.3A.6 Reference sensitivity level for CA (inter-band DL CA and UL CA)	TBD	TBD	TBD
7.3A.7 Reference sensitivity level for CA (intra-band non-contiguous DL CA and UL CA)	PCC Value in Table 7.3.1-1+ ΔR_{2UL_PCC} in Table 7.3.1A-4 SCC Value in Table 7.3.1-1 + ΔR_{2UL_PCC} in Table 7.3.1A-4 PCC and SCC values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A or Table 7.3.1-1B where applicable T-put limit = 95% of maximum for	Same as 7.3	PCC Value in TS 36.101 Table 7.3.1-1+TT+ ΔR_{2UL_PCC} in Table 7.3.1A-4 SCC Value in TS 36.101 Table 7.3.1-1+TT + ΔR_{2UL_SCC} in Table 7.3.1A-4 PCC and SCC values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A where applicable T-put limit unchanged

	the Ref Meas channel		
7.3A.9 Reference sensitivity level for 4DL CA	PCC and SCCs Value in Table 7.3.1-1 Exceptions in Tables 7.3.1A-0a, 7.3.1A-0bC, 7.3.1A-0d PCC and SCCs values are each increased by $\Delta R_{IB,c}$ in Table 7.3.1A-3, 7.3.1-1B or/and ΔR_{IBNC} in Table 7.3.1A-3 where applicable T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.3	PCC and SCC Value in TS 36.101 Table 7.3.1-1+TT Exceptions in TS 36.101 Tables 7.3.1A-0a, 7.3.1A-0bC, 7.3.1A-0d +TT PCC and SCCs values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B or/and ΔR_{IBNC} in TS 36.101 Table 7.3.1A-3 where applicable T-put limit unchanged
7.3A.10 Reference sensitivity level for 5DL CA	PCC and SCCs Value in Table 7.3.1-1 Exceptions in Tables 7.3.1A-0a, 7.3.1A-0bC, 7.3.1A-0d PCC and SCCs values are each increased by $\Delta R_{IB,c}$ in Table 7.3.1A-3, 7.3.1-1B or/and ΔR_{IBNC} in Table 7.3.1A-3 where applicable T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.3	PCC and SCC Value in TS 36.101 Table 7.3.1-1+TT Exceptions in TS 36.101 Tables 7.3.1A-0a, 7.3.1A-0bC, 7.3.1A-0d +TT PCC and SCCs values are each increased by $\Delta R_{IB,c}$ in Table 7.3.3-1A, 7.3.3-1B or/and ΔR_{IBNC} in TS 36.101 Table 7.3.1A-3 where applicable T-put limit unchanged
7.3B Reference Sensitivity Level for UL-MIMO	Same as 7.3	Same as 7.3	Same as 7.3
7.3D.1 Reference sensitivity level for ProSe Direct Discovery	Values as defined in table 7.3D.0.1	All cases: f ≤ 3.0GHz 0.7dB	Formula: Reference sensitivity power level + TT T-put limit unchanged
7.3D.2 Reference sensitivity level for ProSe Direct Communication	Values as defined in table 7.3D.0.2	Same as 7.3D.1	Same as 7.3D.1
7.3E Reference Sensitivity Level for UE category 0	Same as 7.3	Same as 7.3	Same as 7.3
7.3EA Reference Sensitivity Level for UE category M1	Reference sensitivity power level as specified T-put limit = 95% of maximum for the Ref Meas channel	All cases: 0.7dB	Formula: Reference sensitivity power level + TT T-put limit unchanged
7.3EB Reference sensitivity level for UE category 1bis	Same as 7.3	Same as 7.3	Same as 7.3
7.3EC Reference Sensitivity Level for UE category M2	Same as 7.3EA	Same as 7.3EA	Same as 7.3EA
7.3F.1 Reference sensitivity level without repetitions for UE category NB1	Reference sensitivity power level: -108.2dBm T-put limit = 95% of maximum for the Ref Meas channel	f ≤ 3.0GHz 0.7dB	Formula: Reference sensitivity power level + TT T-put limit unchanged
7.3F.2 Reference sensitivity level with repetitions for category NB1	Reference sensitivity power level: TBD T-put limit = TBD% of maximum for the Ref Meas channel	f ≤ 3.0GHz 0.7dB	Formula: Reference sensitivity power level + TT T-put limit unchanged
7.4 Maximum input level	Signal level -25dBm T-put limit = 95% of maximum for the Ref Meas channel	f ≤ 3.0GHz0.7 dB 3.0GHz < f ≤ 4.2GHz	Formula: Maximum input level - TT Signal level: f ≤ 3.0GHz: -25.7 dBm 3.0GHz < f ≤ 4.2GHz: -26.0 dBm

	Uplink power	1.0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	T-put limit unchanged Uplink power measurement window comprises four quantities: 1. UE power step size 1dB 2. UE Power step tolerance ±1dB 3. Test system power measurement at top of window: f ≤ 3.0GHz ±0.7 dB 3.0GHz < f ≤ 4.2GHz ±1.0 dB. 4. Test system power measurement at bottom of window: f ≤ 3.0GHz ±0.7 dB 3.0GHz < f ≤ 4.2GHz ±1.0 dB. Items 1 to 4 are added arithmetically: Overall UL power window size: f ≤ 3.0GHz: (1dB+1dB+0.7dB+0.7dB) =3.4dB 3.0GHz < f ≤ 4.2GHz: (1dB+1dB+1dB+1dB) =4dB Top of window is aligned to UL power requirement, hence +0dB, -3.4dB or +0dB, -4.0dB according to frequency
7.4_1 Maximum input level with 4 Rx antenna ports	Same as 7.4	Same as 7.4	Same as 7.4
7.4A.1 Maximum input level for CA (intra band contiguous DL CA and UL CA)	Signal level for each CC as specified T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Signal level for each CC - TT T-put limit unchanged Uplink power measurement window is calculated in the same way as 7.4, but the target power for each CC is scaled according to the allocation: For PCC: $10\log(P_L_{CRB}/N_{RB_alloc})$ For SCC: $10\log(S_L_{CRB}/N_{RB_alloc})$
7.4A.1 H Maximum input level for SCE-L1 for CA (intra-band contiguous DL CA and UL CA)	Signal level for each CC as specified T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Signal level for each CC – TT Signal level: f ≤ 3.0GHz: -27.7 dBm 3.0GHz < f ≤ 4.2GHz: -28.0 dBm T-put limit unchanged Uplink power measurement window is calculated in the same way as 7.4, but the target power for each CC is scaled according to the allocation: For PCC: $10\log(P_L_{CRB}/N_{RB_alloc})$ For SCC: $10\log(S_L_{CRB}/N_{RB_alloc})$
7.4A.2 Maximum input level for CA (intra band contiguous DL CA without UL CA)	Signal level for each CC as specified T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Signal level for each CC - TT T-put limit unchanged Uplink power measurement window same as 7.4
7.4A.2 H Maximum input	Signal level for each CC as	f ≤ 3.0GHz	Formula: Signal level for each CC -

level for SCE-L1 for CA (intra-band contiguous DL CA without UL CA)	specified T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	TT T-put limit unchanged Uplink power measurement window same as 7.4
7.4A.3 Maximum input level for CA (inter-band DL CA without UL CA)	Signal level -25dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB 4.2GHz < f ≤ 6.0GHz 1.5 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Maximum input level - TT Signal level: f ≤ 3.0GHz: -25.7 dBm 3.0GHz < f ≤ 4.2GHz: -26.0 dBm4.2GHz < f ≤ 6.0GHz: -26.5 dBm T-put limit unchanged Uplink power measurement window same as 7.4
7.4A.4 Maximum input level for CA (intra band non-contiguous DL CA without UL CA)	Signal level -25dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Maximum input level - TT Signal level: f ≤ 3.0GHz: -25.7 dBm 3.0GHz < f ≤ 4.2GHz: -26.0 dBm T-put limit unchanged Uplink power measurement window same as 7.4
7.4A.5 Maximum input level for 3DL CA	Signal level for each CC as specified T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB 4.2GHz < f ≤ 6.0GHz 1.5 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Signal level for each CC - TT T-put limit unchanged Uplink power measurement window same as 7.4
7.4A.5_H Maximum input level for SCE-L1 for 3DL CA	Signal level for each CC as specified T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB f ≤ 3.0GHz 0dB, -3.4dB	Formula: Signal level for each CC - TT T-put limit unchanged Uplink power measurement window is calculated in the same way as 7.4

		3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	
7.4A.7 Maximum input level for for 4DL CA	Signal level for each CC as specified T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Signal level for each CC - TT T-put limit unchanged Uplink power measurement window is calculated in the same way as 7.4
7.4B Maximum Input Level for UL-MIMO	Same as 7.4	Same as 7.4	Same as 7.4 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
7.4D.1 Maximum input level for ProSe Direct Discovery	Signal level -22dBm T-put limit = 95% of maximum for the Ref Meas channel	f ≤ 3.0GHz 0.7 dB	Formula: Maximum input level - TT Signal level: f ≤ 3.0GHz: -22.7 dBm T-put limit unchanged
7.4D.2 Maximum input level for ProSe Direct Communication	Same as 7.4D.1	Same as 7.4D.1	Same as 7.4D.1
7.4E Maximum input level for UE category 0	Same as 7.4	Same as 7.4	Same as 7.4
7.4EA Maximum input level for UE category M1	Same as 7.4	Same as 7.4	Same as 7.4
7.4_H Maximum input level for SCE-L1	Signal level -27dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	f ≤ 3.0GHz 0.7 dB 3.0GHz < f ≤ 4.2GHz 1.0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Maximum input level - TT Signal level: f ≤ 3.0GHz: -27.7 dBm 3.0GHz < f ≤ 4.2GHz: -28.0 dBm T-put limit unchanged Uplink power measurement window same as 7.4
7.4F Maximum imput level for UE category NB1	Signal level -25dBm T-put limit = 95% of maximum for the Ref Meas channel	f ≤ 3.0GHz 0.7 dB	Formula: Maximum input level - TT Signal level: f ≤ 3.0GHz: -25.7dBm T-put limit unchanged
7.5 Adjacent Channel Selectivity (ACS)	Case 1: Wanted signal power, all BWs: (REFSENS + 14 dB) Interferer signal power For 1.4 MHz, 3 MHz, 5 MHz, 10 MHz BW: (REFSENS + 45.5 dB) For 15 MHz BW: (REFSENS + 42.5 dB) For 20 MHz BW: (REFSENS + 39.5 dB) Case 2:	0 dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4

	Wanted signal power For 1.4 MHz, 3 MHz, 5 MHz, 10 MHz BW: -56.5 dBm For 15 MHz BW: -53.5 dBm For 20 MHz BW: -50.5 dBm Interferer signal power, all BWs: -25 dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	 f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	
7.5_1 Adjacent Channel Selectivity (ACS) with 4 Rx antenna ports	Same as 7.5	Same as 7.5	Same as 7.5
7.5A.1 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA and UL CA)	Case 1: Wanted signal power: (REFSENS + 14 dB) Interferer signal power For CA BW Class C: (Aggregated power + 22.5 dB) Case 2: Wanted signal power: $-47.5 + 10\log(N_{RB,c}/N_{RB\ agg})$ dBm Interferer signal power For CA BW Class C: -25 dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4A.1
7.5A.2 Adjacent Channel Selectivity (ACS) for CA (intra band contiguous DL CA without UL CA)	Same as 7.5A.1	Same as 7.5A.1	Same as 7.5A.1
7.5A.3 Adjacent Channel Selectivity (ACS) for CA (inter band DL CA without UL CA)	Same as 7.5 for each CC	Same as 7.5	Same as 7.5 for each CC
7.5A.4 Adjacent Channel Selectivity (ACS) for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.5 for each CC	Same as 7.5	Same as 7.5 for each CC
7.5A.5 Adjacent Channel Selectivity (ACS) for 3DL CA	Intra-band contiguous DL CA Case 1: Wanted signal power: (REFSENS + 14 dB) Interferer signal power For CA BW Class B, Class C: (Aggregated power + 22.5 dB) For CA BW Class D:	 0 dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged

	(Aggregated power + 20.7 dB) Case 2: Wanted signal power: For CA BW Class B: -50.5 +10log($N_{RB,c}/N_{RB\ agg}$) dBm For CA BW Class C: -47.5 +10log($N_{RB,c}/N_{RB\ agg}$) dBm For CA BW Class D: -43.9 +10log($N_{RB,c}/N_{RB\ agg}$) dBm Interferer signal power -25 dBm Inter-band CA Same as 7.5 for each CC T-put limit = 95% of maximum for the Ref Meas channel Uplink power	 <

category NB1	(REFSENS + 14 dB) Interferer signal power For GSM interferer: (REFSENS + 42 dB) For E-UTRA interferer: (REFSENS + 47 dB) <u>ACS 2:</u> Wanted signal power For GSM interferer: -53 dBm For E-UTRA interferer: -58 dBm Interferer signal power: -25 dBm T-put limit = 95% of maximum for the Ref Meas channel		Interferer signal power unchanged T-put limit unchanged
7.6.1 In-band blocking	Wanted signal power: (REFSENS + BW dependent value) Interferer signal power: -56dBm or -44dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB <u>f ≤ 3.0GHz</u> 0dB, -3.4dB <u>3.0GHz < f ≤ 4.2GHz</u> 0dB, -4.0dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4
7.6.1_1 In-band blocking with 4 Rx antenna ports	Same as 7.6.1	Same as 7.6.1	Same as 7.6.1
7.6.1A.1 In-band blocking for CA (intra band contiguous DL CA and UL CA)	Wanted signal power: (REFSENS + CA BW Class specific value) Interferer signal power: -56dBm or -44dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	Same as 7.6.1	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4A.1
7.6.1A.2 In-band blocking for CA (intra band contiguous DL CA without UL CA)	Same as 7.6.1A.1	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1A.3 In-band blocking for CA (inter band DL CA without UL CA)	Same as 7.6.1A.1	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1A.4 In-band blocking for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.6.1A.1	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1A.5 In-band blocking for 3DL CA	Same as 7.6.1A.1	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1A.7 In-band blocking for 4DL CA	Same as 7.6.1A.1	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1A.8 In-band blocking for 5DL CA	Same as 7.6.1A.1	Same as 7.6.1A.1	Same as 7.6.1A.1
7.6.1B In-band blocking for UL-MIMO	Same as 7.6.1	Same as 7.6.1	Same as 7.6.1 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
7.6.1D.1 In-band blocking	Signal levels as defined in	0 dB	Formula:

for ProSe Direct Discovery	minimum requirements T-put limit = 95% of maximum for the Ref Meas channel		Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged
7.6.1D.2 In-band blocking for ProSe Direct Communication	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.6.1D.1	Same as 7.6.1D.1
7.6.1E In-band blocking for UE category 0	Same as 7.6.1	Same as 7.6.1	Same as 7.6.1
7.6.1F In-band blocking for category NB1	Wanted signal power: (REFSENS + 6dB) Interferer signal power: -56dBm or -44dBm T-put limit = 95% of maximum for the Ref Meas channel	0 dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged
7.6.1EA In-band blocking for UE category M1	Wanted signal power: (REFSENS + CA BW Class specific value) Interferer signal power: -56dBm or -44dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB f ≤ 3.0GHz 0dB, -3.4dB	Same as 7.6.1
7.6.2 Out of-band blocking	Wanted signal power: (REFSENS + BW dependent value) Interferer signal power: -44dBm, -30dBm or -15dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4
7.6.2_1 Out of-band blocking with 4 Rx antenna ports	Same as 7.6.2	Same as 7.6.2	Same as 7.6.2
7.6.2A.1 Out-of-band blocking for CA (intra band contiguous DL CA and UL CA)	Wanted signal power: (REFSENS + CA BW Class specific value) Interferer signal power: -44dBm, -30dBm or -15dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	Same as 7.6.2	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4A.1
7.6.2A.2 Out-of-band blocking for CA (intra band contiguous DL CA without UL CA)	Same as 7.6.2A.1	Same as 7.6.2A.1	Same as 7.6.2A.1
7.6.2A.3 Out-of-band blocking for CA (inter band DL CA without UL CA)	Same as 7.6.2A.1	Same as 7.6.2A.1	Same as 7.6.2A.1
7.6.2A.4 Out-of-band blocking for CA (intra-band non-contiguous DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1	Same as 7.6.2A.1

without UL CA)			
7.6.2A.5 Out-of-band blocking for 3DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1	Same as 7.6.2A.1
7.6.2A.7 Out-of-band blocking for 4DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1	Same as 7.6.2A.1
7.6.2A.8 Out-of-band blocking for 5DL CA	Same as 7.6.2A.1	Same as 7.6.2A.1	Same as 7.6.2A.1
7.6.2B Out-of-band blocking for UL-MIMO	Same as 7.6.2	Same as 7.6.2	Same as 7.6.2 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
7.6.2D.1 Out-of-band blocking for ProSe Direct Discovery	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for the Ref Meas channel	0 dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged
7.6.2D.2 Out-of-band blocking for ProSe Direct Communication	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.6.2D.1	Same as 7.6.1D.1
7.6.2E Out of-band blocking for UE category 0	Same as 7.6.2	Same as 7.6.2	Same as 7.6.2
7.6.2F Out of-band blocking for category NB1	Wanted signal power: (REFSENS + 6dB) Interferer signal power: -44dBm, -30dBm or -15dBm T-put limit = 95% of maximum for the Ref Meas channel	0 dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged
7.6.2EA Out-of-band blocking for UE category M1	Wanted signal power: (REFSENS + BW dependent value) Interferer signal power: -44dBm, -30dBm or -15dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB f ≤ 3.0GHz 0dB, -3.4dB	Same as 7.6.2
7.6.3 Narrow band blocking	Wanted signal power,: (REFSENS + BW dependent value) Interferer signal power: -55dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4
7.6.3_1 Narrow band blocking with 4 Rx antenna ports	Same as 7.6.3	Same as 7.6.3	Same as 7.6.3
7.6.3A.1 Narrow band blocking for CA (intra band contiguous DL CA and UL CA)	Wanted signal power: (REFSENS + CA BW Class specific value) Interferer signal power:	Same as 7.6.3	Formula: Wanted signal power + TT Interferer signal power unchanged

	-55dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power		T-put limit unchanged Uplink power measurement window same as 7.4A.1
7.6.3A.2 Narrow band blocking for CA (intra band contiguous DL CA without UL CA)	Same as 7.6.3A.1	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.3 Narrow band blocking for CA (inter band DL CA without UL CA)	Same as 7.6.3A.1	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.4 Narrow band blocking for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.6.3A.1	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.5 Narrow band blocking for 3DL CA	Same as 7.6.3A.1	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.7 Narrow band blocking for 4DL CA	Same as 7.6.3A.1	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3A.8 Narrow band blocking for 5DL CA	Same as 7.6.3A.1	Same as 7.6.3A.1	Same as 7.6.3A.1
7.6.3B Narrow band blocking for UL-MIMO	Same as 7.6.3	Same as 7.6.3	Same as 7.6.3 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
7.6.3D.1 Narrow band blocking for ProSe Direct Discovery	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for the Ref Meas channel	0 dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged
7.6.3D.2 Narrow band blocking for ProSe Direct Communication	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.6.3D.1	Same as 7.6.3D.1
7.6.3E Narrow band blocking for UE category 0	Same as 7.6.3	Same as 7.6.3	Same as 7.6.3
7.6.3EA Narrow band blocking for UE category M1	Wanted signal power,: (REFSENS + BW dependent value) Interferer signal power: -55dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB f ≤ 3.0GHz 0dB, -3.4dB	Same as 7.6.3
7.7 Spurious response	Wanted signal power: (REFSENS + BW dependent value) Interferer signal power: -44dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4

7.7_1 Spurious response with 4 Rx antenna ports	Same as 7.7	Same as 7.7	Same as 7.7
7.7A.1 Spurious response for CA (intra band contiguous DL CA and UL CA)	Wanted signal power: (REFSENS + CA BW Class specific value) Interferer signal power: -44dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	Same as 7.7	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4A.1
7.7A.2 Spurious response for CA (intra band contiguous DL CA without UL CA)	Same as 7.7A.1	Same as 7.7A.1	Same as 7.7A.1
7.7A.3 Spurious response for CA (inter band DL CA without UL CA)	Same as 7.7A.1	Same as 7.7A.1	Same as 7.7A.1
7.7A.4 Spurious response for CA (intra-band non-contiguous DL CA without UL CA)	Same as 7.7A.1	Same as 7.7A.1	Same as 7.7A.1
7.7A.5 Spurious response for 3DL CA	Same as 7.7A.1	Same as 7.7A.1	Same as 7.7A.1
7.7A.7 Spurious response for 4DL CA	Same as 7.7A.1	Same as 7.7A.1	Same as 7.7A.1
7.7A.8 Spurious response for 5DL CA	Same as 7.7A.1	Same as 7.7A.1	Same as 7.7A.1
7.7B Spurious response for UL-MIMO	Same as 7.7	Same as 7.7	Same as 7.7 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
7.7D.1 Spurious response for ProSe Direct Discovery	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for the Ref Meas channel	0 dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged
7.7D.2 Spurious response for ProSe Direct Communication	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.7D.1	Same as 7.7D.1
7.7E Spurious response for UE category 0	Same as 7.7	Same as 7.7	Same as 7.7
7.7EA Spurious response for UE category M1	Same as 7.7	Same as 7.7	Same as 7.7
7.7F Spurious response for category NB1	Wanted signal power: (REFSENS + 6 dB) Interferer signal power: -44dBm T-put limit = 95% of maximum for the Ref Meas channel	0 dB	Formula: Wanted signal power + TT Interferer signal power unchanged T-put limit unchanged
7.8.1 Wide band intermodulation	Wanted signal power: For 1.4 MHz BW: (REFSENS + 12 dB) For 3 MHz BW: (REFSENS + 8 dB) For 5 MHz and 10MHz BW: (REFSENS + 6 dB) For 15 MHz BW: (REFSENS + 7 dB) For 20 MHz BW: (REFSENS + 9 dB)	0 dB	Formula: Wanted signal power +TT CW Interferer signal power unchanged Modulated Interferer signal power unchanged T-put limit unchanged

	CW Interferer power, all BWs: -46 dBm Modulated Interferer power:, all BWs: -46 dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	 f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Uplink power measurement window same as 7.4
7.8.1_1 Wide band Intermodulation with 4 Rx antenna ports	Same as 7.8.1	Same as 7.8.1	Same as 7.8.1
7.8.1A.1 Wideband intermodulation for CA (intra band contiguous DL CA and UL CA)	Wanted signal power: (REFSENS + CA BW Class specific value) CW Interferer power, all BWs: -46 dBm Modulated Interferer power:, all BWs: -46 dBm T-put limit = 95% of maximum for the Ref Meas channel Uplink power	0 dB f ≤ 3.0GHz 0dB, -3.4dB 3.0GHz < f ≤ 4.2GHz 0dB, -4.0dB	Formula: Wanted signal power +TT CW Interferer signal power unchanged Modulated Interferer signal power unchanged T-put limit unchanged Uplink power measurement window same as 7.4 A.1
7.8.1A.2 Wideband intermodulation for CA (intra band contiguous DL CA without UL CA)	Same as 7.8.1A.1	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1A.3 Wideband intermodulation for CA (inter band DL CA without UL CA)	Same as 7.8.1A.1	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1A.4 Wideband intermodulation for CA (intra band non-contiguous DL CA without UL CA)	Same as 7.8.1A.1	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1A.5 Wideband intermodulation for 3DL CA	Same as 7.8.1A.1	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1A.7 Wideband intermodulation for 4 DL CA	Same as 7.8.1A.1	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1A.8 Wideband intermodulation for 5 DL CA	Same as 7.8.1A.1	Same as 7.8.1A.1	Same as 7.8.1A.1
7.8.1B Wide band intermodulation for UL-MIMO	Same as 7.8.1	Same as 7.8.1	Same as 7.8.1 Uplink power measurement window applies to overall UL power, which is the linear sum of the output powers over all Tx antenna connectors
7.8.1D.1 Wide band Intermodulation for ProSe Direct Discovery	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for	0 dB	Formula: Wanted signal power + TT CW Interferer signal power

	the Ref Meas channel		unchanged Modulated Interferer signal power unchanged T-put limit unchanged
7.8.1D.2 Wide band Intermodulation for ProSe Direct Communication	Signal levels as defined in minimum requirements T-put limit = 95% of maximum for the Ref Meas channel	Same as 7.8.1D.1	Same as 7.8.1D.1
7.8.1E Wide band intermodulation for UE category 0	Same as 7.8.1	Same as 7.8.1	Same as 7.8.1
7.8.1EA Wide band Intermodulation for UE category M1	Same as 7.8.1	Same as 7.8.1	Same as 7.8.1
7.8.1F Wide band intermodulation for category NB1	Wanted signal power: (REFSENS + 6 dB) CW Interferer power: -46 dBm E-UTRA Interferer power: -46 dBm T-put limit = 95% of maximum for the Ref Meas channel	0 dB	Formula: Wanted signal power +TT CW Interferer signal power unchanged Modulated Interferer signal power unchanged T-put limit unchanged
7.9 Spurious emissions	30MHz ≤ f < 1GHz: -57dBm / 100kHz 1GHz ≤ f ≤ 12.75 GHz: -47dBm / 1MHz 12.75GHz ≤ f ≤ 19 GHz: -47dBm / 1MHz	0 dB	Formula: Minimum Requirement + TT
7.9_1 Spurious emissions with 4 Rx antenna ports	Same as 7.9	Same as 7.9	Same as 7.9
7.9A Spurious emissions for CA	30MHz ≤ f < 1GHz: -57dBm / 100kHz 1GHz ≤ f ≤ 12.75 GHz: -47dBm / 1MHz	0 dB	Formula: Minimum Requirement + TT
7.9E Spurious emissions for UE category 0	Same as 7.9	Same as 7.9	Same as 7.9
7.9EA Spurious emissions for UE category M1	Same as 7.9	Same as 7.9	Same as 7.9
7.9F Spurious emissions for category NB1	Same as 7.9	Same as 7.9	Same as 7.9

F.3.4 Measurement of performance requirements

Table F.3.4-1: Derivation of Test Requirements (performance tests)

Test	Minimum Requirement in TS 36.101	Test Tolerance (TT)	Test Requirement in TS 36.521-1
8.2.1.1.1 Multiple PRBs - Prop'n Condition EVA5 - Prop'n Condition ETU70 - Prop'n Condition ETU300	SNRs as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.1.1.1 Multiple PRBs - Prop'n Condition HST	SNR as specified	0.6dB	Formula: SNR + TT T-put limit unchanged
8.2.1.1.1 Single PRB - Prop'n Condition ETU70	SNRs as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.1.1.1_1 Multiple PRBs - Prop'n Condition EVA5 - Prop'n Condition ETU70 - Prop'n Condition ETU300	SNRs as specified	Same as 8.2.1.1.1 Multiple PRBs Propagation EVA5, ETU70, ETU300	Formula: SNR + TT T-put limit unchanged
8.2.1.1.1_2 Multiple PRB - Prop'n Condition EVA5	SNRs as specified	Same as 8.2.1.1.1 Multiple PRBs Propagation EVA5	Formula: SNR + TT T-put limit unchanged
8.2.1.1.1_A.1	SNRs as specified	Same as 8.2.1.1.1 Multiple PRBs, for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.1.1_A.2	SNRs as specified	Same as 8.2.1.1.1 Multiple PRBs for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.1.1_A.4	SNRs as specified	Same as 8.2.1.1.1 Multiple PRBs for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.1.1_A.5	SNRs as specified	Same as 8.2.1.1.1 Multiple PRBs for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.1.2 Single PRB	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.1.2.1 - Prop'n Condition EVA5	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.2.1 - Prop'n Condition HST	SNR as specified	0.6 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.2.1_1 - Prop'n Condition EVA5	SNR as specified	Same as 8.2.1.2.1	Formula: SNR + TT T-put limit unchanged
8.2.1.2.2	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.2.2_1	SNR as specified	Same as 8.2.1.2.2	Formula: SNR + TT T-put limit unchanged

8.2.1.2.3_C.1	N_{oc1}: -102dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.8dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +3.4dB $\hat{E}s_2$ / N_{oc2}: +6dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -102.1dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.9dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +4.3dB $\hat{E}s_2$ / N_{oc2}: +5.8dB Formulae for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.1.2.3_E.1 - Prop'n Condition EVA5	N_{oc1}: -98dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -93dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +3.4dB $\hat{E}s_2$ / N_{oc2}: +12dB $\hat{E}s_3$ / N_{oc2}: +10dB	0dB 0dB -0.1dB +0.9dB -0.2dB -0.2dB	N_{oc1}: -98dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -93.1dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +4.3dB $\hat{E}s_2$ / N_{oc2}: +11.8dB $\hat{E}s_3$ / N_{oc2}: +9.8dB The analysis is recorded in 3GPP TR 36.904 [17] T-put limit unchanged
8.2.1.2.4	N_{oc}: -98dBm/15kHz DIP 1: -2.23dB DIP 1: -8.06dB SINR: -1.10dB	0dB +0.35dB +0.85dB +0.95dB	N_{oc}: -98dBm/15kHz DIP 1: -1.88dB DIP 1: -7.21dB SINR: -0.15dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.1.2.5	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +15.5 dB Cell 2 $\hat{E}s/N_{oc}$: +13.91 dB Cell 3 $\hat{E}s/N_{oc}$: +3.34 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.85 dB +0.8 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +17.35 dB Cell 2 $\hat{E}s/N_{oc}$: +14.71 dB Cell 3 $\hat{E}s/N_{oc}$: +4.14 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.1.2.6	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +8.4 dB Cell 2 $\hat{E}s/N_{oc}$: +3.28 dB Cell 3 $\hat{E}s/N_{oc}$: +0.74 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.54 dB +0.8 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +9.94 dB Cell 2 $\hat{E}s/N_{oc}$: +4.08 dB Cell 3 $\hat{E}s/N_{oc}$: +1.54 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.1.3.1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.3.1_1	SNR as specified	Same as 8.2.1.3.1	Formula: SNR + TT T-put limit unchanged
8.2.1.3.1_A.1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.3.1_A.2	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.3.1_A.3	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.3.1_A.4	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.3.1A_A.1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged

8.2.1.3.1B	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.3.1C	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +19.9 dB Cell 2 $\hat{E}s/N_{oc}$: +12.95 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.9 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +21.8 dB Cell 2 $\hat{E}s/N_{oc}$: +13.75 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.1.3.2	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.3.3_C.1	N_{oc1}: -102dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.8dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +13.3dB $\hat{E}s_2$ / N_{oc2}: +6dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -102.1dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.9dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +14.2dB $\hat{E}s_2$ / N_{oc2}: +5.8dB Formulae for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.2.1.3.3_C.2	N_{oc1}: -102dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.8dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +12.0dB $\hat{E}s_2$ / N_{oc2}: +6dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -102.1dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.9dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +12.9dB $\hat{E}s_2$ / N_{oc2}: +5.8dB Formulae for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.2.1.3.3_E.1 - Prop'n Condition EVA5	N_{oc1}: -98dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -93dBm/15kHz Test 1 $\hat{E}s_1$ / N_{oc2}: + 13.9dB $\hat{E}s_2$ / N_{oc2}: + 9dB $\hat{E}s_3$ / N_{oc2}: + 7dB Test 2 $\hat{E}s_1$ / N_{oc2}: +22.6dB $\hat{E}s_2$ / N_{oc2}: +9dB +1dB $\hat{E}s_3$ / N_{oc2}:	0dB 0dB -0.1dB +0.9dB -0.2dB -0.2dB +0.9dB -0.2dB -0.2dB	N_{oc1}: -98dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: - 93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: + 14.8 dB $\hat{E}s_2$ / N_{oc2}: + 8.8dB $\hat{E}s_3$ / N_{oc2}: + 6.8 dB $\hat{E}s_1$ / N_{oc2}: +23.5dB $\hat{E}s_2$ / N_{oc2}: +8.8dB $\hat{E}s_3$ / N_{oc2}: +0.8dB The analysis is recorded in 3GPP TR 36.904 [17] T-put limit unchanged
8.2.1.4.1	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.4.1_1	SNR as specified	Same as 8.2.1.4.1	Formula: SNR + TT T-put limit unchanged

8.2.1.4.1_E.1 - Prop'n Condition EPA5	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +6.1 dB $\hat{E}s_2$ / N_{oc2}: +12 dB $\hat{E}s_3$ / N_{oc2}: +10 dB	0 dB 0 dB -0.1 dB +0.9 dB -0.2 dB -0.2 dB	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +7.0 dB $\hat{E}s_2$ / N_{oc2}: +11.8 dB $\hat{E}s_3$ / N_{oc2}: +9.8 dB The analysis is recorded in 3GPP TR 36.904 [17] T-put limit unchanged
8.2.1.4.1_H FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 for SCE-L1	SNR as specified	Same as 8.2.1.4.1	Formula: SNR + TT T-put limit unchanged
8.2.1.4.2	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.4.2_1	SNR as specified	Same as 8.2.1.4.2	Formula: SNR + TT T-put limit unchanged
8.2.1.4.2_A.1	SNR as specified	Same as 8.2.1.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.4.2_A.2	SNR as specified	Same as 8.2.1.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.4.2_A.3	SNR as specified	Same as 8.2.1.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.4.2_A.4	SNR as specified	Same as 8.2.1.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.4.2A	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.1.4.3	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB DIP 1: -8.66dB SINR: 0.8dB	0dB +0.29dB +0.89dB +0.99dB	N_{oc}: -98dBm/15kHz DIP 1: -1.44dB DIP 1: -7.77dB SINR: 1.79dB T-put limit unchanged
8.2.1.4.3A	SNR as specified	Same as 8.2.1.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.1.4.4	Test 1: N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +17.0 dB Cell 2 $\hat{E}s/N_{oc}$: +13.91 dB Cell 3 $\hat{E}s/N_{oc}$: +3.34 dB Test 2: N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +10.1 dB Cell 2 $\hat{E}s/N_{oc}$: +3.28 dB Cell 3 $\hat{E}s/N_{oc}$: +0.74 dB	Test 1: 0 dB +1.85 dB +0.8 dB +0.8 dB Test 2: 0 dB +1.54 dB +0.8 dB +0.8 dB	Test 1: N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +18.85 dB Cell 2 $\hat{E}s/N_{oc}$: +14.71 dB Cell 3 $\hat{E}s/N_{oc}$: +4.14 dB T-put limit unchanged Test 2: N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +11.64 dB Cell 2 $\hat{E}s/N_{oc}$: +4.08 dB Cell 3 $\hat{E}s/N_{oc}$: +1.54 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.1.7.1_A.1	TBD	TBD	TBD
8.2.2.1.1 Multiple PRBs - Prop'n Condition EVA5 - Prop'n Condition ETU70 - Prop'n Condition ETU300	SNRs as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.2.1.1 Multiple PRBs - Prop'n Condition HST	SNR as specified	0.6dB	Formula: SNR + TT T-put limit unchanged
8.2.2.1.1 Single PRB - Prop'n Condition ETU70	SNRs as specified	0.8dB	Formula: SNR + TT T-put limit unchanged

8.2.2.1.1_1 Multiple PRBs - Prop'n Condition EVA5 - Prop'n Condition ETU70 - Prop'n Condition ETU300	SNRs as specified	Same as 8.2.2.1.1 Multiple PRBs Propagation EVA5, ETU70, ETU300	Formula: SNR + TT T-put limit unchanged
8.2.2.1.1_2 Multiple PRB - Prop'n Condition EVA5	SNRs as specified	Same as 8.2.2.1.1 Multiple PRBs Propagation EVA5	Formula: SNR + TT T-put limit unchanged
8.2.2.1.1_A.1	SNRs as specified	8.2.2.1.1 Multiple PRBs for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.1.1_A.2	SNRs as specified	8.2.2.1.1 Multiple PRBs for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.1.1_A.3	SNRs as specified	8.2.2.1.1 Multiple PRBs for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.1.2 Single PRB	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.2.2.1 - Prop'n Condition EVA5	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.2.2.1 - Prop'n Condition HST	SNR as specified	0.6 dB	Formula: SNR + TT T-put limit unchanged
8.2.2.2.1_1 - Prop'n Condition EVA5	SNR as specified	Same as 8.2.2.2.1	Formula: SNR + TT T-put limit unchanged
8.2.2.2.2	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.2.2.2_1	SNR as specified	Same as 8.2.2.2.2	Formula: SNR + TT T-put limit unchanged
8.2.2.2.3_C.1	N_{oc1}: -102dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.8dBm/15kHz $\hat{E}s_1 / N_{oc2}$: +3.8dB $\hat{E}s_2 / N_{oc2}$: +6dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -102.1dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.9dBm/15kHz $\hat{E}s_1 / N_{oc2}$: +4.7dB $\hat{E}s_2 / N_{oc2}$: +5.8dB Formulae for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1 / N_{oc2}$: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2 / N_{oc2}$: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.2.2.3_E.1 - Prop'n Condition EVA5	N_{oc1}: [-98dBm/15kHz] N_{oc2}: -98dBm/15kHz N_{oc3}: -93dBm/15kHz $\hat{E}s_1 / N_{oc2}$: +3.5dB $\hat{E}s_2 / N_{oc2}$: +12dB $\hat{E}s_3 / N_{oc2}$: +10dB	0dB 0dB -0.1dB +0.9dB -0.2dB -0.2dB	N_{oc1}: -98dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -93.1dBm/15kHz $\hat{E}s_1 / N_{oc2}$: +4.4dB $\hat{E}s_2 / N_{oc2}$: +11.8dB $\hat{E}s_3 / N_{oc2}$: +9.8dB The analysis is recorded in 3GPP TR 36.904 [17] T-put limit unchanged

8.2.2.2.4	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB DIP 2: -8.66dB SINR: -1.4dB	0 dB +0.29dB +0.89dB +0.99dB	N_{oc}: -98dBm/15kHz DIP1: -1.44dB DIP2: -7.77 SINR: -0.41dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.2.2.6	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +15.3 dB Cell 2 $\hat{E}s/N_{oc}$: +13.91 dB Cell 3 $\hat{E}s/N_{oc}$: +3.34 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.85 dB +0.8 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +17.15 dB Cell 2 $\hat{E}s/N_{oc}$: +14.71 dB Cell 3 $\hat{E}s/N_{oc}$: +4.14 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.2.2.7	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +8.1 dB Cell 2 $\hat{E}s/N_{oc}$: +3.28 dB Cell 3 $\hat{E}s/N_{oc}$: +0.74 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.54 dB +0.8 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +9.64 dB Cell 2 $\hat{E}s/N_{oc}$: +4.08 dB Cell 3 $\hat{E}s/N_{oc}$: +1.54 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.2.3.1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.2.3.1_1	SNR as specified	Same as 8.2.2.3.1	Formula: SNR + TT T-put limit unchanged
8.2.2.3.1_2	SNR as specified	Same as 8.2.2.3.1	Formula: SNR + TT T-put limit unchanged
8.2.2.3.1_A.1	SNRs as specified	Same as 8.2.2.3.1 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.3.1_A.2	SNRs as specified	Same as 8.2.2.3.1 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.3.1_A.3	SNRs as specified	Same as 8.2.2.3.1 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.3.1A_A.1	SNRs as specified	Same as 8.2.2.3.1 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.3.1B	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.2.3.1C	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +19.6 dB Cell 2 $\hat{E}s/N_{oc}$: +12.95 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.9 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +21.5 dB Cell 2 $\hat{E}s/N_{oc}$: +13.75 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.2.3.2	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged

8.2.2.3.3_C.1	N_{oc1}: -102dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.8dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +14.0dB $\hat{E}s_2$ / N_{oc2}: +6dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -102.1dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.9dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +14.9dB $\hat{E}s_2$ / N_{oc2}: +5.8dB Formulae for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.2.2.3.3_C.2	N_{oc1}: -102dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.8dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +12.2dB $\hat{E}s_2$ / N_{oc2}: +6dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -102.1dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -94.9dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +13.1dB $\hat{E}s_2$ / N_{oc2}: +5.8dB Formulae for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.2.2.3.3_E.1 - Prop'n Condition EVA5	N_{oc1}: -98dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -93dBm/15kHz Test 1 $\hat{E}s_1$ / N_{oc2}: + 14.2 dB $\hat{E}s_2$ / N_{oc2}: + 9 dB $\hat{E}s_3$ / N_{oc2}: + 7 dB Test 2 $\hat{E}s_1$ / N_{oc2}: +22.7dB $\hat{E}s_2$ / N_{oc2}: +9dB $\hat{E}s_3$ / N_{oc2}: +1dB	0dB 0dB -0.1dB +0.9dB -0.2dB -0.2dB +0.9dB -0.2dB -0.2dB	N_{oc1}: -98dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -93.1dBm/15kHz $\hat{E}s_1$ / N_{oc2}: + 15.1 dB $\hat{E}s_2$ / N_{oc2}: + 8.8 dB $\hat{E}s_3$ / N_{oc2}: + 6.8 dB $\hat{E}s_1$ / N_{oc2}: +23.6dB $\hat{E}s_2$ / N_{oc2}: +8.8dB $\hat{E}s_3$ / N_{oc2}: +0.8dB The analysis is recorded in 3GPP TR 36.904 [17] T-put limit unchanged
8.2.2.4.1	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.2.4.1_1	SNR as specified	Same as 8.2.2.4.1	Formula: SNR + TT T-put limit unchanged
8.2.2.4.1_E.1 - Prop'n Condition EPA5	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +6.4 dB $\hat{E}s_2$ / N_{oc2}: +12 dB $\hat{E}s_3$ / N_{oc2}: +10 dB	0 dB 0 dB -0.1 dB +0.9 dB -0.2 dB -0.2 dB	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +7.3 dB $\hat{E}s_2$ / N_{oc2}: +11.8 dB $\hat{E}s_3$ / N_{oc2}: +9.8 dB The analysis is recorded in 3GPP TR 36.904 [17] T-put limit unchanged
8.2.2.4.1_H TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 for SCE-L1	SNR as specified	Same as 8.2.2.4.1	Formula: SNR + TT T-put limit unchanged
8.2.2.4.2	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged

8.2.2.4.2_1	SNR as specified	Same as 8.2.2.4.2	Formula: SNR + TT T-put limit unchanged
8.2.2.4.2_A.1	SNR as specified	Same as 8.2.2.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.4.2_A.2	SNR as specified	Same as 8.2.2.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.4.2_A.3	SNR as specified	Same as 8.2.2.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.4.2A	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.2.2.4.3	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB DIP 2: -8.66dB SINR: 1.1dB	0 dB +0.29dB +0.89dB +0.99dB	N_{oc}: -98dBm/15kHz DIP1: -1.44dB DIP2: -7.77 SINR: 2.09dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.2.4.4	SNR as specified	Same as 8.2.2.4.2 for each CC	Formula: SNR + TT T-put limit unchanged
8.2.2.4.5	Test 1: N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +16.1 dB Cell 2 $\hat{E}s/N_{oc}$: +13.91 dB Cell 3 $\hat{E}s/N_{oc}$: +3.34 dB Test 2: N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +9.5 dB Cell 2 $\hat{E}s/N_{oc}$: +3.28 dB Cell 3 $\hat{E}s/N_{oc}$: +0.74 dB	Test 1: 0 dB +1.85 dB +0.8 dB +0.8 dB Test 2: 0 dB +1.54 dB +0.8 dB +0.8 dB	Test 1: N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +17.95 dB Cell 2 $\hat{E}s/N_{oc}$: +14.71 dB Cell 3 $\hat{E}s/N_{oc}$: +4.14 dB T-put limit unchanged Test 2: N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +11.04 dB Cell 2 $\hat{E}s/N_{oc}$: +4.08 dB Cell 3 $\hat{E}s/N_{oc}$: +1.54 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.2.2.7.1_A.1	TBD	TBD	TBD
8.2.3.1.1.1	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.3.1.1.2	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.3.1.1.3	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.3.1.1.4	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.3.1.2.1	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.3.1.2.2	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.3.1.2.3	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.3.1.2.4	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.1.1	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.1.2	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.1.3	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.1.4	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.1A	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged

8.2.3.2.2.1	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.2.2	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.2.3	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.2.4	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.2.2A	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.3.1.1	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.3.1.2	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.3.1.3	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.3.1.4	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.3.2.1	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.3.2.2	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.3.2.3	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.3.3.2.4	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.4.1.1	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.2.4.1.2	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.3.1.1.1_D	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.1.1.1_H FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO for SCE-L1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.1.1.2_D	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.1.1.3	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB SINR: -1.10dB	0 dB +0.28dB +0.98dB	N_{oc}: -98dBm/15kHz DIP1: -1.45dB SINR: -0.12dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.3.1.1.4	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +18.5 dB Cell 2 $\hat{E}s/N_{oc}$: +13.91 dB Cell 3 $\hat{E}s/N_{oc}$: +3.34 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.85 dB +0.8 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +20.35 dB Cell 2 $\hat{E}s/N_{oc}$: +14.71 dB Cell 3 $\hat{E}s/N_{oc}$: +4.14 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.3.1.1.5	$\hat{E}s_1 / N_{oc}$: +14.3dB $\hat{E}s_2 / N_{oc}$: +13.91dB $\hat{E}s_3 / N_{oc}$: +3.34dB	+0.9dB -0.2dB 0 dB	$\hat{E}s_1 / N_{oc}$: +15.2dB $\hat{E}s_2 / N_{oc}$: +13.71dB $\hat{E}s_3 / N_{oc}$: +3.34dB Formulas for Test Tolerance values: $\hat{E}s_1 / N_{oc}$: +$\hat{E}s_1/N_{oc}$ uncertainty $\hat{E}s_2 / N_{oc}$: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc}$ uncertainty) T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]

8.3.1.1.6	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +11.5 dB Cell 2 $\hat{E}s/N_{oc}$: +3.28 dB Cell 3 $\hat{E}s/N_{oc}$: +0.74 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.54 dB +0.8 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +13.04 dB Cell 2 $\hat{E}s/N_{oc}$: +4.08 dB Cell 3 $\hat{E}s/N_{oc}$: +1.54 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.3.1.1.7	TBD	TBD	TBD
8.3.1.2.1_D	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.1.2.1_D_1	N_{oc}: -98dBm/15kHz $\hat{E}s_1$ / N_{oc}: +14.2 dB $\hat{E}s_2$ / N_{oc}: +7.25 dB	0 dB +0.8 dB -0.35 dB	N_{oc}: -98dBm/15kHz $\hat{E}s_1$ / N_{oc}: +15.0 dB $\hat{E}s_2$ / N_{oc}: +6.9 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.3.1.2.2	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.1.3.1_F	SNR as specified Test 1: 2us Test 2: -0.5us	0.9 dB -0.145us +0.142us	Formula: SNR + TT Test 1: 57Ts Test 2: -11Ts Timings: (Offset – uncertainty), then rounded to integer multiple of Ts T-put limit unchanged
8.3.1.3.2_F	SNR as specified Test 1: 2us Test 2: -0.5us	0.9 dB -0.145us +0.142us	Formula: SNR + TT Test 1: 57Ts Test 2: -11Ts Timings: (Offset – uncertainty), then rounded to integer multiple of Ts T-put limit unchanged
8.3.1.3.3_F	SNR as specified Test 1: 2us Test 2: -0.5us	0.9 dB -0.145us +0.142us	Formula: SNR + TT Test 1: 57Ts Test 2: -11Ts Timings: (Offset - uncertainty), then rounded to integer multiple of Ts T-put limit unchanged
8.3.2.1.1	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.1.1_1	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.1.2	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.1.2_D	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.1.2_H TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO for SCE-L1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.1.3	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.1.3_D	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.1.4	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB SINR: -1.0dB	0 dB +0.28dB +0.98dB	N_{oc}: -98dBm/15kHz DIP1: -1.45dB SINR: -0.02dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]

8.3.2.1.5	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +18.0 dB Cell 2 $\hat{E}s/N_{oc}$: +13.91 dB Cell 3 $\hat{E}s/N_{oc}$: +3.34 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.85 dB +0.8 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +19.85 dB Cell 2 $\hat{E}s/N_{oc}$: +14.71 dB Cell 3 $\hat{E}s/N_{oc}$: +4.14 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.3.2.1.6	$\hat{E}s_1 / N_{oc}$: +14.0dB $\hat{E}s_2 / N_{oc}$: +13.91dB $\hat{E}s_3 / N_{oc}$: +3.34dB	+0.9dB -0.2dB 0 dB	$\hat{E}s_1 / N_{oc}$: +14.9dB $\hat{E}s_2 / N_{oc}$: +13.71dB $\hat{E}s_3 / N_{oc}$: +3.34dB Formulas for Test Tolerance values: $\hat{E}s_1 / N_{oc}$: +$\hat{E}s_1/N_{oc}$ uncertainty $\hat{E}s_2 / N_{oc}$: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc}$ uncertainty) T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.3.2.1.7	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +11.3 dB Cell 2 $\hat{E}s/N_{oc}$: +3.28 dB Cell 3 $\hat{E}s/N_{oc}$: +0.74 dB Cell 1 $\hat{E}s/N_{oc}$ is defined as SNR in minimum requirement.	0 dB +1.54 dB +0.8 dB +0.8 dB	N_{oc}: -98dBm/15kHz Cell 1 $\hat{E}s/N_{oc}$: +12.84 dB Cell 2 $\hat{E}s/N_{oc}$: +4.08 dB Cell 3 $\hat{E}s/N_{oc}$: +1.54 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.3.2.1.8	TBD	TBD	TBD
8.3.2.2.1	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.2.1_D	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.2.1_D_1	N_{oc}: -98dBm/15kHz $\hat{E}s_1 / N_{oc}$: +14.8 dB $\hat{E}s_2 / N_{oc}$: +7.25 dB	0 dB +0.8 dB -0.35 dB	N_{oc}: -98dBm/15kHz $\hat{E}s_1 / N_{oc}$: +15.6 dB $\hat{E}s_2 / N_{oc}$: +6.9 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.3.2.2.2	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.3.2.4.1_F	SNR as specified Test 1: 2us Test 2: -0.5us	0.9 dB -0.145us +0.142us	Formula: SNR + TT Test 1: 57Ts Test 2: -11Ts Timings: (Offset – uncertainty), then rounded to integer multiple of Ts T-put limit unchanged
8.3.2.4.2_F	SNR as specified Test 1: 2us Test 2: -0.5us	0.9 dB -0.145us +0.142us	Formula: SNR + TT Test 1: 57Ts Test 2: -11Ts Timings: (Offset - uncertainty), then rounded to integer multiple of Ts T-put limit unchanged
8.3.2.4.3_F	SNR as specified Test 1: 2us Test 2: -0.5us	0.9 dB -0.145us +0.142us	Formula: SNR + TT Test 1: 57Ts Test 2: -11Ts Timings: (Offset - uncertainty), then rounded to integer multiple of Ts T-put limit unchanged
8.3.3.1.1	SNR as specified	0.9 dB for each CC	Formula: SNR + TT T-put limit unchanged
8.3.3.1.2	SNR as specified	0.9 dB for each CC	Formula: SNR + TT T-put limit unchanged

8.4.1.1	SNR as specified	0.8 dB	Formula: SNR + TT T-put limit unchanged
8.4.1.2.1	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged
8.4.1.2.1_1	SNR as specified	Same as 8.4.1.2.1	Formula: SNR + TT T-put limit unchanged
8.4.1.2.2	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged
8.4.1.2.2_1	SNR as specified	Same as 8.4.1.2.2	Formula: SNR + TT T-put limit unchanged
8.4.1.2.3_C.1	N_{oc1}: -100.5dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.3dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -3.9dB $\hat{E}s_2$ / N_{oc2}: +1.5dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -100.6dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.4dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -3dB $\hat{E}s_2$ / N_{oc2}: +1.3dB Formula for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.4.1.2.3_C.2	N_{oc1}: -100.5dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.3dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -4.2dB $\hat{E}s_2$ / N_{oc2}: +1.5dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -100.6dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.4dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -3.3dB $\hat{E}s_2$ / N_{oc2}: +1.3dB Formula for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.4.1.2.3_E.1 - Prop'n Condition EVA5	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -2.2 dB $\hat{E}s_2$ / N_{oc2}: +5 dB $\hat{E}s_3$ / N_{oc2}: +3 dB	0 dB 0 dB -0.1 dB +0.9 dB -0.2 dB -0.2 dB	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -1.3 dB $\hat{E}s_2$ / N_{oc2}: +4.8 dB $\hat{E}s_3$ / N_{oc2}: +2.8 dB The analysis is recorded in 3GPP TR 36.904 [17] Pm-dsg limit unchanged
8.4.1.2.3_E.2 - Prop'n Condition EVA5	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -2 dB $\hat{E}s_2$ / N_{oc2}: +5 dB $\hat{E}s_3$ / N_{oc2}: +3 dB	0 dB 0 dB -0.1 dB +0.9 dB -0.2 dB -0.2 dB	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -1.1 dB $\hat{E}s_2$ / N_{oc2}: +4.8 dB $\hat{E}s_3$ / N_{oc2}: +2.8 dB The analysis is recorded in 3GPP TR 36.904 [17] Pm-dsg limit unchanged
8.4.2.1	SNR as specified	0.8 dB	Formula: SNR + TT T-put limit unchanged
8.4.2.2.1	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged
8.4.2.2.1_1	SNR as specified	Same as 8.4.2.2.1	Formula: SNR + TT T-put limit unchanged
8.4.2.2.2	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged

8.4.2.2.2_1	SNR as specified	Same as 8.4.2.2.2	Formula: SNR + TT T-put limit unchanged
8.4.2.2.3_C.1	N_{oc1}: -100.5dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.3dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -3.9dB $\hat{E}s_2$ / N_{oc2}: +1.5dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -100.6dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.4dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -3dB $\hat{E}s_2$ / N_{oc2}: +1.3dB Formula for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.4.2.2.3_C.2	N_{oc1}: -100.5dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.3dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -4.1dB $\hat{E}s_2$ / N_{oc2}: +1.5dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -100.6dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.4dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -3.2dB $\hat{E}s_2$ / N_{oc2}: +1.3dB Formula for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.4.2.2.3_E.1 - Prop'n Condition EVA5	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -.2 dB $\hat{E}s_2$ / N_{oc2}: +5 dB $\hat{E}s_3$ / N_{oc2}: +3 dB	0 dB 0 dB -0.1 dB +0.9 dB -0.2 dB -0.2 dB	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -1.1 dB $\hat{E}s_2$ / N_{oc2}: +4.8 dB $\hat{E}s_3$ / N_{oc2}: +2.8 dB The analysis is recorded in 3GPP TR 36.904 [17] Pm-dsg limit unchanged
8.4.2.2.3_E.2 - Prop'n Condition EVA5	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -1.8 dB: $\hat{E}s_2$ / N_{oc2} +5 dB $\hat{E}s_3$ / N_{oc2}: +3 dB	0 dB 0 dB -0.1 dB +0.9 dB -0.2 dB -0.2 dB	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: -0.9 dB $\hat{E}s_2$ / N_{oc2}: +4.8 dB $\hat{E}s_3$ / N_{oc2}: +2.8 dB The analysis is recorded in 3GPP TR 36.904 [17] Pm-dsg limit unchanged
8.4.3.1.1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.5.1.1	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.5.1.2.1	SNR as specified	1.1 dB	Formula: SNR + TT T-put limit unchanged
8.5.1.2.1_1	SNR as specified	Same as 8.5.1.2.1	Formula: SNR + TT T-put limit unchanged
8.5.1.2.2	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged

8.5.1.2.3_C.1	N_{oc1}: -100.5dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.3dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +4.6dB $\hat{E}s_2$ / N_{oc2}: +1.5dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -100.6dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.4dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +5.5dB $\hat{E}s_2$ / N_{oc2}: +1.3dB Formula for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.5.1.2.3_E.1	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +5 dB $\hat{E}s_2$ / N_{oc2}: +5 dB $\hat{E}s_3$ / N_{oc2}: +3 dB	0 dB 0 dB -0.1 dB +0.9 dB -0.2 dB -0.2 dB	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +5.9 dB $\hat{E}s_2$ / N_{oc2}: +4.8 dB $\hat{E}s_3$ / N_{oc2}: +2.8 dB The analysis is recorded in 3GPP TR 36.904 [17] Pm-an limit unchanged
8.5.1.2.2_1	SNR as specified	Same as 8.5.1.2.2	Formula: SNR + TT T-put limit unchanged
8.5.2.1	SNRs as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.5.2.2.1	SNR as specified	1.1 dB	Formula: SNR + TT T-put limit unchanged
8.5.2.2.1_1	SNR as specified	Same as 8.5.2.2.1	Formula: SNR + TT T-put limit unchanged
8.5.2.2.2	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged
8.5.2.2.2_1	SNR as specified	Same as 8.5.2.2.2	Formula: SNR + TT T-put limit unchanged
8.5.2.2.3_C.1	N_{oc1}: -100.5dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.3dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +4.6dB $\hat{E}s_2$ / N_{oc2}: +1.5dB	-0.1dB 0dB -0.1dB +0.9dB -0.2dB	N_{oc1}: -100.6dBm/15kHz N_{oc2}: -98dBm/15kHz N_{oc3}: -95.4dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +5.5dB $\hat{E}s_2$ / N_{oc2}: +1.3dB Formula for Test Tolerance values: N_{oc1}: -($\hat{E}s_1/N_{oc1}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) N_{oc2}: unchanged N_{oc3}: -($\hat{E}s_1/N_{oc3}$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) $\hat{E}s_1$ / N_{oc2}: +$\hat{E}s_1/N_{oc2}$ uncertainty $\hat{E}s_2$ / N_{oc2}: -($\hat{E}s_2/\hat{E}s_1$ uncertainty - $\hat{E}s_1/N_{oc2}$ uncertainty) T-put limit unchanged
8.5.2.2.3_E.1	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +5.7 dB $\hat{E}s_2$ / N_{oc2}: +5 dB $\hat{E}s_3$ / N_{oc2}: +3 dB	0 dB 0 dB -0.1 dB +0.9 dB -0.2 dB -0.2 dB	N_{oc1}: -98 dBm/15kHz N_{oc2}: -98 dBm/15kHz N_{oc3}: -93.1 dBm/15kHz $\hat{E}s_1$ / N_{oc2}: +6.6 dB $\hat{E}s_2$ / N_{oc2}: +4.8 dB $\hat{E}s_3$ / N_{oc2}: +2.8 dB The analysis is recorded in 3GPP TR 36.904 [17] Pm-an limit unchanged
8.7.1.1 FDD sustained data rate performance	Downlink power -85dBm/15kHz	0 dB	Formula: Downlink power + TT T-put limit unchanged
8.7.1.1_1	Same as 8.7.1.1	Same as 8.7.1.1	Formula: Downlink power + TT T-put limit unchanged
8.7.1.1_2	Same as 8.7.1.1	Same as 8.7.1.1	Formula: Downlink power + TT T-put limit unchanged
8.7.1.1_A.1	Same as 8.7.1.1	Same as 8.7.1.1	Formula: Downlink power + TT T-put limit unchanged

8.7.1.1_A.2	Same as 8.7.1.1	Same as 8.7.1.1	Formula: Downlink power + TT T-put limit unchanged
8.7.1.1_A.4	Same as 8.7.1.1	Same as 8.7.1.1	Formula: Downlink power + TT T-put limit unchanged
8.7.1.1_A.5	Same as 8.7.1.1	Same as 8.7.1.1	Formula: Downlink power + TT T-put limit unchanged
8.7.1.1_H.1	Same as 8.7.1.1	Same as 8.7.1.1	Formula: Downlink power + TT T-put limit unchanged
8.7.1.1_H.2	Same as 8.7.1.1	Same as 8.7.1.1 for each CC	Formula: Downlink power + TT T-put limit unchanged
8.7.1.1_H.3	Same as 8.7.1.1	Same as 8.7.1.1 for each CC	Formula: Downlink power + TT T-put limit unchanged
8.7.2.1 TDD sustained data rate performance	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.2.1_1	Same as 8.7.2.1	Same as 8.7.2.1	Formula: Downlink power + TT T-put limit unchanged
8.7.2.1_2	Same as 8.7.2.1	Same as 8.7.2.1	Formula: Downlink power + TT T-put limit unchanged
8.7.2.1_A.1	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Formula: Downlink power + TT T-put limit unchanged
8.7.2.1_A.2	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Formula: Downlink power + TT T-put limit unchanged
8.7.2.1_A.3	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Formula: Downlink power + TT T-put limit unchanged
8.7.2.1_H.1	Same as 8.7.2.1	Same as 8.7.2.1	Formula: Downlink power + TT T-put limit unchanged
8.7.2.1_H.2	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Formula: Downlink power + TT T-put limit unchanged
8.7.2.1_H.3	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Formula: Downlink power + TT T-put limit unchanged
8.7.3.1 FDD sustained data rate performance for EPDCCH scheduling	Same as 8.7.1.1	Same as 8.7.1.1	Formula: Downlink power + TT T-put limit unchanged
8.7.4.1 TDD sustained data rate performance for EPDCCH scheduling	Same as 8.7.2.1	Same as 8.7.2.1	Same as 8.7.2.1
8.7.5.1.1 TDD FDD CA Sustained data rate performance for FDD PCell (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1 for each CC	Same as 8.7.1.1
8.7.5.1.2 TDD FDD CA Sustained data rate performance for FDD PCell (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1 for each CC	Same as 8.7.1.1
8.7.5.1.3 TDD FDD CA Sustained data rate performance for FDD PCell (4DL CA)	Same as 8.7.1.1	Same as 8.7.1.1 for each CC	Same as 8.7.1.1
8.7.5.1.4 TDD FDD CA Sustained data rate performance for FDD PCell (5DL CA)	Same as 8.7.1.1	Same as 8.7.1.1 for each CC	Same as 8.7.1.1
8.7.5.1_H.1 TDD FDD CA Sustained data rate performance for FDD PCell for SCE-L1 (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1 for each CC	Same as 8.7.1.1
8.7.5.1_H.2 TDD FDD CA Sustained data rate performance for FDD PCell for SCE-L1 (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1 for each CC	Same as 8.7.1.1

8.7.5.2.1 TDD FDD CA Sustained data rate performance for TDD PCell (2DL CA)	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1
8.7.5.2.2 TDD FDD CA Sustained data rate performance for TDD PCell (3DL CA)	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1
8.7.5.2.3 TDD FDD CA Sustained data rate performance for TDD PCell (4DL CA)	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1
8.7.5.2_H.1 TDD FDD CA Sustained data rate performance for TDD PCell for SCE-L1 (2DL CA)	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1
8.7.5.2_H.2 TDD FDD CA Sustained data rate performance for TDD PCell for SCE-L1 (3DL CA)	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1
8.7.5.2_H.3 TDD FDD CA Sustained data rate performance for TDD PCell for SCE-L1 (4DL CA)	Same as 8.7.2.1	Same as 8.7.2.1 for each CC	Same as 8.7.2.1
8.7.6.1 FDD sustained data rate performance for Dual Connectivity 64QAM	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.6.2 FDD sustained data rate performance for Dual Connectivity 256QAM	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.7.1 TDD sustained data rate performance for Dual Connectivity 64QAM	Same as 8.7.2.1	Same as 8.7.2.1	Same as 8.7.2.1
8.7.7.2 TDD sustained data rate performance for Dual Connectivity 256QAM	Same as 8.7.2.1	Same as 8.7.2.1	Same as 8.7.2.1
8.7.9.2 FDD sustained data rate performance for 4 layer MIMO (single carrier)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.9.3 FDD sustained data rate performance for 4 layer MIMO (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.9.4 FDD sustained data rate performance for 4 layer MIMO (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.9.5 FDD sustained data rate performance for 4 layer MIMO (4DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.9.6 FDD sustained data rate performance for 4 layer MIMO (5DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.2 TDD sustained data rate performance for 4 layer MIMO (single carrier)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.3 TDD sustained data rate performance for 4 layer MIMO (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.4 TDD sustained data rate performance for 4 layer MIMO (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.5 TDD sustained data rate performance for 4 layer MIMO (4DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.10.6 TDD sustained data rate performance for 4 layer MIMO (5DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1

8.7.11.2 TDD FDD CA sustained data rate performance for 4 layer MIMO (2DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.11.3 TDD FDD CA sustained data rate performance for 4 layer MIMO (3DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.11.4 TDD FDD CA sustained data rate performance for 4 layer MIMO (4DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.7.11.5 TDD FDD CA sustained data rate performance for 4 layer MIMO (5DL CA)	Same as 8.7.1.1	Same as 8.7.1.1	Same as 8.7.1.1
8.8.1.1 FDD distributed EPDCCH performance	SNR as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.8.1.2 TDD distributed EPDCCH performance	SNR as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.8.2.1 FDD localized EPDCCH performance with TM9	SNR as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.8.2.2 TDD localized EPDCCH performance with TM9	SNR as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.8.3.1 FDD localized EPDCCH transmission with TM10 Type B quasi co-location type	SNR as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.8.3.2 TDD localized EPDCCH transmission with TM10 Type B quasi co-location type	SNR as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.9.1.1.1 FDD PDSCH Transmit Diversity 2x1 for UE category 0	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.1.2 FDD Closed-loop spatial multiplexing performance (Cell-Specific Reference Symbols) for UE category 0	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.1.3 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.1.3_1 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 1bis	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.1.1_1 FDD PDSCH Transmit Diversity 2x1 for UE category 1bis	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.1.2_1 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x1 for UE Category 1bis	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.2.1 TDD PDSCH Transmit Diversity for UE category 0	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.2.1_1 TDD PDSCH Transmit Diversity 2x1 for UE category 1bis	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged

8.9.1.2.2 TDD Closed-loop spatial multiplexing performance (Cell-Specific Reference Symbols) for UE category 0	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.2.2_1 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x1 for UE Category 1bis	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.2.3 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.1.2.3_1 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 1bis	SNR as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.9.2.1.1 FDD PHICH transmit diversity for UE category 0	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.9.2.1.1_1 FDD PHICH transmit diversity for UE category 1bis	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.9.2.2.1 TDD PHICH Transmit Diversity for UE category 0	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.10.1.1.1 FDD PDSCH Transmit Diversity 2x4	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.10.1.1.2 FDD PDSCH Open Loop Spatial Multiplexing 2x4	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.10.1.1.3 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model – Enhanced Performance Requirement Type A	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB SINR: -2.3dB	0dB +0.28dB +0.98dB	N_{oc}: -98dBm/15kHz DIP 1: -1.45dB SINR: -1.32dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.10.1.1.4 FDD PDSCH Closed Loop Spatial Multiplexing 4x4	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.10.1.1.5 FDD PDSCH Single-layer Spatial Multiplexing 2x4 on antenna ports 7 or 8 with TM9 interference model – Enhanced Performance Requirement Type A	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB SINR: -3.0dB	0 dB +0.28dB +0.98dB	N_{oc}: -98dBm/15kHz DIP1: -1.45dB SINR: -2.03dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.10.1.1.6 FDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols)	N_{oc}: -98dBm/15kHz $\hat{E}_{S1}$ / N_{oc}: +9.2 dB $\hat{E}_{S2}$ / N_{oc}: +7.25 dB	0 dB +0.8 dB -0.35 dB	N_{oc}: -98dBm/15kHz $\hat{E}_{S1}$ / N_{oc}: +10.0 dB $\hat{E}_{S2}$ / N_{oc}: +6.9 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.10.1.1.7 FDD Open-loop spatial multiplexing, 3 Layer Multiplexing with 4 Tx Antenna Ports	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.10.1.1.8 FDD Closed-loop spatial multiplexing performance, 4 Layers spatial multiplexing 4 Tx antennas	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged

8.10.1.1.9 FDD 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.10.1.2.1 TDD PDSCH Transmit Diversity 2x4	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.10.1.2.2 TDD PDSCH Open Loop Spatial Multiplexing 2x4	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.10.1.2.3 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model – Enhanced Performance Requirement Type A	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB SINR: -1.9dB	0dB +0.28dB +0.98dB	N_{oc}: -98dBm/15kHz DIP 1: -1.45dB SINR: -0.92dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.10.1.2.4 TDD PDSCH Closed Loop Spatial Multiplexing 4x4	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.10.1.2.5 FDD PDSCH Single-layer Spatial Multiplexing 2x4 on antenna ports 7 or 8 with TM9 interference model – Enhanced Performance Requirement Type A	N_{oc}: -98dBm/15kHz DIP 1: -1.73dB SINR: -3.3dB	0 dB +0.28dB +0.98dB	N_{oc}: -98dBm/15kHz DIP1: -1.45dB SINR: -2.32dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.10.1.2.6 TDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols)	N_{oc}: -98dBm/15kHz $\hat{E}_{S1}$ / N_{oc}: +9.5 dB $\hat{E}_{S2}$ / N_{oc}: +7.25 dB	0 dB +0.8 dB -0.35 dB	N_{oc}: -98dBm/15kHz $\hat{E}_{S1}$ / N_{oc}: +10.3 dB $\hat{E}_{S2}$ / N_{oc}: +6.9 dB T-put limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
8.10.1.2.7 TDD Open-loop spatial multiplexing, 3 Layer Multiplexing with 4 Tx Antenna Ports	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.10.1.2.8 TDD Closed-loop spatial multiplexing performance, 4 Layers spatial multiplexing 4 Tx antennas	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.10.1.2.9 TDD 4 Layer Spatial Multiplexing (User-Specific Reference Symbols)	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.10.2.1.1 FDD PCFICH/PDCCH Single-antenna Port Performance 1x4	SNR as specified	0.8 dB	Formula: SNR + TT T-put limit unchanged
8.10.2.1.2 FDD PCFICH/PDCCH Transmit Diversity 2x4	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged
8.10.2.1.3 FDD PCFICH/PDCCH Transmit Diversity 4x4	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged
8.10.2.2.1 TDD PCFICH/PDCCH Single-antenna Port Performance 1x4	SNR as specified	0.8 dB	Formula: SNR + TT T-put limit unchanged
8.10.2.2.2 TDD PCFICH/PDCCH Transmit Diversity 2x4	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged
8.10.2.2.3 TDD PCFICH/PDCCH Transmit Diversity 4x4	SNR as specified	1.0 dB	Formula: SNR + TT T-put limit unchanged

8.10.3.1.1 FDD PHICH Single-antenna Port Performance 1x4	SNR as specified	0.9 dB	Formula: SNR + TT Pm-an limit unchanged
8.10.3.1.2 FDD PHICH Transmit Diversity 2x4	SNR as specified	1.1 dB	Formula: SNR + TT Pm-an limit unchanged
8.10.3.1.3 FDD PHICH Transmit Diversity 4x4	SNR as specified	1.0 dB	Formula: SNR + TT Pm-an limit unchanged
8.10.3.2.1 TDD PHICH Single-antenna Port Performance 1x4	SNR as specified	0.9 dB	Formula: SNR + TT Pm-an limit unchanged
8.10.3.2.2 TDD PHICH Transmit Diversity 2x4	SNR as specified	1.1 dB	Formula: SNR + TT Pm-an limit unchanged
8.10.3.2.3 TDD PHICH Transmit Diversity 4x4	SNR as specified	1.0 dB	Formula: SNR + TT Pm-an limit unchanged
8.10.4.1.1 FDD distributed E2PDCCH performance 2x4	SNRs as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.10.4.1.2 TDD distributed EPDCCH performance 2x4	SNR as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.10.4.2.1 FDD localized EPDCCH performance with TM9 2x4	SNRs as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.10.4.2.2 TDD localized EPDCCH performance with TM9 2x4	SNRs as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.11.1.1.2 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.11.1.1.3.1 FDD PDSCH Transmit Diversity 2x1 for UE category M1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.11.1.1.3.1_1 FDD PDSCH Transmit Diversity 2x1 for UE category M1 (CEModeB)	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.11.1.2.1	Same as 8.11.1.1.1	Same as 8.11.1.1.1	Same as 8.11.1.1.1
8.11.1.2.2 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1	SNRs as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
8.11.1.2.3.1 TDD PDSCH Transmit Diversity for UE category M1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.11.1.2.3.1_1 TDD PDSCH Transmit Diversity for UE category M1 (CEModeB)	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.11.2.1.1 FDD and HD-FDD demodulation of MPDCCH in CE Mode A	SNRs as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.11.2.1.2 FDD and HD-FDD demodulation of MPDCCH in CE Mode B	SNRs as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.11.2.2.1 TDD demodulation of MPDCCH in CE Mode A	SNRs as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged
8.11.2.2.2 TDD demodulation of MPDCCH in CE Mode B	SNRs as specified	0.9dB	Formula: SNR + TT Pm-dsg limit unchanged

8.12.1.1.1 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in In-band mode for category NB1	SNR as specified	0.9 dB	Formula: SNR + TT T-put limit unchanged
8.12.1.1.2 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in standalone and Guard-band mode for category NB1	SNRs as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
8.12.2.1.1 Demodulation of NPDCCH single-antenna performance for category NB1	SNRs as specified	0.8dB	Formula: SNR + TT Pm-dsg limit unchanged
8.12.2.1.2 Demodulation of NPDCCH Transmit diversity performance for category NB1	SNR as specified	0.9 dB	Formula: SNR + TT Pm-dsg limit unchanged
8.13.1.2.2	SNRs as specified	0.9 dB for each CC	Formula: SNR + TT T-put limit unchanged
8.13.1.2.3	SNRs as specified	0.9 dB for each CC	Formula: SNR + TT T-put limit unchanged
8.13.1.2.4	SNRs as specified	0.9 dB for each CC	Formula: SNR + TT T-put limit unchanged
8.13.1.2.5	SNRs as specified	0.9 dB for each CC	Formula: SNR + TT T-put limit unchanged
10.1	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
10.2	SNR as specified	0.9dB	Formula: SNR + TT T-put limit unchanged
14.2	SNRs as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
14.3	SNRs as specified	0.8dB	Formula: SNR + TT T-put limit unchanged
[Other tests FFS]			

F.3.5 Measurement of Channel State Information reporting

Table F.3.5-1: Derivation of Test Requirements (Channel State Information reporting tests)

Test	Minimum Requirement in TS 36.101	Test Tolerance (TT)	Test Requirement in TS 36.521-1
9.2.1.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.1.2 TDD CQI Reporting under AWGN condit.1ions – PUCCH 1-0	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.1.3_C.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for eICIC (non-MBSFN ABS)	Values as specified Limits as in the Test Procedure	No test tolerances applied	The analysis is recorded in 3GPP TR 36.904 [17]
9.2.1.4_C.1 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for eICIC (non-MBSFN ABS)	Values as specified Limits as in the Test Procedure	No test tolerances applied	The analysis is recorded in 3GPP TR 36.904 [17]
9.2.1.5_E.1 FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	Values as specified Limits as in the Test Procedure	No test tolerances applied	The analysis is recorded in 3GPP TR 36.904 [17]
9.2.1.6_E.1 TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	Values as specified Limits as in the Test Procedure	No test tolerances applied	The analysis is recorded in 3GPP TR 36.904 [17]
9.2.1.7 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 256QAM in DL	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.1.8 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 256QAM in DL	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.2.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.2.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.3.1_D FDD CQI Reporting under AWGN conditions – PUCCH 1-1 for eDL-MIMO	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.3.2_D TDD CQI Reporting under AWGN conditions – PUCCH 1-1 for eDL-MIMO	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.4.1_F FDD CQI Reporting under AWGN conditions - Single CSI Process for CoMP	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.4.2_F TDD CQI Reporting under AWGN conditions - Single CSI Process for CoMP	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged

9.2.6.1 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with FDD as Pcell (PUSCH 3-0)	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.6.2 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with TDD as Pcell (PUSCH 3-0)	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.7.1 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with FDD as Pcell (PUSCH 3-1)	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.2.7.2 LAA CQI Reporting under AWGN Conditions with Frame Structure Type 3 with TDD as Pcell (PUSCH 3-1)	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.3.1.1.1 FDD CQI Reporting under fading conditions – PUSCH 3-0	SNRs as specified α 2% β 55% γ 1.10 BLER 0.05	SNR 0dB α 0% β 0% γ 0.01 BLER 0	SNR unchanged α limit unchanged β limit unchanged γ1.09 as per Table G.5.4-1 BLER limit unchanged
9.3.1.1.2 TDD CQI Reporting under fading conditions – PUSCH 3-0	Same as 9.3.1.1.1	Same as 9.3.1.1.1	Same as 9.3.1.1.1
9.3.1.2.1_D FDD CQI Reporting under fading conditions – PUSCH 3-1 for eDL-MIMO	Same as 9.3.1.1.1	Same as 9.3.1.1.1	Same as 9.3.1.1.1
9.3.1.2.2_D TDD CQI Reporting under fading conditions – PUSCH 3-1 for eDL-MIMO	Same as 9.3.1.1.1	Same as 9.3.1.1.1	Same as 9.3.1.1.1
9.3.1.2.3 FDD CQI Reporting under fading conditions – PUSCH 3-1 for 256QAM in DL	SNRs as specified α 2% β 40 γ 1.10 BLER 0.05	SNR 0dB α 0% β 0% γ 0.01 BLER 0	SNR unchanged α limit unchanged β limit unchanged γ1.09 as per Table G.5.4-1 BLER limit unchanged
9.3.1.2.4 TDD CQI Reporting under fading conditions – PUSCH 3-1 for 256QAM in DL	Same as 9.3.1.2.3	Same as 9.3.1.2.3	Same as 9.3.1.2.3
9.3.1.3.1_E.1 FDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	SNRs as specified α 2% β 55% γ 1.10 BLER 0.01	SNR 0dB α 0% β 0% γ 0.01 BLER 0	SNR unchanged α limit unchanged β limit unchanged γ1.09 as per Table G.5.4-1 BLER limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
9.3.1.3.2_E.1 TDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	Same as 9.3.1.3.1_E.1	Same as 9.3.1.3.1_E.1	Same as 9.3.1.3.1_E.1
9.3.2.1.1 FDD CQI Reporting under fading conditions – PUCCH 1-0	SNRs as specified α 20% γ 1.05 BLER 0.02	SNR 0dB α 0% γ 0.01 BLER 0	SNR and α, BLER limits unchanged α limit unchanged γ1.04 as per Table G.5.4-1 BLER limit unchanged

9.3.2.1.1_1 FDD CQI Reporting under fading conditions – PUCCH 1-0	Same as 9.3.2.1.1	Same as 9.3.2.1.1	Same as 9.3.2.1.1
9.3.2.1.2 TDD CQI Reporting under fading conditions – PUCCH 1-0	Same as 9.3.2.1.1	Same as 9.3.2.1.1	Same as 9.3.2.1.1
9.3.2.1.2_1 TDD CQI Reporting under fading conditions – PUCCH 1-0	Same as 9.3.2.1.1	Same as 9.3.2.1.1	Same as 9.3.2.1.1
9.3.2.2.1_D FDD CQI Reporting under fading conditions – PUCCH 1-1 for eDL-MIMO	Same as 9.3.2.1.1	Same as 9.3.2.1.1	Same as 9.3.2.1.1
9.3.2.2.2_D TDD CQI Reporting under fading conditions – PUCCH 1-1 for eDL-MIMO	Same as 9.3.2.1.1	Same as 9.3.2.1.1	Same as 9.3.2.1.1
9.3.3.1.1 FDD CQI Reporting under fading conditions and frequency-selective interference – PUSCH 3-0	Ior and Iot as specified α 60% γ 1.60	Ior, Iot 0dB α 20% γ 0.10	Ior and Iot unchanged α 40%, Formula: Min Req't – Test Tol γ 1.50, Formula: Min Req't – Test Tol The effect of AWGN flatness and signal flatness on the α requirement was derived by simulation. AWGN flatness / signal flatness and the statistical effect of a finite test time both affect the T-put result. The Test Tolerance comprises two quantities: 1. Effect of AWGN flatness and signal flatness, derived by simulation 2. Statistical effect as per Table G.5.4-1 Items 1 and 2 are assumed to be uncorrelated so can be root sum squared T-put requirement Test Tol = SQRT (AWGN flatness and signal flatness effect ^{2} + Statistical effect ^{2}) AWGN flatness and signal flatness effect 0.1, Statistical effect 0.01, giving overall effect 0.10
9.3.3.1.2 TDD CQI Reporting under fading conditions and frequency-selective interference – PUSCH 3-0	Same as 9.3.3.1.1	Same as 9.3.3.1.1	Same as 9.3.3.1.1
9.3.4.1.1 FDD CQI Reporting under fading conditions – PUSCH 2-0	SNRs as specified Limits as in the Test Procedure γ 1.2	γ 0.01	SNR unchanged γ 1.19 as per Table G.5.4-1
9.3.4.1.2 TDD CQI Reporting under fading conditions – PUSCH 2-0	Same as 9.3.4.1.1	Same as 9.3.4.1.1	Same as 9.3.4.1.1
9.3.4.2.1 FDD CQI Reporting under fading conditions – PUCCH 2-0	SNRs as specified Limits as in the Test Procedure γ 1.15	γ 0.01	SNR unchanged γ 1.14 as per Table G.5.4-1
9.3.4.2.2 TDD CQI Reporting under fading conditions – PUCCH 2-0	Same as 9.3.4.2.1	Same as 9.3.4.2.1	Same as 9.3.4.2.1

9.3.5.1.1 FDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A	N_{oc}: -98dBm/15kHz DIP 1: -0.41dB SINR: -2.00dB γ 1.8 BLER 0.02	0dB +0.03dB +0.03dB γ 0.01	N_{oc}: -98dBm/15kHz DIP 1: -0.38dB SINR: -1.97dB γ 1.79 as per Table G.5.4-1 BLER limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
9.3.5.1.2 TDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A	Same as 9.3.5.1.1	Same as 9.3.5.1.1	Same as 9.3.5.1.1
9.3.5.2.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A	Same as 9.3.5.1.1 Same as 9.3.5.1.1	Same as 9.3.5.1.1	Same as 9.3.5.1.1
9.3.5.2.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A	Same as 9.3.5.1.1	Same as 9.3.5.1.1	
9.3.6.1_F FDD CQI Reporting under fading conditions Single CSI processes for CoMP	γ 1.02	γ 0.01	γ1.01 as per Table G.5.4-1
9.3.6.1_F.2 FDD CQI Reporting under fading conditions Three CSI processes for CoMP	Same as 9.3.6.1_F.1	Same as 9.3.6.1_F.1	Same as 9.3.6.1_F.1
9.3.6.1_F.3 FDD CQI Reporting under fading conditions Four CSI processes for CoMP	Same as 9.3.6.1_F.1	Same as 9.3.6.1_F.1	Same as 9.3.6.1_F.1
9.3.6.2_F.1 TDD CQI Reporting under fading conditions Single CSI processes for CoMP	γ 1.02	γ 0.01	γ1.01 as per Table G.5.4-1
9.3.6.2_F.2 TDD CQI Reporting under fading conditions Three CSI processes for CoMP	Same as 9.3.6.2_F.1	Same as 9.3.6.2_F.1	Same as 9.3.6.2_F.1
9.3.6.2_F.3 TDD CQI Reporting under fading conditions Four CSI processes for CoMP	Same as 9.3.6.2_F.1	Same as 9.3.6.2_F.1	Same as 9.3.6.2_F.1
9.3.7.1 FDD CQI Reporting under fading conditions - PUSCH 3-2 for eDL MIMO Enhancement	SNRs as specified Limits as in the Test Procedure N_{oc}: -98dBm/15kHz α: *1.05* β: *1.15*	0dB α 0.01 β 0.01	SNR unchanged N_{oc}: -98dBm/15kHz α: *1.04* as per Table G.5.4-1 β: *1.14* as per Table G.5.4-1 The analysis is recorded in 3GPP TR 36.904 [17]
9.3.7.2 TDD CQI Reporting under fading conditions - PUSCH 3-2 for eDL MIMO Enhancement	Same as 9.3.7.1	Same as 9.3.7.1	Same as 9.3.7.1

9.3.8.1.1	N_{oc}: -98dBm/15kHz SNR: +8.34dB Cell 2 Ês/N_{oc}: +3.28 dB Cell 3 Ês/N_{oc}: +0.74 dB γ : 0.925	0 dB +0.63 dB +0.8 dB +0.8 dB 0.01	N_{oc}: -98dBm/15kHz SNR: +8.97dB Cell 2 Ês/N_{oc}: +4.08 dB Cell 3 Ês/N_{oc}: +1.54 dB γ : 0.915 as per Table G.5.4-1 The analysis is recorded in 3GPP TR 36.904 [17]
9.3.8.1.2	Same as 9.3.8.1.1	Same as 9.3.8.1.1	Same as 9.3.8.1.1
9.3.8.2.1	Noc: -98dBm/15kHz SNR: +8.34dB Cell 2 Ês/Noc: +3.28 dB Cell 3 Ês/Noc: +0.74 dB 0.925	0 dB +0.63 dB +0.8 dB +0.8 dB 0.01	Noc: -98dBm/15kHz SNR: +8.97dB Cell 2 Ês/Noc: +4.08 dB Cell 3 Ês/Noc: +1.54 dB 0.915 as per Table G.5.4-1 The analysis is recorded in 3GPP TR 36.904 [17]
9.3.8.2.2	Same as 9.3.8.2.1	Same as 9.3.8.2.1	Same as 9.3.8.2.1
9.3.8.3.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM10 with TM9 interference - Enhanced Receiver Type B	Noc: -98dBm/15kHz SNR: +8.34dB Cell 2 Ês/Noc: +3.28 dB Cell 3 Ês/Noc: +0.74 dB γ: 0.925	0 dB +0.63 dB +0.8 dB +0.8 dB 0.01	Noc: -98dBm/15kHz SNR: +8.97dB Cell 2 Ês/Noc: +4.08 dB Cell 3 Ês/Noc: +1.54 dB γ: 0.915 as per Table G.5.4-1
9.3.8.3.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM10 with TM9 interference - Enhanced Receiver Type B	Same as 9.3.8.3.1	Same as 9.3.8.3.1	Same as 9.3.8.3.1
9.4.1.1.1 FDD PMI Reporting – PUSCH 3-1 (Single PMI)	γ 1.10	γ 0.01	γ1.09 as per Table G.5.4-1
9.4.1.1.2 TDD PMI Reporting – PUSCH 3-1 (Single PMI)	Same as 9.4.1.1.1	Same as 9.4.1.1.1	Same as 9.4.1.1.1
9.4.1.2.1 FDD PMI Reporting – PUCCH 2-1 (Single PMI)	N_{oc} as specified in test procedure γ 1.2	 γ 0.01	N_{oc} unchanged Ior/ N_{oc}=SNR_{rnd} is a result of an approach according to G.5.2 and is reused unchanged as setting in procedure step 3. γ1.19 as per Table G.5.4-1
9.4.1.2.2 TDD PMI Reporting – PUCCH 2-1 (Single PMI)	Same as 9.4.1.2.1	Same as 9.4.1.2.1	Same as 9.4.1.2.1
9.4.1.3.1_D FDD Reporting of PMI – PUSCH 3-1 (Single PMI) for eDL-MIMO	Same as 9.4.1.2.1	Same as 9.4.1.2.1	Same as 9.4.1.2.1
9.4.1.3.2_D TDD Reporting of PMI – PUSCH 3-1 (Single PMI) for eDL-MIMO	Same as 9.4.1.2.1	Same as 9.4.1.2.1	Same as 9.4.1.2.1
9.4.1.4.1 FDD PMI Reporting with 4Tx enhanced codebook – PUCCH 1-1 (Single PMI) for eDL MIMO Enhancement 9.6.1.3.2, TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (3DL CA)	N_{oc}: -98dBm/15kHz *γ: 1.8*	 γ 0.01	N_{oc}: -98dBm/15kHz *γ: 1.79* as per Table G.5.4-1 The analysis is recorded in 3GPP TR 36.904 [17]

9.4.1.4.2 TDD PMI Reporting with 4Tx enhanced codebook – PUCCH 1-1 (Single PMI) for eDL MIMO Enhancement 9.6.1.4.2, TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (3DL CA)	Same as 9.4.1.4.1	Same as 9.4.1.4.1	Same as 9.4.1.4.1
9.4.2.1.1 FDD PMI Reporting – PUSCH 1-2 (Multiple PMI)	N_{oc} as specified in test procedure γ 1.20	γ 0.01	N_{oc} unchanged Ior/ N_{oc}=SNR_{rnd} is a result of an approach according to G.5.2 and is reused unchanged as setting in procedure step 3. γ 1.19 as per Table G.5.4-1
9.4.2.1.1_1 FDD PMI Reporting – PUSCH 1-2 (Multiple PMI)	Same as 9.4.2.1.1	Same as 9.4.2.1.1	Same as 9.4.2.1.1
9.4.2.1.2 TDD PMI Reporting – PUSCH 1-2 (Multiple PMI)	Same as 9.4.2.1.1	Same as 9.4.2.1.1	Same as 9.4.2.1.1
9.4.2.1.2_1 TDD PMI Reporting – PUSCH 1-2 (Multiple PMI)	Same as in 9.4.2.1.1	Same as in 9.4.2.1.1	Same as in 9.4.2.1.1
9.4.2.2.1 FDD PMI Reporting – PUSCH 2-2 (Multiple PMI)	Same as in 9.4.2.1.1	Same as in 9.4.2.1.1	Same as in 9.4.2.1.1
9.4.2.2.2 TDD PMI Reporting – PUSCH 2-2 (Multiple PMI)	N_{oc} as specified in test procedure γ 1.15	γ 0.01	N_{oc} unchanged Ior/ N_{oc}=SNR_{rnd} is a result of an approach according to G.5.2 and is reused unchanged as setting in procedure step 3. γ 1.14 as per Table G.5.4-1
9.4.2.3.1_D FDD PMI Reporting – PUSCH 1-2 (Multiple PMI) for eDL-MIMO	N_{oc} as specified in test procedure γ 1.30	γ 0.01	N_{oc} unchanged Ior/ N_{oc}=SNR_{rnd} is a result of an approach according to G.5.2 and is reused unchanged as setting in procedure step 3. γ 1.29 as per Table G.5.4-1
9.4.2.3.2_D TDD PMI Reporting – PUSCH 1-2 (Multiple PMI) for eDL-MIMO	N_{oc} as specified in test procedure γ 3.50	γ 0.01	N_{oc} unchanged Ior/ N_{oc}=SNR_{rnd} is a result of an approach according to G.5.2 and is reused unchanged as setting in procedure step 3. γ 3.49 as per Table G.5.4-1
9.4.2.3.3 FDD PMI Reporting with 4Tx enhanced codebook - PUSCH 1-2 (Multiple PMI) for eDL-MIMO Enhancement	N_{oc}: -98dBm/15kHz *γ: 1.2*	γ 0.01	N_{oc}: -98dBm/15kHz *γ: 1.19* as per Table G.5.4-1 The analysis is recorded in 3GPP TR 36.904 [17]
9.4.2.3.4 TDD PMI Reporting with 4Tx enhanced codebook - PUSCH 1-2 (Multiple PMI) for eDL-MIMO Enhancement	Same as 9.4.2.3.3	Same as 9.4.2.3.3	Same as 9.4.2.3.3
9.5.1.1 FDD RI Reporting– PUCCH 1-1	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_2 1.10	SNR 0dB γ_2 0.01 γ_1 0.01 γ_2 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_2 1.09 as per Table G.5.4-1

9.5.1.1_1 FDD RI Reporting– PUCCH 1-1 (Release 10)	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_1 0.90, γ_2 1.10	SNR 0dB γ_2 0.01 γ_1 0.01 γ_2 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89, γ_2 1.09 as per Table G.5.4-1
9.5.1.1_2 FDD RI Reporting– PUCCH 1-1 (Release 11)	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_1 0.90	SNR 0dB γ_2 0.01 γ_1 0.01 γ_1 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89 as per Table G.5.4-1
9.5.1.2 TDD RI Reporting– PUSCH 3-1	Same as 9.5.1.1	Same as 9.5.1.1	Same as 9.5.1.1
9.5.1.2_1 TDD RI Reporting– PUSCH 3-1 (Release 10)	Same as 9.5.1.1_1	Same as 9.5.1.1_1	Same as 9.5.1.1_1
9.5.1.2_2 TDD RI Reporting– PUSCH 3-1 (Release 11)	Same as 9.5.1.1_2	Same as 9.5.1.1_2	Same as 9.5.1.1_2
9.5.2.1_D FDD RI Reporting – PUCCH 1-1 for eDL-MIMO	SNR as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_1 0.9	SNR 0dB γ_2 0.01 γ_1 0.01 γ_2 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89 as per Table G.5.4-1
9.5.2.2_D TDD RI Reporting – PUCCH 1-1 for eDL-MIMO	SNR as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_1 0.9	SNR 0dB γ_2 0.01 γ_1 0.01 γ_2 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89 as per Table G.5.4-1
9.5.3.1_C.1 FDD RI Reporting – PUCCH 1-0 for eICIC (non-MBSFN ABS)	SNRs as specified Test 1: γ_1 0.90 Test 2: γ_1 1.05	SNR 0dB γ_1 0.01 γ_1 0.01	SNR unchanged γ_1 0.89 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 The analysis is recorded in 3GPP TR 36.904 [17]
9.5.3.2_C.1 TDD RI Reporting – PUCCH 1-0 for eICIC (non-MBSFN ABS)	SNRs as specified Test 1: γ_1 0.90 Test 2: γ_1 1.05	SNR 0dB γ_1 0.01 γ_1 0.01	SNR unchanged γ_1 0.89 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 The analysis is recorded in 3GPP TR 36.904 [17]
9.5.4.1_E.1 FDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	SNR as specified Test 1: γ_2 1.05 Test 2: γ_1 1.05 Test 3: γ_1 0.9	SNR 0dB γ_2 0.01 γ_1 0.01 γ_1 0.01	SNR unchanged γ_2 1.04 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89 as per Table G.5.4-1 The analysis is recorded in 3GPP TR 36.904 [17]
9.5.4.2_E.1 TDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	Same as 9.5.4.1_E.1	Same as 9.5.4.1_E.1	Same as 9.5.4.1_E.1
9.5.5.1_F.1 FDD RI Reporting with Single CSI process for CoMP	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.00	SNR 0dB γ_2 0.01 γ_1 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 0.99 as per Table G.5.4-1
9.5.5.1_F.2 FDD RI Reporting with Multiple CSI processes for CoMP	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.00	SNR 20dB γ_2 0.01 γ_1 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 0.99 as per Table G.5.4-1
9.5.5.2_F.1 TDD RI Reporting with Single CSI process for CoMP	Same as 9.5.5.1_F.1	Same as 9.5.5.1_F.1	Same as 9.5.5.1_F.1
9.5.5.2_F.2 TDD RI Reporting with Multiple CSI processes for CoMP	Same as 9.5.5.2_F.1	Same as 9.5.5.2_F.1	Same as 9.5.5.2_F.1

9.6.1.1_A.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (2DL CA)	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR ratios each have an uncertainty of ±0.3 dB. For uncorrelated uncertainties, the overall uncertainty in the SNR difference between any two CCs would be SQRT (0.3^2 + 0.3^2) = 0.42dB. This could widen the Median CQI difference, but the uncertainty is significantly less than one reported CQI step. Relaxing the allowed Median CQI difference would relax the test excessively, so in this case the Test requirement should be left unchanged.
9.6.1.1_A.2 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 (3DL CA)	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	Same as 9.6.1.1_A.1
9.6.1.1_A.4 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 (5DL CA)	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	Same as 9.6.1.1_A.1
9.6.1.2_A.1 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 2DL CA	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.2_A.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (3DL CA)	Same as 9.6.1.1_A.2	Same as 9.6.1.1_A.2	Same as 9.6.1.1_A.2
9.6.1.2_A.3 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (4DL CA)	Same as 9.6.1.1_A.3	Same as 9.6.1.1_A.3	Same as 9.6.1.1_A.3
9.6.1.2_A.4 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (5DL CA)	Same as 9.6.1.1_A.4	Same as 9.6.1.1_A.4	Same as 9.6.1.1_A.4
9.6.1.3.1 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (2DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1 The analysis is recorded in 3GPP TR 36.904 [17]
9.6.1.3.2 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (3DL CA)	Same as 9.6.1.1_A.2	Same as 9.6.1.1_A.2	Same as 9.6.1.1_A.2 The analysis is recorded in 3GPP TR 36.904 [17]
9.6.1.3.3 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (4DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.3.4 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (5DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.6.1.4.1 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (2DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1 The analysis is recorded in 3GPP TR 36.904 [17]
9.6.1.4.2 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (3DL CA)	Same as 9.6.1.1_A.2	Same as 9.6.1.1_A.2	Same as 9.6.1.1_A.2 The analysis is recorded in 3GPP TR 36.904 [17]
9.6.1.4.3 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (4DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1

9.6.1.4.4 TDD FDD CA CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (5DL CA)	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1	Same as 9.6.1.1_A.1
9.7.1.1 FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category 0	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.7.1.2 TDD CQI reporting definition under AWGN conditions for UE category 0	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.7.2.1 FDD and Half duplex FDD CQI reporting definition under fading conditions for UE category 0	Same as 9.3.1.1.1	Same as 9.3.1.1.1	Same as 9.3.1.1.1
9.7.2.2 TDD CQI reporting definition under fading conditions for UE category 0	Same as 9.3.1.1.1	Same as 9.3.1.1.1	Same as 9.3.1.1.1
9.8.1.1 FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category M1	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.8.1.2 TDD CQI reporting definition under AWGN conditions for UE category M1	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.8.2.1 FDD and Half duplex FDD CQI reporting definition under fading conditions for UE category M1	Same as 9.3.1.1.1	Same as 9.3.1.1.1	Same as 9.3.1.1.1
9.8.2.2 TDD CQI reporting definition under fading conditions for UE category M1	Same as 9.3.1.1.1	Same as 9.3.1.1.1	Same as 9.3.1.1.1
9.9.1.1.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 with Rank 1 1x4	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.9.1.1.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 with Rank 1 1x4	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.9.1.2.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 2 4x4	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.9.1.2.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 2 8x4	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.9.1.3.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 4 4x4	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.9.1.3.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 4 4x4	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.9.1.4.1 FDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 3 4x4	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged

9.9.1.4.2 TDD CQI Reporting under AWGN conditions – PUCCH 1-1 with rank 3 8x4	SNRs as specified Limits as in the Test Procedure	No test tolerances applied	SNR and limits unchanged
9.9.2.1.1 FDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A 1x4	N_{oc}: -98dBm/15kHz DIP 1: -0.41dB SINR: -4.00dB γ 1.8 BLER 0.02	0dB +0.03dB +0.03dB γ 0.01	N_{oc}: -98dBm/15kHz DIP 1: -0.38dB SINR: -3.97dB γ 1.79 as per Table G.5.4-1 BLER limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
9.9.2.1.2 TDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A 1x4	Same as 9.9.2.1.1	Same as 9.9.2.1.1	Same as 9.9.2.1.1
9.9.2.2.1 FDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A 2x4	N_{oc}: -98dBm/15kHz DIP 1: -0.41dB SINR: -4.00dB γ 1.8 BLER 0.02	0dB +0.03dB +0.03dB γ 0.01	N_{oc}: -98dBm/15kHz DIP 1: -0.38dB SINR: -3.97dB γ 1.79 as per Table G.5.4-1 BLER limit unchanged The analysis is recorded in 3GPP TR 36.904 [17]
9.9.2.2.2 TDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A 2x4	Same as 9.9.2.2.1	Same as 9.9.2.2.1	Same as 9.9.2.2.1
9.9.3.1.1 TDD PMI Reporting – PUSCH 3-1 (Single PMI) 8x4	Noc as specified in test procedure 2.50	0.01	Noc unchanged Ior/ Noc=SNRrnd is a result of test procedure step 2 and is used as setting in test procedure step 3. 2.49 as per Table G.5.4-1
9.9.4.1.1 FDD RI Reporting– PUCCH 1-1 4x4	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_1 0.9 Test 4: γ_2 1.10	SNR 0dB γ_2 0.01 γ_1 0.01 γ_1 0.01 γ_2 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89 as per Table G.5.4-1 γ_2 1.09 as per Table G.5.4-1
9.9.4.1.2 TDD RI Reporting– PUSCH 3-1 4x4	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_1 0.9 Test 4: γ_2 1.10	SNR 0dB γ_2 0.01 γ_1 0.01 γ_1 0.01 γ_2 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89 as per Table G.5.4-1 γ_2 1.09 as per Table G.5.4-1
9.9.4.2.1 FDD RI Reporting- PUCCH 1-1 for eDL-MIMO 1x4	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_1 0.9 Test 4: γ_2 1.10	SNR 0dB γ_2 0.01 γ_1 0.01 γ_1 0.01 γ_2 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89 as per Table G.5.4-1 γ_2 1.09 as per Table G.5.4-1
9.9.4.2.2 TDD RI Reporting- PUCCH 1-1 for eDL-MIMO 1x4	SNRs as specified Test 1: γ_2 1.00 Test 2: γ_1 1.05 Test 3: γ_1 0.9 Test 4: γ_2 1.10	SNR 0dB γ_2 0.01 γ_1 0.01 γ_1 0.01 γ_2 0.01	SNR unchanged γ_2 0.99 as per Table G.5.4-1 γ_1 1.04 as per Table G.5.4-1 γ_1 0.89 as per Table G.5.4-1 γ_2 1.09 as per Table G.5.4-1

Annex G (normative): Statistical Testing

G.1 General

FFS.

G.2 Statistical testing of receiver characteristics

G.2.1 General

The test of receiver characteristics is two fold.

1. A signal or a combination of signals is offered to the RX port(s) of the receiver.
2. The ability of the receiver to demodulate /decode this signal is verified by measuring the throughput.

In (2) is the statistical aspect of the test and is treated here.

The minimum requirement for all receiver tests is >95% of the maximum throughput.

All receiver tests are performed in static propagation conditions. No fading conditions are applied.

G.2.2 Mapping throughput to error ratio

a) The measured information bit throughput R is defined as the sum (in kilobits) of the information bit payloads successfully received during the test interval, divided by the duration of the test interval (in seconds).

b) In measurement practice the UE indicates successfully received information bit payload by signalling an ACK to the SS.
If payload is received, but damaged and cannot be decoded, the UE signals a NACK.

c) Only the ACK and NACK signals, not the data bits received, are accessible to the SS.
The number of bits is known in the SS from knowledge of what payload was sent.

d) For the reference measurement channel, applied for testing, the number of bits is different in different subframes, however in a radio frame it is fixed during one test.

e) The time in the measurement interval is composed of successfully received subframes (ACK), unsuccessfully received subframes (NACK) and no reception at all (DTX-subframes).

f) DTX-subframes may occur regularly according the applicable reference measurement channel (regDTX).
In real live networks this is the time when other UEs are served. In TDD these are the UL and special subframes. regDTX vary from test to test but are fixed within the test.

g) Additional DTX-subframes occur statistically when the UE is not responding ACK or NACK where it should. (statDTX)
This may happen when the UE was not expecting data or decided that the data were not intended for it.

The pass / fail decision is done by observing the:

- number of NACKs
- number of ACKs and
- number of statDTXs (regDTX is implicitly known to the SS)

The ratio (NACK + statDTX)/(NACK+ statDTX + ACK)is the Error Ratio (ER). Taking into account the time consumed by the ACK, NACK, and DTX-TTIs (regular and statistical), ER can be mapped unambiguously to throughput for any single reference measurement channel test.

G.2.3 Design of the test

The test is defined by the following design principles (see clause G.x, Theory….):

1. The early decision concept is applied.
2. A second limit is introduced: Bad DUT factor M>1
3. To decide the test pass:

   Supplier risk is applied based on the Bad DUT quality

   To decide the test fail

   Customer Risk is applied based on the specified DUT quality

The test is defined by the following parameters:

1. Limit ER = 0.05 (Throughput limit = 95%)
2. Bad DUT factor M=1.5 (selectivity)
3. Confidence level CL = 95% (for specified DUT and Bad DUT-quality)

G.2.4 Numerical definition of the pass fail limits

Table G.2.4-1: pass fail limits

ne	ns_p	ns_f	ne	ns_p	ns_f	ne	ns_p	ns_f	ne	ns_p	ns_f
0	67	NA	39	763	500	78	1366	1148	117	1951	1828
1	95	NA	40	778	516	79	1381	1166	118	1965	1845
2	119	2	41	794	532	80	1396	1183	119	1980	1863
3	141	7	42	810	548	81	1412	1200	120	1995	1881
4	162	14	43	826	564	82	1427	1217	121	2010	1899
5	183	22	44	842	580	83	1442	1234	122	2025	1916
6	202	32	45	858	596	84	1457	1252	123	2039	1934
7	222	42	46	873	612	85	1472	1269	124	2054	1952
8	241	53	47	889	629	86	1487	1286	125	2069	1969
9	259	64	48	905	645	87	1502	1303	126	2084	1987
10	278	76	49	920	661	88	1517	1321	127	2099	2005
11	296	88	50	936	678	89	1532	1338	128	2113	2023
12	314	100	51	952	694	90	1547	1355	129	2128	2040
13	332	113	52	967	711	91	1562	1373	130	2143	2058
14	349	126	53	983	727	92	1577	1390	131	2158	2076
15	367	140	54	998	744	93	1592	1407	132	2172	2094
16	384	153	55	1014	760	94	1607	1425	133	2187	2111
17	401	167	56	1029	777	95	1623	1442	134	2202	2129
18	418	181	57	1045	793	96	1637	1459	135	2217	2147
19	435	195	58	1060	810	97	1652	1477	136	2231	2165
20	452	209	59	1076	827	98	1667	1494	137	2246	2183
21	469	224	60	1091	844	99	1682	1512	138	2261	2201
22	486	238	61	1106	860	100	1697	1529	139	2275	2218
23	503	253	62	1122	877	101	1712	1547	140	2290	2236
24	519	268	63	1137	894	102	1727	1564	141	2305	2254

25	536	283	64	1153	911	103	1742	1582	142	2320	2272
26	552	298	65	1168	928	104	1757	1599	143	2334	2290
27	569	313	66	1183	944	105	1772	1617	144	2349	2308
28	585	328	67	1199	961	106	1787	1634	145	2364	2326
29	602	343	68	1214	978	107	1802	1652	146	2378	2344
30	618	359	69	1229	995	108	1817	1669	147	2393	2361
31	634	374	70	1244	1012	109	1832	1687	148	2408	2379
32	650	389	71	1260	1029	110	1847	1704	149	2422	2397
33	667	405	72	1275	1046	111	1861	1722	150	2437	2415
34	683	421	73	1290	1063	112	1876	1740	151	2452	2433
35	699	436	74	1305	1080	113	1891	1757	152	2466	2451
36	715	452	75	1321	1097	114	1906	1775	153*)	NA	2469
37	731	468	76	1336	1114	115	1921	1793			
38	747	484	77	1351	1131	116	1936	1810	*) note 2 in G.2.5		

NOTE 1: The first column is the number of errors (ne = number of NACK + statDTX)

NOTE 2: The second column is the number of samples for the pass limit (ns_p, ns=Number of Samples= number of `NACK + statDTX + ACK`)

NOTE 3: The third column is the number of samples for the fail limit (ns_f)

G.2.5 Pass fail decision rules

The pass fail decision rules apply for a single test, comprising one component in the test vector. The over all Pass /Fail conditions are defined in clause G.2.6and G.2A.6

Having observed 0 errors, pass the test at 67+ samples, otherwise continue

Having observed 1 error, pass the test at 95+ otherwise continue

Having observed 2 errors, pass the test at 119+ samples, fail the test at 2- samples, otherwise continue

Etc. etc.

Having observed 151 errors, pass the test at 2452+ samples, fail the test at 2433- samples, otherwise continue

Having observed 152 errors, pass the test at 2466+ samples, fail the test at 2451- samples.

Where x+ means: x or more, x- means x or less

NOTE 1: an ideal DUT passes after 67 samples. The maximum test time is 2466 samples.

NOTE 2: It is allowed to deviate from the early decision concept by postponing the decision (pass/fail or continue). Postponing the decision to or beyond the end of Table G.2.4-1 requires a pass fail decision against the test limit: pass the DUT for ER<0.0618, otherwise fail.

G.2.6 Test conditions for receiver tests

Table G.2.6-1: Test conditions for receiver tests

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test	Over all Pass/Fail condition
7.3 Reference sensitivity level	Yes: the inherent receiver noise is assumed to be AWGN	tbd	To pass 7.3 each component in the test vector must pass
7.3F.1 Reference sensitivity level without repetitions for category NB1	Yes: the inherent receiver noise is assumed to be AWGN	tbd	To pass 7.3F each component in the test vector must pass
7.4 Maximum input level	Unclear: in case, clipping causes errors, errors are data dependent. Statistical independence is assumed.	tbd	To pass 7.4 each component in the test vector must pass
7.4A.3 Maximum input level for CA (inter-band DL CA without UL CA)	Unclear: in case, clipping causes errors, errors are data dependent. Statistical independence is assumed.	tbd	To pass 7.4A.3 each component in the test vector must pass
7.4F Maximum input level for category NB1	Unclear: in case, clipping causes errors, errors are data dependent. Statistical independence is assumed.	tbd	To pass 7.4f each component in the test vector must pass
7.5 Adjacent Channel Selectivity (ACS)	Unclear: errors are data dependent on the interferers data. Statistical independence is assumed.	tbd	To pass 7.5 each component in the test vector must pass
7.5A.3 Adjacent Channel Selectivity (ACS) for CA (inter-band DL CA without UL CA)	Unclear: errors are data dependent on the interferers data. Statistical independence is assumed.	tbd	To pass 7.5A.3 each component in the test vector must pass
7.5F Adjacent Channel Selectivity (ACS) for category NB1	Unclear: errors are data dependent on the interferers data. Statistical independence is assumed	8	To pass 7.5F each component in the test vector must pass
7.6.1 In-band blocking	Unclear: errors are data dependent on the interferers data. Statistical independence is assumed.	tbd	To pass 7.6.1 each component in the test vector must pass
7.6.1_1 In-band blocking with 4 Rx antenna ports	Unclear: errors are data dependent on the interferers data. Statistical independence is assumed.	tbd	To pass 7.6.1_1 each component in the test vector must pass
7.6.1A.3 In-band blocking for CA (inter-band DL CA without UL CA)	Unclear: errors are data dependent on the interferers data. Statistical independence is assumed.	tbd	To pass 7.6.1A.3 each component in the test vector must pass
7.6.2 Out of-band blocking	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.6.2, all except [tbd] components in the test vector must pass
7.6.2A.3 Out-of-band blocking for CA (inter-band DL CA without UL CA)	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.6.2A.3, all except [tbd] components in the test vector must pass
7.6.3 Narrow band	yes: it is assumed that the CW	tbd	To pass 7.6.3 each component in

blocking	interferer causes errors, which are independent and time invariant.		the test vector must pass
7.6.3A.3 Narrow band blocking for CA (inter-band DL CA without UL CA)	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.6.3A.3 each component in the test vector must pass
7.7 Spurious response	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.7 each component in the test vector must pass
7.7A.3 Spurious response for CA (inter-band DL CA without UL CA)	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.7A.3 each component in the test vector must pass
7.7F Spurious response for category NB1	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.7F each component in the test vector must pass
7.8.1 Wide band Intermodulation	Unclear: errors are dependent on the data content of the interferer. Statistical independence is assumed.	tbd	To pass 7.8.1 each component in the test vector must pass
7.8.1A.3 Wide-band intermodulation for CA (inter-band DL CA without UL CA)	Unclear: errors are dependent on the data content of the interferer. Statistical independence is assumed.	tbd	To pass 7.8.1A.3 each component in the test vector must pass
7.8.1F Wide band Intermodulation for category NB1	Unclear: errors are dependent on the data content of the interferer. Statistical independence is assumed.	tbd	To pass 7.8.1F each component in the test vector must pass

G.2A Statistical testing of receiver characteristics with CA

G.2A.1 General

G.2.1 applies.

G.2A.2 Mapping throughput to error ratio

The test is defined by the following design principles (see clause G.x, Theory….):

1. The standard concept is applied. (not the early decision concept).
2. A second limit is introduced, defining the Bad DUT.
3. To decide the test pass:
   - Supplier risk is applied based on the Bad DUT quality.
   - To decide the test fail.
   - Customer Risk is applied based on the specified DUT quality.

The test is defined by the following parameters:

1) Limit Error Ratio = 0.05 (95% throughput is tested).
2) Bad DUT factor M=1.5 (selectivity).
3) Confidence level CL = 95% (for specified DUT and Bad DUT-quality).

G.2A.3

G.2A.4 Pass fail limits

Apply 1003 samples to the DUT per CC.

Decide pass per CC in case of ≤ 62 errors, otherwise fail.

NOTE 1: The pass fail decision is done individually for each CC. The pass fail decision for one component in the test vector is as follows: pass if all CCs or SCC only according to the test cases pass, otherwise fail. The overall pass fail decision is according to clause G.2A.6

NOTE 2: It is allowed to apply more samples to the DUT, common for all CCs, (e.g. up to an integer number of frames). Use the ratio (62/1003) for the pass fail decision.

NOTE 3: 62/1003 = 0.0618, the same test limit is used at the end of Table G.2.4-1

G.2A.5 void

G.2A.6 Test conditions for receiver tests with CA

Table G.2A.6-1: Test conditions for receiver tests with CA

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test Note 1	Over all Pass/Fail condition Note 1
7.3A Reference sensitivity level for CA	Yes: the inherent receiver noise is assumed to be AWGN	tbd	To pass 7.3A each component in the test vector must pass
7.4A Maximum input level for CA	Unclear: in case, clipping causes errors, errors are data dependent. Statistical independence is assumed.	tbd	To pass 7.4A each component in the test vector must pass
7.5A Adjacent Channel Selectivity (ACS) for CA	Unclear: errors are data dependent on the interferers data. Statistical independence is assumed.	tbd	To pass 7.5A each component in the test vector must pass
7.6.1A In-band blocking for CA	Unclear: errors are data dependent on the interferers data. Statistical independence is assumed.	tbd	To pass 7.6.1A each component in the test vector must pass
7.6.2.A Out of-band blocking for CA	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.6.2A, all except [tbd] components in the test vector must pass
7.6.3A Narrow band blocking for CA	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.6.3A each component in the test vector must pass
7.7A Spurious response for CA	yes: it is assumed that the CW interferer causes errors, which are independent and time invariant.	tbd	To pass 7.7A each component in the test vector must pass
7.8.1A Wide band Intermodulation	[place holder]		
Note 1: A DUT with marginal performance on one component in the test vector passes this component with a confidence level of 95%, which is a false fail probability of 5%. All components in the test vector shall pass, to pass the test, For more than 1 component, performing marginal, there is an increased probability of a false fail for the test.			

G.3 Statistical testing of Performance Requirements with throughput

G.3.1 General

The test of receiver performance characteristics is two fold.

1. A signal or a combination of signals is offered to the RX port(s) of the receiver.
2. The ability of the receiver to demodulate /decode this signal is verified by measuring the throughput.

In (2) is the statistical aspect of the test and is treated here.

The minimum requirement for all receiver performance tests is either 70% or 30% of the maximum throughput.

All receiver performance tests are performed in fading conditions. In addition to the statistical considerations, this requires the definition of a minimum test time.

G.3.2 Mapping throughput to error ratio

G.2.2 applies

G.3.3 Design of the test

The test is defined by the following design principles (see clause G.x, Theory….):

1. The standard concept is applied. (not the early decision concept)
2. A second limit is introduced: The second limit is different, whether 30% or 70% throughput is tested.
3. To decide the test pass:

   Supplier risk is applied based on the Bad DUT quality

   To decide the test fail:

   Customer Risk is applied based on the specified DUT quality

The test is defined by the following parameters:

1a) Limit Error Ratio = 0.3 (in case 70% Throughput is tested) or

1b) Limit Throughput = 0.3 (in case 30% Throughput is tested)

2a) Bad DUT factor M=1.378 (selectivity)

2b) Bad DUT factor m=0.692 (selectivity)

justification see: TS 34.121 Clause F.6.3.3

3) Confidence level CL = 95% (for specified DUT and Bad DUT-quality)

G.3.4 Pass Fail limit

Testing Throughput = 30%, then the test limit is

Number of successes (ACK) / number of samples $\geq$ 59 / 233

Testing Throughput = 70% then the test limit is

Number of fails (NACK and statDTX) / number of samples $\leq$ 66 / 184

We have to distinguish 3 cases:

a) The duration for the number of samples (233 or 184) is greater than the minimum test time:

Then the number of samples (233 or 184) is predefined and the decision is done according to the number of events (59 successes or 66 fails)

b) Since subframe 0 and 5 contain less bits than the remaining subframes, it is allowed to predefine a number of samples contained in an integer number of frames. In this case test-limit-ratio applies.

c) The minimum test time is greater than the duration for the number of samples:

The minimum test time is predefined and the decision is done comparing the measured ratio at that instant against the test-limit-ratio.

NOTE: The test time for most of the tests is governed by the Minimum Test Time

G.3.5 Minimum Test time

If a pass fail decision in G.3.4 can be achieved earlier than the minimum test time, then the test shall not be decided, but continued until the minimum test time is elapsed.

The tables below contain the minimum number of subframes for FDD and TDD.

By simulations the minimum number of active subframes (carrying DL payload) was derived (MNAS),

then adding inactive subframes to the active ones (e.g. subframe 5 contains no DL payload. For TDD additional subframes contain no DL payload)

then rounding up to full thousand and

then adding a bias of 1000 (BMNSF).

Simulation method to derive minimum test time:

With a level, corresponding a throughput at the test limit (here 30% or 70% of the max. throughput) the preliminary throughput versus time converges towards the final throughput. The allowance of ± 0.2 dB around the above mentioned level is predefined by RAN5 to find the minimum test time. The allowance of ±0.2 dB maps through the function “final throughput versus level” into a throughput corridor. The minimum test time is achieved when the preliminary throughput escapes the corridor the last time. The two functions “final throughput versus level” and “preliminary throughput versus time” are simulation results, which are done individual for each demodulation scenario. HST-scenarios and scenarios with MNAS ≥ 50000 are derived differently.

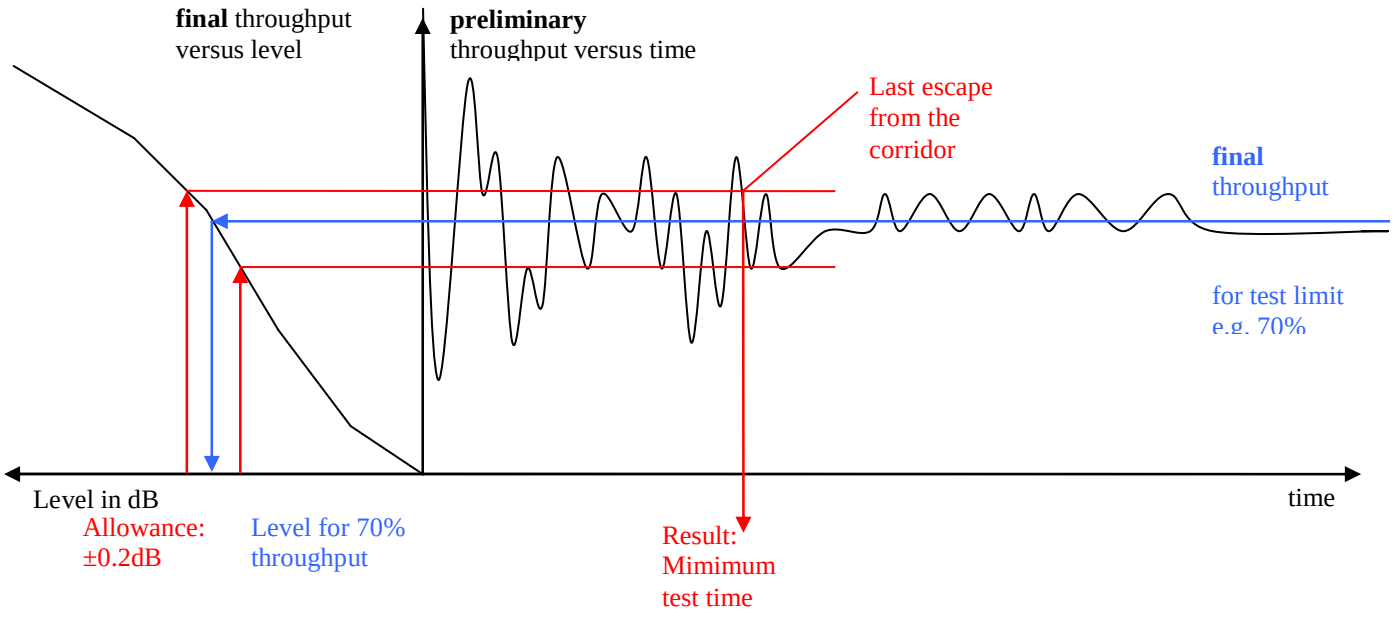


Figure G.3.5-1: Simulation method to derive minimum test time

Table G.3.5-1: Minimum Test time for PDSCH Single Antenna Port Performance

Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes (MNAS) to reach the corridor (Simulation, info only)	Minimum Number of Subframes (MNS) to reach the corridor (MNS = active and inactive subframes) (Calculation, info only)		Biased Minimum Number of SubFrames (BMNSF) BMNSF= $1000 * \lceil \frac{MNS}{1000} \rceil$ +1000 (mandatory)	
			FDD	TDD	FDD	TDD
1	R.2 (10 MHz, full, QPSK, 1/3) (1x2 Low) EVA,5	38 764	43 072	77 528	45 000	79 000
2	R.2 (10 MHz, full, QPSK, 1/3) (1x2 Low) ETU,70	2 764	3 072	5 528	5 000	7 000
3	R.2 (10 MHz, full, QPSK, 1/3) (1x2 Low) ETU,300	1 424	1 583	2 848	3 000	4 000
4	R.2 (10 MHz , full, QPSK, 1/3) (1x2) HST	28 800	NA	NA	28 800	57 600
5	R.4 (1.4 MHz, full, QPSK, 1/3) (1x2 Low) EVA,5	44 354	49 283	147 847	51 000	149 000
6	R.3 (10 MHz, full, 16QAM, ½) (1x2 Low) EVA,5	39 020	43 356	78 040	45 000	80 000
	R.3-1 (5 MHz, full, 16QAM, ½) (1x2 Low) EVA,5	39 020	43 356	78 040	45 000	80 000
6 Rel-9	R.3-1 (5MHz, full, 16QAM, ½) (1x2 Low) EVA5	39 020 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-1 Test6)	43 356	78 040	45 000	80 000
7	R.3 (10 MHz, full, 16QAM, ½) (1x2 Low) ETU,70	1 366	1 518	2 732	3 000	4 000
	R.3-1 (5 MHz, full, 16QAM, ½) (1x2 Low) ETU70	1 366	1 518	2 732	3 000	4 000
7 Rel-9	R.3-1 (5MHz, full, 16QAM, ½) (1x2 Low) ETU70	1 366 (MNAS is not simulated, but estimated based on similar scenario in	1 518	2 732	3 000	4 000

		Table G.3.5-1 Test7)				
8	R.3 (10 MHz, full, 16QAM, ½) (1x2 High) ETU,300	3 189	3 544	6 378	5 000	8 000
	R.3-1 (5MHz, full, 16QAM, ½) (1x2 High) ETU300	3 189	3 544	6 378	5 000	8 000
8 Rel-9	R.3-1 (5MHz, full, 16QAM, ½) (1x2 High) ETU300	3 189 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-1 Test8)	3 544	6 378	5 000	8 000
9	R.5 (3 MHz, full, 64QAM, ¾) (1x2 Low) EVA,5	50 000	55 556	100 000	57 000	101 000
10	R.6 (5 MHz, full, 64QAM, 3/4) (1x2 Low) EVA,5	48 847	54 275	97 694	56 000	99 000
10 Rel-9	R.6-1 (5MHz, partial, 64QAM, ¾) (1x2 Low) EVA5	48 847 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-1 Test10)	54 275	97 694	56 000	99 000
11	R.7 (10 MHz, full, 64QAM, ¾) (1x2 Low) EVA,5	46 524	51 694	93 048	53 000	95 000
11 Rel-9	R.7-1 (10MHz, partial, 64QAM, ¾) (1x2 Low) EVA5	46 524 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-1 Test11)	51 694	93 048	53 000	95 000
12	R.7 (10 MHz, full, 64QAM, ¾) (1x2 Low) ETU,70	4 722	5 247	9 444	7 000	11 000
12 Rel-9	R.7-1 (10MHz, partial, 64QAM, ¾) (1x2 Low) ETU70	4 722 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-1 Test12)	5 247	9 444	7 000	11 000
13	R.7 (10 MHz, full, 64 QAM, 3/4) (1x2High) EVA,5	100 000	111 112	200 000	113 000	201 000
13 Rel-9	R.7-1 (10MHz, partial, 64QAM, ¾)	100 000 (MNAS is not	111 112	200 000	113 000	201 000

	(1x2 High) EVA5	simulated, but estimated based on similar scenario in Table G.3.5-1 Test13)				
14	R.8 (15 MHz, full, 64QAM, ¾) (1x2 Low) EVA,5	48 434	53 816	96 868	55 000	98 000
14 Rel-9	R.8-1 (15MHz, partial, 64QAM, ¾) (1x2 Low) EVA5	48 434 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-1 Test14)	53 816	96 868	55 000	98 000
15	R.9 (20 MHz, full, 64QAM,3/4) (1x2 Low) EVA,5	100 000	111 112	200 000	113 000	201 000
15 Rel-9	R.9-1 (20MHz, partial, 64QAM, ¾) (1x2 Low) EVA5	100 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-1 Test15)	111 112	200 000	113 000	201 000
15 Rel-9	R.9-2 (20MHz, partial, 64QAM, ¾) (1x2 Low) EVA5	100 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-1 Test15)	111 112	200 000	113 000	201 000
16	R.0 (3 MHz, 1PRB,16QAM, ½) (1x2 Low) ETU,70	5 710	6 345	11 420	8 000	13 000
17	R.1 (10MHz,1PRB,16QAM, ½) (1x2 Low) ETU,70	9 234	10 260	18 468	12 000	20 000
18	R.1 (20MHz,1PRB,16QAM, ½) (1x2 Low) ETU,70	13 373	14 859	26 746	16 000	28 000

Table G.3.5-2: Minimum Test time for PDSCH Single Antenna Port Performance with 1 PRB

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
1	R.29 (10MHz,1PRB,16QAM,½) (1x2 Low) ETU,70 [MBSFN]	5 246	17 487	17 487	19 000	19 000

Table G.3.5-3: Minimum Test time for PDSCH Transmit diversity 2x2

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
1	R.11 (10MHz, full, 16QAM, ½) (2x2 Med) EVA,5 [SFBC, Space Frequency Block Code]	50 000	55 556	100 000	57 000	101 000
	R.11-1 (5MHz, full, 16QAM, ½) (2x2 Med) EVA5 [SFBC, Space Frequency Block Code]	50 000	55 556	100 000	57 000	101 000
1 Rel-9	R.11-2 (5MHz, full, 16QAM, ½) (2x2 Med) EVA5 [SFBC]	50 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-3 Test1)	55 556	100 000	57 000	101 000
2	R.10 (10MHz, Full, QPSK, 1/3) (2x2) HST [SFBC]	28 800	NA	NA	28 800	57 600

Table G.3.5-3a: Minimum Test time for PDSCH Transmit diversity 2x2 for eICIC

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11-4 (10MHz, full, QPSK, ½) (2x2 Med) EVA,5 [SFBC, Space Frequency Block Code]	50 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-3 Test1)	224 000	501 000

Table G.3.5-3b: Minimum Test time for PDSCH Transmit diversity 2x2 for feICIC

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11-4 (10MHz, full, QPSK, ½) (2x2 Med) EVA,5 [SFBC, Space Frequency Block Code]	50 000 MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-3 Test1	224 000	501 000

Table G.3.5-4: Minimum Test time for PDSCH Transmit diversity 4x2

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
1	R.12 (1.4MHz, full, QPSK, 1/3) (4x2 med) EPA,5 [SFBC-FSTD, SFBC-Frequency Shifted Transmit Diversity]	150 000	166 667	300 000	168 000	301 000
1 Rel-9	R.13 (10 MHz, full, QPSK, 1/3) (4x2 Low) ETU70 [SFBC-FSTD]	10 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-4 Test1)	11 112	20 000	13 000	21 000

Table G.3.5-5: Minimum Test time for PDSCH Open Loop Spacial Multiplexing 2x2

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
1 FDD	R.11 (10MHz, Full, 16QAM, ½) (2x2 Low) EVA70 [LD-CDD, Large Delay-Cyclic Delay Diversity]	7 600	8 445	-	10 000	-
1 TDD	R.11-1 (10MHz, Full, 16QAM, ½) (2x2 Low) EVA70 [LD-CDD, Large Delay-Cyclic Delay Diversity]	7 600	-	19 000	-	20 000
2	R.11-2 (5MHz, Full, 16QAM, ½) (2x2 Low) EVA,70 [LD-CDD, Large Delay-Cyclic Delay Diversity]	7 600 (MNAS is not simulated, just follow the similar 10MHz test scenario in Test 1)	8 445	-	10 000	-

Table G.3.5-5a: Minimum Test time for PDSCH Open Loop Spacial Multiplexing 2x2 for eICIC

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD

1	R.11 (10MHz, Full, 16QAM, ½) (2x2 Low) EVA,5 [LD-CDD, Large Delay-Cyclic Delay Diversity, Non-MBSFN ABS]	7 600 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-5 Test1)	35 000	77 000
1	R.11 (10MHz, Full, 16QAM, ½) (2x2 Low) EVA,5 [LD-CDD, Large Delay-Cyclic Delay Diversity, MBSFN ABS]	7 600 (MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-3 Test1)	77 000	77 000

Table G.3.5-5b: Minimum Test time for PDSCH Open Loop Spacial Multiplexing 2x2 for feICIC

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11 (10MHz, Full, 16QAM, ½) (2x2 Low) EVA,5 [LD-CDD, Large Delay-Cyclic Delay Diversity]	7 600 MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-5 Test1	35 000	77 000
2	R.35 (10MHz, full, 64QAM, ½) (2x2 Low) EVA,5 [LD-CDD, Large Delay-Cyclic Delay Diversity]	7 600 MNAS is not simulated, but estimated based on similar scenario in Table G.3.5-5 Test1	35 000	77 000

Table G.3.5-6: Minimum Test time for PDSCH Open Loop Spacial Multiplexing 4x2

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
1	R.14 (10MHz, full, 16 QAM, ½) (4x2 low) EVA,70 [LD-CDD]	4 860	5 400	12 150	7 000	14 000

Table G.3.5-7: Minimum Test time for PDSCH Closed LoopSingle/Multilayer Spacial Multiplexing 2x2

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
1	R.10 (10MHz, Full, QPSK,1/3) (2x2 Low) EVA5 [SCW, Single CodeWord]	49 140	54 600	98 280	56 000	100 000
1A	R.10-2 (5MHz, Full, QPSK,1/3) (2x2 Low) EVA5 [SCW, Single CodeWord]	49 140	54 600	98 280	56 000	100 000
2	R.10 (10MHz, Full, QPSK, 1/3) (2x2 High) EPA5 [SCW]	50 000	55 556	100 000	57 000	101 000
3 FDD	R.11 (10MHz,full, 16QAM, ½) (2x2Low) EVA5 [MCW, Multiple Code Word]	34 266	38 074	-	40 000	-
3 TDD	R.11-1 (10MHz,full, 16QAM, ½) (2x2Low) EVA5 [MCW, Multiple Code Word]	34 266	-	85 665	-	87 000
3 Rel-9	R.35 (10MHz, full, 64QAM, ½) (2x2 Low) EPA5 [MCW]	48 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-12 Test5)	53 333	120 000	55 000	121 000
4 FDD	R.11 (10MHz, full, 16QAM, ½) (2x2Low) ETU70 [MCW]	2 736	3 040	-	5 000	-
4 TDD	R.11-1 (10MHz, full, 16QAM, ½) (2x2Low) ETU70 [MCW]	2 736	-	6840	-	8000
4A	R.11-2 (5MHz, full, 16QAM, ½) (2x2Low) ETU70 [MCW]	2 736	3 040	-	5 000	-

Table G.3.5-8: Minimum Test time for PDSCH Closed Loop Single/Multilayer Spacial Multiplexing 4x2

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
1	R.13 (10 MHz, Full, QPSK, 1/3) (4x2 Low) EVA,5 [SCW]	26 528	29 476	53 056	31 000	55 000
2	R.14 (10MHz, Full, 16QAM, ½) (4x2low) EVA5 [MCW]	26 066	28 963	65 165	30 000	67 000
2 Rel-9	R.36 (10MHz, full, 64QAM 1/2) (4x2 Low) EPA5 [MCW]	30 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-4 Test1)	33 333	75 000	35 000	76 000

Table G.3.5-9: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 8 and forward)

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
1	R.25 (10 MHz, full, QPSK, 1/3) (1x2 Low) EPA,5	38 879	43 199	77 758	45 000	79 000
2	R.26 (10MHz, full, 16QAM, ½) (1x2 Low) EPA5	47 781	53 090	95 562	55 000	97 000
3	R.27 (10MHz, full, 64QAM, 3/4) (1x2 Low) EPA,5	48 685	54 095	97 370	56 000	99 000
4	R.28 (10MHz, 1PRB, 16QAM, ½) (1x2 Low) EPA,5	100 000	111 112	200 000	113 000	201 000

Table G.3.5-10: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 9 and forward)

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1 NA				
2	R.26-1 (5MHz, full, 16QAM ½) (2x2 Low) EPA5	Note: MNAS is not simulated. Because of same demodulation scenario except for antenna configuration, MNSF is reused from Table G.3.5-9, Test 2	55 000	97 000
3	R.27-1 (10MHz, part, 64QAM 3/4) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for antenna configuration, MNSF is reused from Table G.3.5-9, Test 3	56 000	99 000
4 NA				

Table G.3.5-11: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without simultaneous transmission

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.31 (10 MHz, full, QPSK, 1/3) (2x2 Low) EVA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, MNSF is reused from Table G.3.5-9, Test 1	45 000	79 000
2	R.32 (10MHz, full, 16QAM, ½) (2x2 Medium) EPA5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, MNSF is reused from Table G.3.5-9, Test 2	55 000	97 000
	R.32-1 (5MHz, full, 16QAM, ½) (2x2 Medium) EPA5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, channel BW, antenna configuration, MNSF is reused from Table G.3.5-9, Test 2		
3	R.33 (10MHz, full, 64QAM, 3/4) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, MNSF is reused from Table G.3.5-9, Test 3	56 000	99 000
	R.33-1 (10MHz, part, 64QAM, 3/4) (2x2 Low) EPA5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, allocation, antenna configuration, MNSF is reused from Table G.3.5-9, Test 3		

Table G.3.5-12: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
4	R.32 (10MHz, full, 16QAM, 1/2) (2x2 Medium) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC number, antenna configuration, MNSF is reused from Table G.3.5-9, Test 2	55 000	97 000
5	R.34 (10MHz, full, 64QAM, 1/2) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC number, target coding rate, antenna configuration, MNSF is reused from Table G.3.5-9, Test 3	56 000	99 000

Table G.3.5-12a: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without simultaneous transmission for eDL-MIMO

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.43 FDD, R50 TDD (10 MHz, full, QSPK, 1/3) (2x2 Low) EVA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, propagation condition, MNSF is reused from Table G.3.5-9, Test 1	45 000	79 000

Table G.3.5-12b: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission for eDL-MIMO

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
2	R.50 FDD, R.44 TDD (10MHz, full, 64QAM, 1/2) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, target coding rate, antenna configuration, MNSF is reused from Table G.3.5-9, Test 3	56 000	99 000

Table G.3.5-12c: Minimum Test time for PDSCH Single-layer Spatial Multiplexing for FeICIC

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11 FDD, R11 TDD (10 MHz, full, 16QAM, 1/2) (2x2 High) EPA, 5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, propagation condition, MNSF is reused from Table G.3.5-9, Test 1	55 000	97 000

Table G.3.5-13: Minimum Test time for PDSCH Dual-layer Spatial Multiplexing

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.31 (10 MHz, full, QPSK, 1/3) (2x2 Low) EVA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, MNSF is reused from Table G.3.5-9, Test 1	[45 000]	[79 000]
2	R.32 (10MHz, full, 16QAM, ½) (2x2 Medium) EPA5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, MNSF is reused from Table G.3.5-9, Test 2	[55 000]	[97 000]

Table G.3.5-13a: Minimum Test time for PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.51 (10MHz, full, 16QAM, 1/2) (2x2 Low) EPA5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, MNSF is reused from Table G.3.5-9, Test 2	55 000	97 000

Table G.3.5-14: Minimum Test time for PDSCH transmit Diversity 2x2 with TM3 Interference Model – Enhanced Performance Type A

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.46 (10MHz, full, QPSK, 1/3) (2x2 Low) EVA70	Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA70 or ETU70 propagation conditions	15 000	27 000

Table G.3.5-15: Minimum Test time for PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 with TM4 Interference Model – Enhanced Performance Type A

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.47 (10MHz, full, 16QAM, 1/3) (2x2 Low) EVA5	Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA5 or ETU70 propagation conditions	56 000	100 000

Table G.3.5-16: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model – Enhanced Performance Type A

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.48 (10MHz, full, QPSK, 1/2) (4x2 Low) EVA5	Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA5 propagation conditions	57 000	101 000

Table G.3.5-17: Minimum Test time for PDSCH Closed Loop Single layer Spacial Multiplexing 2x1 for UE Category 0

Clause 8.9.1.1.2/8.9.1.2.2 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	HD-FDD	TDD
1	R.63 (10MHz, 1PRB, 64QAM, ½) (2x1 Low) EPA5	48 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-7 Test3 Rel-9) with HD-FDD pattern	142 222	120 000	144 000	121 000

Table G.3.5-17a: Minimum Test time for PDSCH Closed Loop Single layer Spacial Multiplexing 2x1 for UE Category M1

Clause 8.11.1.1.1/8.11.1.2.1 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	HD-FDD	TDD
1	R.79] (10MHz, 1PRB, 16QAM, ½) (2x1 Low) EPA5	48 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-7 Test3 Rel-9) with HD-FDD pattern	240 000	120 000	241 000	121 000

Table G.3.5-18: Minimum Test time for PDSCH Open Loop Spatial Multiplexing 2x2– Enhanced Performance Type C

Clause 8.2.1.3.1B/8.2.2.3.1B Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11 FDD R.11-1 TDD (10MHz, Full, 16QAM, ½) (2x2 Medium) EVA70 [LD-CDD, Large Delay-Cyclic Delay Diversity]	7 600 (MNAS is not simulated, just follow the similar 10MHz test scenario in Table G.3.5-5 Test 1 FDD)	10 000	20 000

Table G.3.5-19: Minimum Test time for PDSCH Closed Loop Spatial Multiplexing 2x2– Enhanced Performance Type C

Clause 8.2.1.4.2A/8.2.2.4.2A Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11 FDD R.11-1 TDD (10MHz, full, 16QAM, ½) (2x2 Medium) ETU70 [MCW]	2 736 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-7 Test4 FDD)	5 000	8 000

Table G.3.5-20: Minimum Test time for PDSCH Open Loop Single/Multilayer Spatial Multiplexing 2x2 with TM1 Interference Model – Enhanced Performance Type C

Clause 8.2.1.3.1C/8.2.2.3.1C Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11-8 FDD R.11-10 TDD (10MHz, full, QPSK, 3/5, 1/2) (2x2 Medium) EVA70	Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA70 or ETU70 propagation conditions	15 000	26 000

Table G.3.5-21: Minimum Test time for for CDM-multiplexed DM RS – Enhanced Performance Type C

Clause 8.3.1.2.2/8.3.2.2.2 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.51 FDD R.32 TDD (10MHz, full, 16QAM, 1/2) (2x2 Medium) EPA5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC, antenna configuration, MNSF is reused from Table G.3.5-9, Test 2	[55 000]	[97 000]

Table G.3.5-22: Minimum Test time for PDSCH transmit Diversity 2x2 with TM2 Interference Model – Enhanced Performance Type B

Clause 8.2.1.2.5 / 8.2.2.2.6 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11-10 FDD R.11-12 TDD (10MHz, full, QPSK, 0.67 FDD, 0.54-0.66 TDD) (2x2 Low) EPA5	48000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	60 000	120 000

Table G.3.5-23: Minimum Test time for PDSCH transmit Diversity 2x2 with TM9 Interference Model – Enhanced Performance Type B

Clause 8.2.1.2.6 / 8.2.2.2.7 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11-9 FDD R.11-11 TDD (10MHz, full, QPSK, 0.58 FDD, 0.48-0.58 TDD) (2x2 Low) EPA5	48000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	60 000	120 000

Table G.3.5-24: Minimum Test time for PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and single NZP CSI-RS resource for CoMP

Clause 8.3.1.3.1_F/ 8.3.2.4.1_F Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.52 FDD R.52 TDD (10MHz, full, 64QAM, 1/2) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC number, target coding rate, antenna configuration, MNSF is reused from Table G.3.5-9, Test 3	56 000	99 000
2	R.52 FDD R.52 TDD (10MHz, full, 64QAM, 1/2) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC number, target coding rate, antenna configuration, MNSF is reused from Table G.3.5-9, Test 3	56 000	99 000

Table G.3.5-25: Minimum Test time for PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and multiple NZP CSI-RS resources for CoMP

Clause 8.3.1.3.2_F/ 8.3.2.4.2_F Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.53 FDD R.53 TDD (10MHz, full, 64QAM, 1/2) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC number, target coding rate, antenna configuration, MNSF is reused from Table G.3.5-9, Test 3	56 000	99 000
2	R.53 FDD R.53 TDD (10MHz, full, 64QAM, 1/2) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC number, target coding rate, antenna configuration, MNSF is reused from Table G.3.5-9, Test 3	56 000	99 000

Table G.3.5-26: Minimum Test time for PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Different Cell ID, Colliding CRS and single NZP CSI-RS resource for CoMP

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.54 FDD R.54 TDD (10MHz, full, 16QAM, 1/2) (2x2 Low) EPA,5	Note: MNAS is not simulated. Because of same demodulation scenario except for RMC number, antenna configuration, MNSF is reused from Table G.3.5-9, Test 2	55 000	97 000

Table G.3.5-27: Minimum Test time for PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 with TM4 Interference Model – Enhanced Performance Type B

Clause 8.2.1.4.4 / 8.2.2.4.5 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11-10 FDD R.11-12 TDD (10MHz, full, QPSK, 0.67 FDD, 0.54-0.66 TDD) (2x2 Low) EVA5	48000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA5 propagation conditions	60 000	120 000
2	R.11-9 FDD R.11-11 TDD (10MHz, full, QPSK, 0.58 FDD, 0.48-0.58 TDD) (2x2 Low) EPA5	48000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	60 000	120 000

Table G.3.5-28: Minimum Test time for PDSCH Transmit Diversity for UE Category 0

Clause 8.9.1.1.1/8.9.1.2.1 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	HD-FDD	TDD
1	R.62 (10MHz, 16QAM, ½) (2x1 Low) EPA5	50 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-3 Test1) with HD-FDD pattern	133 333	125 000	145 000	126 000

Table G.3.5-28a: Minimum Test time for PDSCH Transmit Diversity for UE Category M1

Clause 8.11.1.1.3.1/8.11.1.1.3.1_1/ 8.11.1.2.3.1/8.11.1.2.3.1_1 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	HD-FDD	TDD
1	R.81 (10MHz, QPSK, 1/10) (2x1 Low) ETU1	194 560 (MNAS is not simulated but based on Table G.4.4-1)	486 400	1 167 360	488 000	1 169 000
2	R.79 (10MHz, 16QAM, ½) (2x1 Low) EPA5	48 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-9 Test2) with HD-FDD pattern	240 000	120 000	241 000	121 000

Table G.3.5-29: Minimum Test time for Closed Loop spatial multiplexing, 4 Layers spatial multiplexing with 4 Tx ports and 4 Rx ports

Clause 8.10.1.1.8/ 8.10.1.2.8 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.74 (10MHz, full, 16QAM, 1/2) (4x4 Low) EPA5	Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	168 000	301 000

Table G.3.5-30: Minimum Test time for 4 Layer Spatial Multiplexing for 4 Rx (User-Specific Reference Symbols)

Clause 8.10.1.1.9/ 8.10.1.2.9 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.75 (10MHz, full, 16QAM, 1/2) (4x4 Low) EPA5	Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	56 000	99 000

Table G.3.5-31: Minimum Test time for Open Loop spatial multiplexing, 3 Layers with 4 Tx ports and 4 Rx ports

Clause 8.10.1.1.7/ 8.10.1.2.7 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.73 (10MHz, full, 64QAM, 0.43) (4x4 Low) EVA70	4 860 Note: MNAS is not simulated, but estimated based on the similar scenario in Table G.3.5-6 Test1	7 000	14 000

Table G.3.5-32: Minimum Test time for 4-Rx PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model – Enhanced Performance Type A

Clause 8.10.1.1.3/8.10.1.2.3 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.47 (10MHz, full, 16QAM, 1/3) (2x4 Low) EVA5	Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA5 or ETU70 propagation conditions	56 000	100 000

Table G.3.5-33: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0

Clause 8.9.1.1.3/8.9.1.2.3 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	FDD	TDD
1	R.64 (10 MHz, 6l, QPSK, 1/3) (2x1 Low) EPA,5	38 879 (MNAS is not simulated. It is estimated based on other similar scenarios in Table G.3.5-9 Test 1) with HD-FDD pattern	115 197	97 198	117 000	99 000

Table G.3.5-33a: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1

Clause 8.11.1.1.2/8.11.1.2.2 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	FDD	TDD
1	R.80 (10 MHz, 6l, QPSK, 1/3) (2x1 Low) EPA,5	38 879 (MNAS is not simulated. It is estimated based on other similar scenarios in Table G.3.5-9 Test 1) with HD-FDD pattern	1 244 128	2 138 345	1 246 000	2 140 000

Table G.3.5-33b: Minimum Test time for PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 1bis

Clause 8.9.1.1.3_1/8.9.1.2.3_1 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	HD-FDD	TDD
2	R.86 (10MHz, 16QAM, 1/3) (2x1 Low) EPA5	50 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-3 Test1) with HD-FDD pattern	133 333	125 000	145 000	126 000

Table G.3.5-34: Minimum Test time for 4-Rx PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model – Enhanced Performance Type A

Clause 8.10.1.1.5 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.76 (10MHz, full, QPSK,) (2x4 Low) EVA5	Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA5 propagation conditions	56 000	100 000

Table G.3.5-35: Minimum Test time for PDSCH Closed Loop Multi-layer Spatial Multiplexing 2x2 for 256QAM in DL

Clause 8.2.1.4.1_H/ 8.2.2.4.1_H Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
3	R.65 FDD (10MHz, full, 256QAM,) (2x2 Low) EVA5 R.65 TDD (20MHz, full, 256QAM,) (2x2 Low) EVA5	50 000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA5 propagation conditions	63 000	125 000

Table G.3.5-36: PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without simultaneous transmission for eDL-MIMO for 256QAM in DL

Clause 8.3.1.1.1_H /8.3.2.1.2_H Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
3	R.66 FDD (10MHz, full, 256QAM,) (2x2 Low) EPA5 R.66 TDD (20MHz, full, 256QAM,) (2x2 Low) EPA5	50 000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	63 000	125 000

Table G.3.5-37: PDSCH Transmit Diversity 2x4

Clause 8.10.1.1.1 /8.10.1.2.1 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11 (10MHz, full, 16QAM,) (2x4 Medium correlation A) EVA5	50 000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA5 propagation conditions	56 000	100 000

Table G.3.5-38: PDSCH Open Loop Spatial Multiplexing 2x4

Clause 8.10.1.1.2 /8.10.1.2.2 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.11 (10MHz, full, 16QAM,) (2x4 Low) EVA70	7600 Note: MNAS is not simulated. It is estimated based on other similar test cases using EVA70 propagation conditions	10 000	17 000

Table G.3.5-39: PDSCH Open Loop Spatial Multiplexing 2x4

Clause 8.10.1.1.4 /8.10.1.2.4 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.36 (10MHz, full, 64QAM,) (4x4 Low) EPA5	50 000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	56000	126 000
2	R.72 (10MHz, full, 256QAM,) (4x4 Low) EPA5	50 000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	56000	126 000

Table G.3.5-40: Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols)

Clause 8.10.1.1.6 /8.10.1.2.6 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD
1	R.51 (10MHz, full, 16QAM,) (2x4 Low) ETU5	50000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	56 000	100 000

Table G.3.5-41: Minimum Test time for PDSCH Transmit Diversity for UE Category 1bis

Clause 8.9.1.1.1_1/8.9.1.2.1_1 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	HD-FDD	TDD
2	R.84 (10MHz, 16QAM, ½) (2x1 Low) EPA5	50 000 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-3 Test1) with HD-FDD pattern	133 333	125 000	145 000	126 000

Table G.3.5-42: Minimum Test time for PDSCH for UE Category NB1

Clause 8.12.1.1.2 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD
1	R.NB.3 FDD (200kHz, QPSK,1/2) (1x1) EPA5	3609	1733000	N/A
2	R.NB.3 FDD (200kHz, QPSK,1/2) (1x1) ETU1	3609	5544000	N/A

G.3.6 Test conditions for receiver performance tests

Table G.3.6: Test conditions for receiver performance tests

Table G.3.6-1: Single Antenna Port Performance (Cell-specific Reference Symbols) for test case 8.2.1.1 and 8.2.2.1 demodulation of PDSCH

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.2.1.1 FDD PDSCH Single Antenna Port Performance (Cell-Specific Reference Symbols)	subframes are independent	CAT	1	2	3-5	To pass 8.2.1.1 and 8.2.2.1each component in the test vector must pass For UEs, supporting multiple E_UTRA-bands (number of bands =B), the number of repetitions must be multiplied by B. If a test is defined over a BW>(BW of the E_UTRA band), the test is not applicable and reduces the number of repetitions. If a test is defined over a BW, which is not supported in the E_UTRAN band, the test is not applicable and reduces the number of repetitions.
		QPSK	5	5	5	
		16QAM	0	3	3	
8.2.1.2 TDD PDSCH Single Antenna Port Performance (Cell-Specific Reference Symbols)	subframes are independent	64 QAM	1	6	7	
		1PRB	4	4	4	
		Σ	10	18	19	

Table G.3.6-2: Transmit Diversity Performance (Cell-specific Reference Symbols) for test case 8.2.1.2 and 8.2.2.2 demodulation of PDSCH

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.2.1.2 FDD PDSCH Transmit Diversity Performance (Cell-Specific Reference Symbols)	subframes are independent	CAT	1	2	3-5	To pass 8.2.1.2 and 8.2.2.2 each component in the test vector must pass For UEs, supporting multiple E_UTRA-bands (number of bands =B), the number of repetitions must be multiplied by B. If a test is defined over a BW, which is not supported in the E_UTRAN band, the test is not applicable and reduces the number of repetitions.
		QPSK	2	2	2	
8.2.2.2 TDD PDSCH Transmit Diversity Performance (Cell-Specific Reference Symbols)	subframes are independent	16QAM	0	1	1	
		Σ	2	3	3	

Table G.3.6-3: Open Loop Spatial Multiplexing Performance (Cell-specific Reference Symbols) for test case 8.2.1.3 and 8.2.2.3 demodulation of PDSCH

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.2.1.3 FDD PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)	subframes are independent	CAT	1	2	3-5	To pass 8.2.1.3 and 8.2.2.3 each component in the test vector must pass
		16QAM	0	2	2	
8.2.2.3 TDD PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)	subframes are independent	Σ	0	2	2	

Table G.3.6-4: Closed Loop Spatial Multiplexing Performance (Cell-specific Reference Symbols) for test case 8.2.1.4 and 8.2.2.4 demodulation of PDSCH

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.2.1.4 FDD PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)	subframes are independent	CAT	1	2	3-5	To pass 8.2.1.4 and 8.2.2.4 each component in the test vector must pass
		Single layer QPSK	3	3	3	
8.2.2.4 TDD PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)	subframes are independent	Multi layer 16QAM	0	3	3	
		Σ	3	6	6	

Table G.3.6-5: TDD PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 8 and forward)

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.2.1.1 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 8 and forward)	subframes are independent	CAT	1	2	3-5	To pass 8.3.2.1 each component in the test vector must pass
		QPSK	1	1	1	
		16QAM	1	2	2	
		64 QAM	0	1	1	
		Σ	2	4	4	

Table G.3.6-6: TDD PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 9 and forward)

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.2.1.1_1 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 9 and forward)	subframes are independent	CAT	1	2	3-5	To pass 8.3.2.1.1_1 each component in the test vector must pass
		16QAM	1	0	0	
		64 QAM	1	0	0	
		Σ	2	0	0	

Table G.3.6-7: TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without a simultaneous transmission

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.2.1.2 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without a simultaneous transmission	subframes are independent	CAT	1	2-5		To pass 8.3.2.1.2 each component in the test vector must pass
		QPSK	1	1		
		16QAM	1	1		
		64 QAM	1	1		
		Σ	3	3		

Table G.3.6-8: TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.2.1.3 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission	subframes are independent	CAT	1	2-5		To pass 8.3.2.1.3 each component in the test vector must pass
		16QAM	0	1		
		64 QAM	0	1		
		Σ	0	2		

Table G.3.6-8a: PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without a simultaneous transmission for eDL-MIMO

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.1.1.1_D FDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without a simultaneous transmission	subframes are independent	CAT	1-8			To pass 8.3.1.1.1_D and 8.3.2.1.2_D each component in the test vector must pass
		QPSK	1			
8.3.2.1.2_D TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without a simultaneous transmission	subframes are independent	QPSK	1			
		Σ	2			

Table G.3.6-8b: PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission for eDL-MIMO

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.1.1.2_D FDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission for eDL-MIMO	subframes are independent	CAT	1	2-8		To pass 8.3.1.1.2_D and 8.3.2.1.3_D each component in the test vector must pass
		64QAM	0	1		
8.3.2.1.3_D TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission for eDL-MIMO	subframes are independent	64QAM	0	1		
		Σ	0	2		

Table G.3.6-8c: PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type A

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.1.1.3 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type A	subframes are independent	CAT	1-8			To pass 8.3.1.1.3 and 8.3.2.1.4 each component in the test vector must pass
		QPSK	1			
8.3.2.1.4 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type A	subframes are independent	QPSK	1			
		Σ	2			

Table G.3.6-9: TDD PDSCH Dual-layer Spatial Multiplexing

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.2.2.1 TDD PDSCH Dual-layer Spatial Multiplexing	subframes are independent	CAT	1	2	3-5	To pass 8.3.2.2.1 each component in the test vector must pass
		QPSK	1	1	1	
		16QAM	1	2	2	
		64 QAM	0	1	1	
		Σ	2	4	4	

Table G.3.6-9a: PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test				Over all Pass/Fail condition
8.3.1.2.1_D FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO	subframes are independent	CAT	1	2-8		To pass 8.3.1.2.1_D and 8.3.2.2.1_D each component in the test vector must pass
		16QAM	0	1		
8.3.2.2.1_D TDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO	subframes are independent	16QAM	0	1		
		Σ	0	2		

G.3A Statistical testing of Performance Requirements with throughput for CA/DC/LAA

G.3A.1 General

The minimum requirements for performance tests in fading conditions in clause 8 with respect to CA/DC are 70% of the maximum throughput. The minimum requirements in static conditions in clause 8 with respect to CA/DC are [TBD]. Statistical tests in static propagation conditions lead to a statistically justified number of samples (testtime) and a test limit. The fading conditions require a minimum test time, overriding the statistically justified test time. It can be found in Tables G.3A.5. The statistically justified test limit is also used for the tests under fading conditions. The throughput is measured on both carriers in parallel (unless otherwise stated). The test for both carriers need the same time. The sum of the CC's throughput is compared against the limit, where the limit is the sum of the individual carrier's limit.

G.3A.2 Mapping throughput to error ratio

G.2.2 applies separate for each CC

G.3A.3 Design of the test

The test is defined by the following design principles (see clause G.x, Theory….):

1. The standard concept is applied (not the early decision concept).
2. A second limit is introduced, defining the Bad DUT.
3. To decide the test pass:
   - Supplier risk is applied based on the Bad DUT quality.
   - To decide the test fails.
   - Customer Risk is applied based on the specified DUT quality.

The test is defined by the following parameters:

1) Limit Error Ratio = 0.3.
(in case 70% throughput is tested , otherwise [TBD]).

2) Bad DUT factor M = 1.378 (selectivity) justification see: TS 34.121 Clause F.6.3.3.
(M = 1.378 is tied to 70% throughput, otherwise M is [TBD].)

3) Confidence level CL = 95% (for specified DUT and Bad DUT-quality).

G.3A.4 Pass Fail limit

Testing with the parameters from G.3A.3 (70% throughput, M = 1.378, CL95%): Apply 184 samples to the DUT per CC and count the errors for each CC. The test limit to pass for one CC is $\leq$ 66 errors, however this is not individually applicable for CA/DC.

Pass fail decision for one test point in CA/DC: The sum of the CC's errors is compared against the test limit, where the test limit is the sum of the individual carrier's test limit.

It is allowed to apply more samples, in parallel for all CCs, to the DUT (e.g. up to an integer number of frames).

In fading conditions it is necessary to apply more samples, in parallel for all CCs, to the DUT, as in fading conditions the minimum test time overrides the statistically justified test time.

When more samples are applied, decide against the ratio 66/184 = 0.3587.

Testing with parameters from G.3A.3 ([TBD]% throughput, M = [TBD], CL = 95%) is [TBD].

G.3A.5 Minimum test time

In contrast to G.3.5, where the minimum test time is derived from simulations, the test time here is selected without simulation utilising test time information from similar demodulation scenarios in non-CA test cases and while maintaining the reasonable testing time.

Note MNAS values in this clause may need to be changed in future if current MNAS values turn out to be too short for giving stable CA/DC throughput results.

Table G.3A.5-1: Minimum Test time FDD PDSCH Single Antenna Port Performance for CA (2DL CA)

Clause 8.2.1.1.1_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.2FDD (2x10 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
2	R.42FDD (2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
3	R.42-3 FDD + R.42-2 FDD (15MHz+5MHz,full,QPSK,1/3) (1x2 Low) EVA5)	50 000	55 556

Table G.3A.5-1A: Minimum Test time FDD PDSCH Single Antenna Port Performance for CA (3DL CA)

Clause 8.2.1.1.1_A.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.42FDD (3x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
2	R.42FDD + R.42-3FDD (20+20+15 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
3	R.42FDD + R.2FDD (20+20+10 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
4	R.42FDD + R.42-3FDD (20+15+15 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
5	R.42FDD + R.42-3FDD + R.2FDD (20+15+10 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
6	R.42FDD + R.2FDD (20+10+10 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
7	R.42-3FDD + R.2FDD (15+15+10 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
8	R.42FDD + R.2FDD + R.42-2FDD (20+10+5 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
9	R.42FDD + R.42-3FDD + R.42-2FDD (20+15+5 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556

Table G.3A.5-1B: Minimum Test time FDD PDSCH Single Antenna Port Performance for CA (4DL CA)

Clause 8.2.1.1.1_A.4 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.42FDD (4x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
2	R.2FDD + R.42FDD (10+20+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
3	R.2FDD + R.42FDD (10+10+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
4	R.42-2FDD + R.2FDD + R.42FDD (5+10+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556
5	R.42-2FDD + R.2FDD + R.42FDD (5+10+10+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	55 556

Table G.3A.5-2: Minimum Test time FDD PDSCH Open Loop Spatial Multiplexing 2x2 (2DL CA)

Clause 8.2.1.3.1_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.11 FDD (2x10 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
2	R.30 FDD (2x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
3	R.11-2 FDD (2x5 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
4	FFS	FFS	FFS
5	R.11-7 FDD + R.11-2 FDD (15MHz+5MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112

Table G.3A.5-2A: Minimum Test time FDD PDSCH Open Loop Spatial Multiplexing 2x2 (3DL CA)

Clause 8.2.1.3.1_A.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.30 FDD (3x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
2	R.30 FDD + R.11-7 FDD (20+20+15 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
3	R.30 FDD + R.11 FDD (20+20+10 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
4	R.30 FDD + R.11-7 FDD (20+15+15 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
5	R.30 FDD + R.11-7 FDD + R.11 FDD (20+15+10 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
6	R.30 FDD + R.11 FDD (20+10+10 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
7	R.11-7 FDD + R.11 FDD (15+15+10 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
8	R.30 FDD + R.11 FDD + R.11-2 FDD (20+10+5 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
9	R.30 FDD + R.11-7 FDD + R.11-2 FDD (20+15+5 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112

Table G.3A.5-2B: Minimum Test time FDD PDSCH Open Loop Spatial Multiplexing 2x2 (4DL CA)

Clause 8.2.1.3.1_A.3 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.30 FDD (4x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
2	R.11 FDD + R.30 FDD (10+20+20+20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
3	R.11 FDD + R.30 FDD (10+10+20+20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
4	R.11-2 FDD + R.11 FDD + R.30 FDD (5+10+20+20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112
5	R.11-2 FDD + R.11 FDD + R.30 FDD (5+10+10+20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70	10 000	11 112

Table G.3A.5-3: Minimum Test time FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 (2DL CA)

Clause 8.2.1.4.2_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.14-3 FDD (2x20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556
2	R.14FDD (2x10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
3	R.14-7 FDD + R.14-6 FDD (15MHz+5MHz,full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556

Table G.3A.5-3A: Minimum Test time FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 (3DL CA)

Clause 8.2.1.4.2_A.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.14-3 FDD (3x20 MHz,full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556
2	R.14-3 FDD + R.14-7 FDD (20+20+15 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
3	R.14-3 FDD + R.14 FDD (20+20+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
4	R.14-3 FDD + R.14-7 FDD (20+15+15 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
5	R.14-3 FDD + R.14-7 FDD + R.14 FDD (20+15+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
6	R.14-3 FDD + R.14 FDD (20+10+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
7	R.14-7 FDD + R.14 FDD (15+15+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
8	R.14-3 FDD + R.14 FDD + R.14-6 FDD (20+10+5 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
9	R.14-3 FDD + R.14-7 FDD + R.14-6 FDD (20+15+5 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556

Table G.3A.5-3B: Minimum Test time FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 (4DL CA)

Clause 8.2.1.4.2_A.3 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.14-3 FDD (4x20 MHz,full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556
2	R.14-3 FDD + R.14-7 FDD (20+20+20+15 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
3	R.14-3 FDD + R.14 FDD (20+20+20+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
4	R.14-3 FDD + R.14-7 FDD (20+20+15+15 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
5	R.14-3 FDD + R.14-7 FDD + R.14 FDD (20+20+15+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
6	R.14-3 FDD + R.14 FDD (20+20+10+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
7	R.14-3 FDD + R.14-7 FDD + R.14 FDD (20+15+15+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
8	R.14-3 FDD + R.14-7 FDD + R.14 FDD (20+15+10+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
9	R.14-3 FDD + R.14 FDD (20+10+10+10MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
10	R.14-7 FDD + R.14 FDD (15+15+15+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556

11	R.14-3 FDD + R.14 FDD + R.14-6 FDD (20+20+10+5 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556
12	R.14-6FDD + R.14 FDD + R.14-3 FDD (5+10+10+10+20MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	55 556

Table G.3A.5-4: Minimum Test time FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for Dual Connectivity

Clause 8.2.1.4.3A Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.14-3FDD (2x20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556
2	R.14-7FDD + R.14-3FDD (15+20 MHz,full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556
3	R.14FDD + R.14-3FDD (10+20 MHz,full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556
4	R.14-7FDD (2x15 MHz,full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556
5	R.14FDD (2x10 MHz,full,16QAM,1/2) (4x2 Low) EVA5	50 000	55 556

Table G.3A.5-4A: Void

Table G.3A.5-5: Void

Table G.3A.5-6: Minimum Test time TDD PDSCH Single Antenna Port Performance for CA (2DL CA)

Clause 8.2.2.1.1_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.42TDD (2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.42TDD (20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
	R.42-3 TDD (1x2 Low) EVA5		

Table G.3A.5-6A: Minimum Test time TDD PDSCH Single Antenna Port Performance for CA (3DL CA)

Clause 8.2.2.1.1_A.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.42TDD (3x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.42TDD + R.42-3TDD (20+20+15 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-7: Minimum Test time TDD PDSCH Open Loop Spatial Multiplexing 2x2 2DL CA

Clause 8.2.2.3.1_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.30-1 TDD (2x20 MHz, full,16QAM,1/2) (2x2 Low) EVA70	10 000	20 000
2	R.30-1 TDD (20 MHz, full,16QAM,1/2) (2x2 Low) EVA70	10 000	20 000
	[TBD] (2x2 Low) EVA70		

Table G.3A.5-7A: Minimum Test time TDD PDSCH Open Loop Spatial Multiplexing 2x2 3DL CA

Clause 8.2.2.3.1_A.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.30-1 TDD (3x20 MHz, full,16QAM,1/2) (2x2 Low) EVA70	10 000	20 000
2	R.30-1 TDD + R.11-9 TDD (20+20+15 MHz, full,16QAM,1/2) (2x2 Low) EVA70	10 000	20 000

Table G.3A.5-8: Minimum Test time TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 2DL CA

Clause 8.2.2.4.2_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.43TDD (2x20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	100 000
2	R.43TDD (20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	100 000
	R.43-5 TDD (15 MHz, full, 16QAM,1/2) (4x2 Low) EVA 5		

Table G.3A.5-8A: Minimum Test time TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 3DL CA

Clause 8.2.2.4.2_A.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.43 TDD (3x20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	100 000
2	R.43 TDD + R.43-5 TDD (20+20+15 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	100 000

Table G.3A.5-9: Minimum Test time TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for Dual Connectivity

Clause 8.2.2.4.4 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.43 TDD (2x20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	100 000

Table G.3A.5-10Void

Table G.3A.5-11: Minimum Test time TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 (intra band non-contiguous DL CA)

Clause 8.2.2.4.2_A.3 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.43TDD (2x20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	100 000

Table G.3A.5-12: Minimum Test time FDD PDSCH Soft buffer management test (2 DL CA)

Clause 8.2.1.3.1A_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.30 FDD (2x20 MHz, full 16QAM, 1/2) (2x2 Low) EVA70	10 000	11 112
2	R.35-2 FDD (15MHz, full 64QAM, 0.39) (2x2 Low) EVA5	10 000	12 500
	R.35-3 FDD (10MHz, full 64QAM, 0.39) (2x2 Low) EVA5		
3	R.30 FDD (20 MHz, full 16QAM, 1/2) (2x2 Low) EVA70	10 000	11 112
	R.11 FDD (10 MHz, full 16QAM, 1/2) (2x2 Low) EVA70		
4	R.30 FDD (20 MHz, full 16QAM, 1/2) (2x2 Low) EVA70	10 000	12 500
	R.30-1 FDD (15 MHz, full 16QAM, 1/2) (2x2 Low) EVA70		
5	R.35-1 FDD (2x20 MHz, full 64QAM, 0.39) (2x2 Low) EVA5	10 000	12 500
6	R.35-1 FDD (20 MHz, full 64QAM, 0.39) (2x2 Low) EVA5	10 000	12 500
	R.35-3 FDD (10MHz, full 64QAM, 0.39) (2x2 Low) EVA5		
7	R.35-1 FDD (20 MHz, full 64QAM, 0.39) (2x2 Low) EVA5	10 000	12 500
	R.35-2 FDD (15MHz, full 64QAM, 0.39) (2x2 Low) EVA5		

Table G.3A.5-14: Minimum Test time TDD PDSCH Soft buffer management test (2 DL CA)

Clause 8.2.2.3.1A_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.30-2 TDD (2x20 MHz,full,16QAM,1/3) (2x2 Low) EVA70	10 000	50 000
2	R.35-1 TDD (2x20 MHz,full,64QAM,1/3) (2x2 Low) EVA5	10 000	50 000

Table G.3A.5-15: Minimum Test time TDD power imbalance test (2 DL CA)

Clause 8.2.2.7_A.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			TDD
1	R.49 TDD for PCC (20 MHz,full, 64QAM, 0.81-087) (1x2) OCNG for SCC	10 000 in PCC	20 000
2	OCNG for PCC R.49-1 TDD for SCC (15 MHz,full, 64QAM, 0.80-0.86) (1x2)	10 000 in SCC	20 000

Table G.3A.5-16: Minimum Test time TDD FDD CA PDSCH Single Antenna Port Performance for FDD Pcell (2DL CA)

Clause 8.2.3.1.1.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.42 FDD+R.42 TDD (20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.2 FDD+R.42 TDD (20+10 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
3	R.42-3 FDD+R.42 TDD (20+15 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-17: Minimum Test time TDD FDD CA PDSCH Single Antenna Port Performance for FDD PCell (3DL CA)

Clause 8.2.3.1.1.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.42 FDD+R.42 TDD (20+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.42-3 FDD+R.42 TDD (15+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
3	R.2 FDD+R.42 TDD (10+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
4	R.42 FDD+R.42 TDD (2x20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
5	R.42-3 FDD+R.42 FDD+R.42 TDD (15+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
6	R.2 FDD+R.42 FDD +R.42 TDD (10+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-17a: Minimum Test time TDD FDD CA PDSCH Single Antenna Port Performance for FDD PCell (4DL CA)

Clause 8.2.3.1.1.3 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.42 FDD+R.42 TDD (20+3x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.42 FDD+R.42 TDD (2x20+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
3	R.42 FDD+R.42-3 FDD+ R.42 TDD (20+15+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
4	R.42-3 FDD+R.42 TDD (2x15+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
5	R.42 FDD +R.42-3 FDD+R.42 FDD+R.42 TDD (2x20+15+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
6	R.42 FDD+ R.42-3 FDD +R.42 TDD (2x15+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
7	R.42 FDD+ R.2 FDD +R.42 TDD (2x20+10+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-17b: Minimum Test time TDD FDD CA PDSCH Single Antenna Port Performance for FDD PCell (5DL CA)

Clause 8.2.3.1.1.4 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.42-3 FDD+R.42 FDD+R.42 TDD (15+2x20+2x20MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.42-3 FDD+R.42 FDD+R.42 TDD (2x15+20+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-18: Minimum Test time TDD FDD CA PDSCH Single Antenna Port Performance for TDD Pcell (2DL CA)

Clause 8.2.3.1.2.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.42 FDD+R.42 TDD (20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.2 FDD+R.42 TDD (20+10 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
3	R.42-3 FDD+R.42 TDD (20+15 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-19: Minimum Test time TDD FDD CA PDSCH Single Antenna Port Performance for TDD PCell(3DL CA)

Clause 8.2.3.1.2.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.42 FDD+R.42 TDD (20+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.42-3 FDD+R.42 TDD (15+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
3	R.2 FDD+R.42 TDD (10+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
4	R.42 FDD+R.42 TDD (2x20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
5	R.42-3 FDD+R.42 FDD+R.42 TDD (15+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
6	R.2 FDD+R.42 FDD +R.42 TDD (10+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-19a: Minimum Test time TDD FDD CA PDSCH Single Antenna Port Performance for TDD PCell(4DL CA)

Clause 8.2.3.1.2.3 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.42 FDD+R.42 TDD (20+3x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.42 FDD+R.42 TDD (2x20+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
3	R.42 FDD+ R.42-3 FDD+ R.42 TDD (20+15+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
4	R.42-3 FDD+R.42 TDD (2x15+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
5	R.42 FDD + R.42-3 FDD+R.42 TDD (2x20+15+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
6	R.42-3 FDD+R.42 FDD +R.42 TDD (2x15+20+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
7	R.42 FDD+R.2 FDD +R.42 TDD (2x20+10+20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-19b: Minimum Test time TDD FDD CA PDSCH Single Antenna Port Performance for TDD PCell(5DL CA)

Clause 8.2.3.1.2.4 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.42-3 FDD+ R.42 FDD+R.42 TDD (15+2x20+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000
2	R.42-3 FDD+ R.42 FDD + R.42 TDD (2x15+20+2x20 MHz,full,QPSK,1/3) (1x2 Low) EVA5	50 000	100 000

Table G.3A.5-20: Minimum Test time TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for FDD PCell (2DL CA)

Clause 8.2.3.2.1.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.30 FDD + R.30-1 TDD (20+20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
2	R.11 FDD + R.30-1 TDD (20+10 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
3	R.11-7 FDD + R.30-1 TDD (20+15 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000

Table G.3A.5-21: Minimum Test time TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for FDD PCell (3DL CA)

Clause 8.2.3.2.1.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.30 FDD + R.30-1 TDD (20+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
2	R.11-7 FDD + R.30-1 TDD (15+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
3	R.11 FDD + R.30-1 TDD (10+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000

Table G.3A.5-21a: Minimum Test time TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for FDD PCell (4DL CA)

Clause 8.2.3.2.1.3 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.30 FDD + R.30-1 TDD (20+3x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
2	R.30FDD + R.30-1 TDD (2x20+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
3	R.30FDD +R.11-7 FDD + R.30-1 TDD (20+15+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
4	R.11-7 FDD + R.30FDD + R.30-1 TDD (2x15+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
5	R.30FDD +R.11-7 FDD + R.30-1 TDD (2x20+15+20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
6	R.11-7 FDD + R.30FDD +R.30-1 TDD (2x15+20+20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
7	R.30FDD +R.11 FDD + R.30-1 TDD (2x20+10+20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000

Table G.3A.5-21b: Minimum Test time TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for FDD PCell (5DL CA)

Clause 8.2.3.2.1.4 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.11-7 FDD+R.30 FDD + R.30-1 TDD (15+2x20+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
2	R.11-7 FDD+R.30FDD + R.30-1 TDD (2x15+20+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000

Table G.3A.5-22: Minimum Test time TDD FDD CA Soft buffer management test for FDD PCell (2DL CA)

Clause 8.2.3.2.1A Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.35-1 FDD+ R.35-1 TDD (20+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
2	R.35-1 FDD+ R.35-1 TDD (20+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
3	R.35-3 FDD+ R.35-1 TDD (10+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
4	R.35-3 FDD+ R.35-1 TDD (10+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
5	R.35-2 FDD+ R.35-1 TDD (15+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
6	R.35-2 FDD+ R.35-1 TDD (15+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000

Table G.3A.5-23: Minimum Test time TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (2DL CA)

Clause 8.2.3.2.2.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.30 FDD + R.30-1 TDD (20+20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
2	R.11 FDD + R.30-1 TDD (20+10 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
3	R.11-7 FDD + R.30-1 TDD (20+15 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000

Table G.3A.5-24: Minimum Test time TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (3DL CA)

Clause 8.2.3.2.2.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.30 FDD + R.30-1 TDD (20+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
2	R.11-7 FDD + R.30-1 TDD (15+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
3	R.11 FDD + R.30-1 TDD (10+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000

Table G.3A.5-24a: Minimum Test time TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (4DL CA)

Clause 8.2.3.2.2.3 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.30 FDD + R.30-1 TDD (20+3x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
2	R.30 FDD + R.30-1 TDD (2x20+2x20MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
3	R.30FDD +R.11-7 FDD + R.30-1 TDD (20+15+2x20MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
4	R.11-7 FDD+ R.30FDD + R.30-1 TDD (2x15+2x20MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
5	R.30FDD +R.11-7 FDD + R.30-1 TDD (2x20+15+20MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
6	R.11-7 FDD+ R.30FDD+ R.30-1 TDD (2x15+20+20MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
7	R.30FDD +R.11 FDD + R.30-1 TDD (2x20+10+20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000

Table G.3A.5-24b: Minimum Test time TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (5DL CA)

Clause 8.2.3.2.2.4 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.11-7 FDD+R.30 FDD + R.30-1 TDD (15+2x20+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000
2	R.11-7 FDD+R.30FDD + R.30-1 TDD (2x15+20+2x20 MHz,full,QPSK,1/3) (2x2 Low) EVA70	10 000	25 000

Table G.3A.5-25: Minimum Test time TDD FDD CA PDSCH Soft buffer management test for TDD PCell (2DL CA)

Clause 8.2.3.2.2A Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in the measured CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.35-1 FDD+ R.35-1 TDD (20+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
2	R.35-1 FDD+ R.35-1 TDD (20+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
3	R.35-3 FDD+ R.35-1 TDD (10+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
4	R.35-3 FDD+ R.35-1 TDD (10+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
5	R.35-2 FDD+ R.35-1 TDD (15+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000
6	R.35-2 FDD + R.35-1 TDD (15+20 MHz,full,64QAM,0.39) (2x2 Low) EVA70	10 000	50 000

Table G.3A.5-26: Minimum Test time TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (2DL CA)

Clause 8.2.3.3.1.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.14-3 FDD + R.43TDD (2x20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000
2	R.14 FDD + R.43TDD (20+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000
3	R.14-7 FDD + R.43 TDD (20+15 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000

Table G.3A.5-27: Minimum Test time TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (3DL CA)

Clause 8.2.3.3.1.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD/TDD
1	R.14-3 FDD + R.43TDD (3x20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000
2	R.14-7 FDD +R.43 TDD (20+20+15 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000
3	R.14 FDD +R.43 TDD (20+20+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000

Table G.3A.5-27a: Minimum Test time TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (4DL CA)

Clause 8.2.3.3.1.3 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
1	R.14-3 FDD+R.43 TDD (20+3x20 MHz, full,16QAM, 1/2) (4x2 Low) EVA5	50 000	125 000
2	R.14-3 FDD+R.43 TDD (2x20+2x20 MHz, full,16QAM, 1/2) (4x2 Low) EVA5	50 000	125 000
3	R.14-3FDD+ R.14-7FDD+R.43TDD (20+15+2x20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000
4	R.14-7 FDD+R.43 TDD (2x15+2x20 MHz, full,16QAM, 1/2) (4x2 Low) EVA5	50 000	125 000
5	R.14-3FDD +R.14-7FDD+R.43TDD (2x20+15+20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000
6	R.14-7FDD+ R.14-3FDD+R.43TDD (2x15+20+20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000
7	R.14-3 FDD+ R.14 FDD +R.43TDD (2x20+10+20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000

Table G.3A.5-27b: Minimum Test time TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (5DL CA)

Clause 8.2.3.3.1.4 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
1	R.14-7 FDD+R.14-3FDD+R.43TDD (15+2x20+2x20MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000
2	R.14-7 FDD+R.14-3FDD+R.43TDD (2x15+20+2x20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000

Table G.3A.5-28: Minimum Test time TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (2DL CA)

Clause 8.2.3.3.2.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes) FDD/TDD
1	R.14-3 FDD + R.43TDD (2x20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000
2	R.14 FDD + R.43TDD (20+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000
3	R.14-7 FDD + R.43TDD (15+20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000

Table G.3A.5-29: Minimum Test time TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (3DL CA)

Clause 8.2.3.3.2.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration,	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes) FDD/TDD

	correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)		
1	R.14-3 FDD + R.43TDD (3x20 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000
2	R.14 FDD + R.43TDD (20+20+15 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000
3	R.14-7 FDD + R.43TDD (20+20+10 MHz,full,16QAM, 1/2) (4x2 Low) EVA 5	50 000	125 000

Table G.3A.5-29a: Minimum Test time TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (4DL CA)

Clause 8.2.3.3.2.3 Test No	**Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)**	**Minimum Number of Active Subframes in each CC**	**Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)**
			FDD/TDD
1	R.14-3 FDD+R.43 TDD (20+3x20 MHz, full,16QAM, 1/2) (4x2 Low) EVA5	50 000	125 000
2	R.14-3 FDD+R.43 TDD (2x20+2x20 MHz, full,16QAM, 1/2) (4x2 Low) EVA5	50 000	125 000
3	R.14-3FDD+ R.14-7FDD+R.43TDD (20+15+2x20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000
4	R.14-7 FDD+R.43 TDD (2x15+2x20 MHz, full,16QAM, 1/2) (4x2 Low) EVA5	50 000	125 000
5	R.14-3FDD +R.14-7FDD+R.43TDD (2x20+15+20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000
6	R.14-7FDD+ R.14-3FDD+R.43TDD (2x15+20+20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000
7	R.14-3 FDD+ R.14 FDD +R.43TDD (2x20+10+20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000

Table G.3A.5-29b: Minimum Test time TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (5DL CA)

Clause 8.2.3.3.2.4 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
1	R.14-7 FDD+R.14-3FDD+R.43TDD (15+2x20+2x20MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000
2	R.14-7 FDD+R.14-3FDD+R.43TDD (2x15+20+2x20 MHz, full,16QAM,1/2) (4x2 Low) EVA5	50 000	125 000

Table G.3A.5-30: LAA Dual-Layer Spatial Multiplexing with DM-RS with FDD as Pcell

Clause 8.3.3.1.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD
1	R.30 FDD (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70 + R.2-FS3 (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA5	50,000	121,000
2	R.30 FDD (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70 + R.2-FS3 (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA5	50,000	121,000
3	R.30 FDD (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70 + R.2-FS3 (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA5	50,000	121,000
4	R.30 FDD (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70 + R.2-FS3 (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA5	50,000	121,000
NOTE 1: MNAS is not simulated, but estimated based on similar scenario in Table G.3A.5-16 Test1. NOTE 2: MNS for SCC is not deterministic due to the statistical burst transmission model in clause B.3.8. The average MNS is presented in this table. This is calculated based on an average burst length of 5.25 ms which in average takes 6.25 ms assuming UE not capable of partial subframes, and a simulated probability of LBT success (p) equal to 0.5 (ratio 6.25/5.25/0.5).			

Table G.3A.5-30A: LAA Dual-Layer Spatial Multiplexing with DM-RS with TDD as Pcell

Clause 8.3.3.1.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD
1	R.30-1 TDD (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70 + R.2 FS3 (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA5	50,000	121,000
2	R.30-1 TDD (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70 + R.2 FS3 (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA5	50,000	121,000
3	R.30-1 TDD (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70 + R.2 FS3 (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA5	50,000	121,000
4	R.30-1 TDD (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA70 + R.2 FS3 (1x20 MHz, full 16QAM, 1/2), (2x2 Low) EVA5	50,000	121,000
NOTE 1: MNAS is not simulated, but estimated based on similar scenario in Table G.3A.5-16 Test1. NOTE 2: MNS for SCC is not deterministic due to the statistical burst transmission model in clause B.3.8. The average MNS is presented in this table. This is calculated based on an average burst length of 5.25 ms which in average takes 6.25 ms assuming UE not capable of partial subframes, and a simulated probability of LBT success (p) equal to 0.5 (ratio 6.25/5.25/0.5).			

Table G.3A.5-31: Minimum Test time LAA PDSCH CA Closed Loop Spatial Multiplexing Performance with 4Tx Antenna ports and with FDD as PCell (FDD Single Carrier)

Clause 8.2.4.1.1 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			FDD/FS3
1	R.14-3 FDD + R.1 FS3 (20 MHz, full,16QAM, 1/2) + (20 MHz, full, 64QAM, 0.6) (4x2 Low) + (4x2 Low) EVA 5 + EVA5	50 000	300,000
NOTE 1: MNAS is not simulated, but estimated based on similar scenario in Table G.3A.5-xx Test1. NOTE 2: MNS for SCC is not deterministic due to the statistical burst transmission model in clause B.3.8. The average MNS is presented in this table. This is calculated based on an average burst length of 5.25 ms which in average takes 6.25 ms assuming UE not capable of partial subframes, and a simulated probability of LBT success (p) equal to 0.5 (ratio 6.25/5.25/0.5).			

Table G.3A.5-32: Minimum Test time LAA PDSCH CA Closed Loop Spatial Multiplexing Performance with 4Tx Antenna ports and with TDD as PCell (TDD Single Carrier)

Clause 8.2.4.1.2 Test No	Demodulation scenario plain text: RMC (Bandwidth, allocated RBs, modulation, coding) Antenna (configuration, correlation) Propagation condition, Doppler [additional parameters, if applicable] (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)
			TDD/FS3
1	R.43 TDD + R.1 FS3 (20 MHz, full,16QAM, 1/2) + (20 MHz, full, 64QAM, 0.6) (4x2 Low) + (4x2 Low) EVA 5 + EVA5	50 000	300 000
NOTE 1: MNAS is not simulated, but estimated based on similar scenario in Table G.3A.5-yy Test1. NOTE 2: MNS for SCC is not deterministic due to the statistical burst transmission model in clause B.3.8. The average MNS is presented in this table. This is calculated based on an average burst length of 5.25 ms which in average takes 6.25 ms assuming UE not capable of partial subframes, and a simulated probability of LBT success (p) equal to 0.5 (ratio 6.25/5.25/0.5).			

Table G.3.5-33: Minimum Test time for PDSCH Dual-layer Spatial Multiplexing for 4Rx (2DL CA - 5DL CA)

Clause 8.13.1.2.2-8.13.1.2.5/8.13.2.2.2-8.13.2.2.5 Test No	Demodulation scenario (info only)	Minimum Number of Active Subframes in each CC	Minimum Number of Subframes (MNS) in each CC (MNS = active and inactive subframes)	
			FDD	TDD
All	R.51 (5-20MHz, full, 16QAM,) (2x4 Low) ETU5	50000 Note: MNAS is not simulated. It is estimated based on other similar test cases using EPA5 propagation conditions	56 000	100 000

G.3A.6 Test conditions

Table G.3A.6-1: Test conditions for CA/DC performance tests

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test	Over all Pass/Fail condition
8.2.1.1.1_A.1 FDD PDSCH Single Antenna Port Performance for CA (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.1.1_A.2 FDD PDSCH Single Antenna Port Performance for CA (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.1.1_A.4 FDD PDSCH Single Antenna Port Performance for CA (4DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.3.1_A.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.3.1_A.2 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.3.1_A.3 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (4DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.3.1A_A.1 FDD PDSCH Soft buffer management test for CA (2 DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.4.2_A.1 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4 x 2 for CA (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.4.2_A.2 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4 x 2 for CA (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.4.2_A.3 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4 x 2 for CA (4DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.1.4.3A FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for Dual Connectivity	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.2.1.1_A.1 TDD PDSCH Single Antenna Port Performance for CA (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.2.1.1_A.2 TDD PDSCH Single Antenna Port Performance for CA (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass

8.2.2.3.1_A.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.2.3.1_A.2 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.2.3.1A_A.1 TDD PDSCH Soft buffer management test (2 DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.2.4.2_A.1 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.2.4.2_A.2 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.2.4.4 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for Dual Connectivity	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.3.2.2.1 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.2.3.2.2.2 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.3.3.1.1 LAA Dual-Layer Spatial Multiplexing with DM-RS with FDD as Pcell	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.3.3.1.2 LAA Dual-Layer Spatial Multiplexing with DM-RS with TDD as Pcell	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.7.1.1_A.1 FDD Sustained data rate performance for CA (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.7.1.1_A.2 FDD Sustained data rate performance for CA (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.7.1.1_A.4 FDD Sustained data rate performance for CA (4DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.7.2.1_A.1 TDD Sustained data rate performance for CA (2DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
8.7.2.1_A.2 TDD Sustained data rate performance for CA (3DL CA)	subframes are independent	1	To pass the test case all applicable components in the test vector must pass
9.6.1.1_A.3 FDD CQI Reporting under AWGN conditions –	subframes are independent	1	To pass the test case all applicable components in the test vector must pass

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G.4 Statistical testing of Performance Requirements with probability of misdetection

G.4.1 General

The test of receiver performance characteristics is two fold.

1. A signal or a combination of signals is offered to the RX port(s) of the receiver.
2. The ability of the receiver to demodulate /decode this signal is verified by analyzing the reaction of the UE to this signal.

In (2) is the statistical aspect of the test and is treated here.

The minimum requirement for those receiver performance tests are 1% or 0.1% misdetection probability

All receiver performance tests are performed in fading conditions. In addition to the statistical considerations, this requires the definition of a minimum test time.

NOTE: All demodulation performance tests (state from version 9.5.0) require a minimum test time, which exceeds the maximum test time in tables G.4.4. Under this circumstances only the test limit at the end of tables G.4.4.-1 resp. G.4.4.-2 is applicable.

G.4.2 Mapping the UE reaction to error ratio

The UE can not indicate the detection or misdetection of the physical channel under test directly. Indirect methods are described in the procedure of the applicable test.

G.4.3 Design of the test

G.2.3 applies, exception:

Limit ER = 0.01 and ER = 0.001

G.4.4 Numerical definition of the pass fail limits

Table G.4.4-1: pass fail limits for ER = 0.01

ne	ns_p	ns_f	ne	ns_p	ns_f	ne	ns_p	ns_f	ne	ns_p	ns_f
0	344	NA	40	3929	2553	80	7033	5874	120	10036	9354
1	485	NA	41	4009	2632	81	7109	5960	121	10110	9442
2	607	10	42	4089	2712	82	7185	6046	122	10184	9530
3	719	33	43	4168	2792	83	7261	6131	123	10259	9619
4	826	66	44	4247	2873	84	7336	6217	124	10333	9707
5	929	107	45	4327	2953	85	7412	6303	125	10407	9796
6	1029	152	46	4406	3034	86	7488	6389	126	10481	9884
7	1127	202	47	4484	3115	87	7564	6475	127	10555	9972
8	1223	255	48	4563	3196	88	7639	6561	128	10629	10061
9	1317	311	49	4642	3278	89	7715	6648	129	10703	10150
10	1409	370	50	4720	3359	90	7790	6734	130	10777	10238
11	1501	430	51	4799	3441	91	7866	6820	131	10851	10327
12	1592	492	52	4877	3523	92	7941	6907	132	10925	10416
13	1681	555	53	4955	3605	93	8017	6993	133	10999	10504
14	1770	620	54	5033	3688	94	8092	7080	134	11073	10593
15	1858	686	55	5111	3770	95	8167	7167	135	11147	10682
16	1946	754	56	5189	3853	96	8242	7253	136	11221	10771
17	2032	822	57	5267	3935	97	8317	7340	137	11295	10860
18	2119	891	58	5344	4018	98	8393	7427	138	11369	10949
19	2204	961	59	5422	4101	99	8468	7514	139	11442	11038
20	2290	1032	60	5499	4185	100	8543	7601	140	11516	11127
21	2374	1103	61	5577	4268	101	8618	7688	141	11590	11216
22	2459	1175	62	5654	4352	102	8693	7775	142	11664	11305
23	2543	1248	63	5731	4435	103	8768	7863	143	11737	11394
24	2627	1321	64	5809	4519	104	8843	7950	144	11811	11483
25	2710	1395	65	5886	4603	105	8917	8037	145	11885	11573
26	2793	1470	66	5963	4687	106	8992	8125	146	11958	11662
27	2876	1544	67	6039	4771	107	9067	8212	147	12032	11751
28	2958	1620	68	6116	4855	108	9142	8300	148	12105	11840
29	3040	1696	69	6193	4940	109	9216	8387	149	12179	11930
30	3122	1772	70	6270	5024	110	9291	8475	150	12252	12019
31	3204	1848	71	6346	5109	111	9366	8562	151	12326	12109
32	3285	1925	72	6423	5193	112	9440	8650	152	12399	12198
33	3366	2003	73	6499	5278	113	9515	8738	153	12473	12288
34	3447	2080	74	6576	5363	114	9589	8826	154	12546	12377
35	3528	2158	75	6652	5448	115	9664	8914	155	12620	12467
36	3609	2237	76	6728	5533	116	9738	9002	156	12693	12556
37	3689	2315	77	6805	5618	117	9813	9090	157	12767	12646
38	3769	2394	78	6881	5704	118	9887	9178	158	12840	12736
39	3850	2473	79	6957	5789	119	9962	9266	159	12913	12826
									160	NA	12915
									Test limit = 1.2352E-2		

Table G.4.4-2: pass fail limits for ER = 0.001

ne	ns_p	ns_f	ne	ns_p	ns_f	ne	ns_p	ns_f	ne	ns_p	ns_f
0	3463	NA	41	40174	26265	82	71961	60368	123	102723	96075
1	4874	4	42	40971	27063	83	72720	61225	124	103465	96958
2	6096	99	43	41766	27863	84	73479	62083	125	104208	97842
3	7226	329	44	42559	28666	85	74237	62941	126	104949	98726
4	8298	658	45	43352	29471	86	74995	63801	127	105691	99610
5	9330	1059	46	44142	30279	87	75752	64661	128	106432	100495
6	10332	1513	47	44932	31088	88	76509	65522	129	107173	101380
7	11310	2009	48	45720	31899	89	77265	66383	130	107914	102266
8	12269	2539	49	46507	32713	90	78020	67246	131	108655	103152
9	13212	3096	50	47293	33528	91	78776	68109	132	109395	104039
10	14141	3677	51	48078	34345	92	79530	68973	133	110135	104926
11	15058	4278	52	48861	35164	93	80285	69838	134	110875	105813
12	15965	4896	53	49644	35984	94	81038	70704	135	111614	106701
13	16863	5530	54	50425	36807	95	81792	71570	136	112353	107589
14	17753	6177	55	51205	37631	96	82544	72437	137	113092	108478
15	18635	6836	56	51985	38456	97	83297	73305	138	113830	109367
16	19511	7507	57	52763	39283	98	84049	74173	139	114569	110257
17	20380	8188	58	53541	40112	99	84800	75042	140	115307	111146
18	21244	8878	59	54317	40942	100	85551	75911	141	116045	112037
19	22103	9576	60	55092	41773	101	86302	76782	142	116782	112927
20	22957	10282	61	55867	42606	102	87052	77653	143	117520	113818
21	23806	10995	62	56641	43440	103	87802	78524	144	118257	114710
22	24652	11715	63	57414	44276	104	88552	79396	145	118994	115602
23	25493	12441	64	58186	45113	105	89301	80269	146	119730	116494
24	26331	13173	65	58957	45951	106	90050	81143	147	120466	117386
25	27166	13911	66	59728	46790	107	90798	82017	148	121203	118279
26	27997	14654	67	60497	47631	108	91546	82891	149	121939	119173
27	28826	15401	68	61266	48472	109	92293	83766	150	122674	120066
28	29651	16154	69	62035	49315	110	93041	84642	151	123410	120960
29	30474	16910	70	62802	50159	111	93787	85518	152	124145	121855
30	31294	17671	71	63569	51004	112	94534	86395	153	124880	122749
31	32111	18436	72	64335	51851	113	95280	87273	154	125615	123644
32	32927	19204	73	65100	52698	114	96026	88151	155	126349	124540
33	33740	19976	74	65865	53546	115	96771	89029	156	127083	125435
34	34551	20752	75	66629	54396	116	97516	89908	157	127818	126332
35	35360	21531	76	67393	55246	117	98261	90788	158	128551	127228
36	36166	22312	77	68156	56097	118	99005	91668	159	129285	128125
37	36971	23097	78	68918	56950	119	99750	92548	160	130019	129022
38	37775	23885	79	69679	57803	120	100493	93429	161	130752	129919
39	38576	24676	80	70440	58657	121	101237	94311	162	NA	130817
40	39376	25469	81	71201	59512	122	101980	95193	Test limit = 1.2345E-3		

NOTE 1: The first column is the number of errors (ne = number of misdetections)

NOTE 2: The second column is the number of samples for the pass limit (ns_p, ns=Number of Samples= number misdetections + number of detections)

NOTE 3: The third column is the number of samples for the fail limit (ns_f)

NOTE 4: The test limit at the end of the table is applicable, when the minimum test time in clause 3.5 governs the test. Pass the test for ER $\leq$ Test limit, otherwise fail.

G.4.5 Pass fail decision rules

G.2.5 applies

NOTE: For ER=0.01 an ideal DUT passes after 344 samples. The maximum test time is 12913 samples. For ER=0.001 an ideal DUT passes after 3463 samples. The maximum test time is 130752 samples.

For LAA the following also apply:

The pass fail decision is done individually for each CC. The pass fail decision for one component in the test vector is as follows: pass if all CCs or SCC only according to the test cases pass, otherwise fail.

It is allowed to apply more samples to the DUT, common for all CCs, (e.g. up to an integer number of frames). Use the ratio for the pass fail decision.

G.4.6 Minimum Test time

Table G.4.6-1: Minimum Test time for Demodulation of PCFICH/PDCCH

Test No	Demod. Scenario	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
				FDD	TDD	FDD	TDD
1	[8.1]	R.15 (10 MHz, 8CCE, full, QPSK 1/3) (1x2 Low) ETU70	200 000	222 222	400 000	224 000	401 000
1	[8.2]	R.16 (1.4MHz, 2CCE, full, QPSK 1/3) (2x2 Low) EPA5	200 000	222 222	400 000	224 000	401 000
1 Rel-9 …	[ ]	R.16_1 (10MHz, 4CCE, full, QPSK 1/3) (2x2 Low) EVA70	200 000	222 222	400 000	224 000	401 000
1	[8.3]	R.17 (10MHz, 4CCE, full, QPSK 1/3) (4x2 Medium) EVA5	200 000	222 222	400 000	224 000	401 000
1 Rel-9 …	[ ]	R.17_1 (5MHz, 2CCE, full, QPSK 1/3) (4x2 Medium) EPA5	200 000	222 222	400 000	224 000	401 000
Note:	Simulation method to derive MNAS is based on finite test time and its effect on test system uncertainty specified in clause F.1.4.						

Table G.4.6-1a: Minimum Test time for Demodulation of PCFICH/PDCCH for eICIC

Test No	Demod. Scenario	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
				FDD	TDD	FDD	TDD
1	[ ]	R.15-1 (10 MHz, 8CCE, full, QPSK 1/3) (2x2 Low) EVA5	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-1 Test1)	2 000 000	2 000 000	2 001 000	2 001 000
Note:	Simulation method to derive MNAS is based on finite test time and its effect on test system uncertainty specified in clause F.1.4.						

Table G.4.6-1b: Minimum Test time for Demodulation of PCFICH/PDCCH for feICIC

Test No	Demod. Scenario	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
				FDD	TDD	FDD	TDD
1	[ ]	R.15-2 (10 MHz, 8CCE, full, QPSK 1/3) (2x2 Low) EVA5	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-1 Test1)	2 000 000	2 000 000	2 001 000	2 001 000
Note:	Simulation method to derive MNAS is based on finite test time and its effect on test system uncertainty specified in clause F.1.4.						

Table G.4.6-2: Minimum Test time for Demodulation of PHICH

Test No	Demod. scenario	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
				FDD	TDD	FDD	TDD
1	[9.1]	R.18 (10 MHz, full, QPSK 1/3) (1x2 Low) ETU70	200 000	200 000	500 000	200 000	500 000
2	[9.4]	R.24 (10MHz, full, 16QAM ½) (1x2 Low) ETU70	200 000	200 000	500 000	200 000	500 000
1	[9.2]	R.19 (1.4MHz, full, 64QAM 3/4) (2x2 Low) EPA5	200 000	200 000	500 000	200 000	500 000
1 Rel-9…	[ ]	R.19_1 (10MHz, full, 64QAM 3/4) (2x2 Low) EVA70	200 000	200 000	500 000	200 000	500 000
1A		R.19-1 (5MHz, full, 64QAM 3/4) (2x2 Low) EVA70	200 000	200 000	500 000	200 000	500 000
1	[9.3]	R.20 (10MHz, 1PRB, 16QAM ½) (4x2 Medium) EVA5	200 000	200 000	500 000	200 000	500 000
1 Rel-9…	[ ]	R.20_1 (5MHz, 1PRB, 16QAM ½) (4x2 Medium) EPA5	200 000	200 000	500 000	200 000	500 000
Note:	Simulation method to derive MNAS is based on finite test time and its effect on test system uncertainty specified in clause F.1.4.						

Table G.4.6-2a: Minimum Test time for Demodulation of PHICH for eICIC

Test No	Demod. scenario	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
				FDD	TDD	FDD	TDD
1	[ ]	R.19_1 (10MHz, full, 64QAM 3/4) (2x2 Low) EPA5	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-2 Test1)	1 600 000	2 000 000	1 600 000	2 000 000
Note: Simulation method to derive MNAS is based on finite test time and its effect on test system uncertainty specified in clause F.1.4.							

Table G.4.6-2b: Minimum Test time for Demodulation of PHICH for feICIC

Test No	Demod. scenario	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
				FDD	TDD	FDD	TDD
1	[ ]	R.19_1 (10MHz, full, 64QAM 3/4) (2x2 Low) EPA5	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-2 Test1)	1 600 000	2 000 000	1 600 000	2 000 000
Note: Simulation method to derive MNAS is based on finite test time and its effect on test system uncertainty specified in clause F.1.4.							

Table G.4.6-3: Minimum Test time for PHICH for UE Category 0 and UE Category 1bis

Clause 8.9.2.1.1/8.9.2.1.1_1/8.9.2.2.1 Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			HD-FDD	TDD	HD-FDD	TDD
1	R.19 (10MHz, 1PRB, PBSK, 1/2) (2x1 Low) EPA5	46 524 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-1 Test11) with HD-FDD pattern	124 064	93 048	126 000	95 000

Table G.4.6-4: Minimum Test time for Demodulation of PCFICH/PDCCH for 4 Rx antenna ports

Test No	Demod. Scenario	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
				FDD	TDD	FDD	TDD
8.10.2.1.1, 8.10.2.2.1: Test 1	[ ]	R.15 (10 MHz, 8CCE, full, QPSK 1/3) (1x4 Low) ETU70	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-1 Test 1)	222 222	400 000	224 000	401 000
8.10.2.1.2, 8.10.2.2.2: Test 1	[ ]	R.16_1 (10MHz, 4CCE, full, QPSK 1/3) (2x4 Low) EVA70	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-1 Test 1)	222 222	400 000	224 000	401 000
8.10.2.1.3, 8.10.2.2.3: Test 1	[ ]	R.17_1 (5MHz, 2CCE, full, QPSK 1/3) (4x4 Medium A Xpol) EPA5	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-1 Test 1)	222 222	400 000	224 000	401 000

Table G.4.6-4.0: Minimum Test time for Demodulation of LAA PCFICH/PDCCH

Test No	Demodulation scenario (info only)	MNAS (Note 1)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
8.4.3.1.1 test 1 for PCC	PCC: R.16_1 (10 MHz, 4CCE, full, QPSK 1/3) (2x2 Low) EVA5	200 000	222 222	N/A	224 000	N/A
8.4.3.1.1 test 1-4 for SCC	SCC: R.16_1 (10 MHz, 4CCE, full, QPSK 1/3) (2x2 Low) EVA5	200 000	476190 (Note 2)	N/A	478000	N/A
Note 1: MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-1 Test1.						
Note 2: MNS for SCC is not deterministic due to the statistical burst transmission model in clause B.3.8. The average MNS is presented in this table. This is calculated based on an average burst length of 5.25 ms which in average takes 6.25 ms assuming UE not capable of partial subframes, and a simulated probability of LBT success (p) equal to 0.5 (ratio 6.25/5.25/0.5).						

Table G.4.6-4a: Minimum Test time for Demodulation of PHICH for 4 Rx antenna ports

Test No	Demod. Scenario	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
				FDD	TDD	FDD	TDD
8.10.3.1.1, 8.10.3.2.1: Test 1	[ ]	R.18 (10 MHz, full, QPSK 1/3) (1x4 Low) ETU70	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-2 Test 1)	200 000	500 000	200 000	500 000
8.10.3.1.2, 8.10.3.2.2: Test 1	[ ]	R.19_1 (10MHz, full, 64QAM 3/4) (2x4 Low) EVA70	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-2 Test 1)	200 000	500 000	200 000	500 000
8.10.3.1.3, 8.10.3.2.3: Test 1	[ ]	R.20_1 (5MHz, 1PRB, 16QAM ½) (4x4 Medium correlation A, Cross polarized) EPA5	200 000 (MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-2 Test 1)	200 000	500 000	200 000	500 000

Table G.4.6-5: Minimum Test time for MPDCCH for UE Category M1 for FDD & HD-FDD

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)	MNSF (Min No Sub Frames, mandatory)
			FDD & HD-FDD	FDD & HD-FDD
8.11.2.1.1: Test 1	R.82 FDD (10MHz, 4 PRB, QPSK, 1/2) (2x1 Low) EPA5	46 524 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-1 Test11) with HD-FDD pattern	4 466 304	4 468 000
8.11.2.1.2: Test 1	R.83 FDD (10MHz, 2+4 PRB, QPSK, 1/2) (2x1 Low) ETU1	194 560	TBD	TBD

Table G.4.6-5a: Minimum Test time for MPDCCH for UE Category M1 for TDD

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)	MNSF (Min No Sub Frames, mandatory)
			TDD	TDD
8.11.2.2.1: Test 1	R.82 TDD (10MHz, 4 PRB, QPSK, 1/2) (2x1 Low) EPA5	46 524 (MNAS is not simulated, but estimated based on similar scenarios in Table G.3.5-1 Test11) with HD-FDD pattern	TBD	TBD
8.11.2.2.2: Test 1	R.83 TDD (10MHz, 2+4 PRB, QPSK, 1/2) (2x1 Low) ETU1	97 280	TBD	TBD

Table G.4.6-6: Minimum Test time for Demodulation of LAA PCFICH/PDCCH

Test No	Demodulation scenario (info only)	MNAS (Note 1)	MNS (Calculation)		MNSF (Min No Sub Frames, mandatory)	
			FDD	TDD	FDD	TDD
8.4.3.1.1 test 1 for PCC	PCC: R.16_1 (10 MHz, 4CCE, full, QPSK 1/3) (2x2 Low) EVA5	200 000	222 222	N/A	224 000	N/A
8.4.3.1.1 test 1-4 for SCC	SCC: R.16_1 (10 MHz, 4CCE, full, QPSK 1/3) (2x2 Low) EVA5	200 000	476190 (Note 2)	N/A	478000	N/A
Note 1: MNAS is not simulated, but estimated based on similar scenario in Table G.4.6-1 Test1.						
Note 2: MNS for SCC is not deterministic due to the statistical burst transmission model in clause B.3.8. The average MNS is presented in this table. This is calculated based on an average burst length of 5.25 ms which in average takes 6.25 ms assuming UE not capable of partial subframes, and a simulated probability of LBT success (p) equal to 0.5 (ratio 6.25/5.25/0.5).						

Table G.4.6-7: Minimum Test time for NPDCCH for UE Category NB1

Test No	Demodulation scenario (info only)	MNAS (Simulation)	MNS (Calculation)	MNSF (Min No Sub Frames, mandatory)
			HD-FDD	HD-FDD
8.12.2.1.1: Test 1	R.NB.3 FDD (200kHz, QPSK,1/2) (1x1) EPA5	36166	15430827	15431000
8.12.2.1.1: Test 2	R.NB.3 FDD (200kHz, QPSK,1/2) (1x1) ETU1	36166	55550976	55551000

G.4.7 Test conditions for receiver performance tests

Table G.4.7: Test conditions for receiver performance tests

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test	Over all Pass/Fail condition Restrictions and extensions see Table G.3.6-1
8.4.1.1 FDD PCFICH/PDCCH Single-antenna Port Performance	A misdetection is an independent event	1	NA
8.4.1.2 FDD PCFICH/PDCCH Transmit Diversity Performance	A misdetection is an independent event	2	To pass 8.4.1.2 each component in the test vector must pass
8.4.2.1 TDD PCFICH/PDCCH Single-antenna Port Performance	A misdetection is an independent event	1	NA
8.4.2.2 TDD PCFICH/PDCCH Transmit Diversity Performance	A misdetection is an independent event	2	To pass 8.4.2.2 each component in the test vector must pass
8.5.1.1 FDD PHICH Single-antenna Port Performance	A misdetection is an independent event	2	To pass 8.5.1.1 each component in the test vector must pass
8.5.1.2 FDD PHICH Transmit Diversity Performance	A misdetection is an independent event	2	To pass 8.5.1.2 each component in the test vector must pass
8.5.2.1 TDD PHICH Single-antenna Port Performance	A misdetection is an independent event	2	To pass 8.5.2.1 each component in the test vector must pass
8.5.2.2 TDD PHICH Transmit Diversity Performance	A misdetection is an independent event	2	To pass 8.5.2.2 each component in the test vector must pass

G.5 Measuring throughput ratio

G.5.1 General

Annex G.5 is applicable for clauses 9.3, 9.4, 9.5 and 9.7. Common to those clauses is, that a throughput ratio γ is measured. These clauses are tested exclusively with “slow” multipath fading profiles. Hence the test time is governed by test time due to fading, and number of samples due to statistical significance is not applicable.

The test requirements except for transmission mode 9 with 8 TX and transmission mode 9 with 4TX enhanced codebook in clause 9.4 are a ratio of 2 throughput tests according to $\gamma = \frac{t_{ue}}{t_{rnd}}$. The denominator must be established by an approach, resulting in the denominator throughput t_{rnd} and the reference SNR_{rnd}, the latter is reused to measure the nominator throughput.

The test requirements for transmission mode 9 with 8 TX and transmission mode 9 with 4TX enhanced codebook in clause 9.4 are a ratio of 2 throughput tests according to $\gamma = \frac{t_{ue,\,follow1,\,follow2}}{t_{rnd1,\,rnd2}}$. The nominator must be established by an approach, resulting in the nominator throughput $t_{ue,\,follow1,\,follow2}$ and the reference $SNR_{follow1,\,follow2}$, the latter is reused to measure the denominator throughput.

The test requirements in clauses 9.3 and 9.5 are a ratio of 2 throughput tests according to $\gamma = \frac{t_{subband}}{t_{median}}$, $\gamma = \frac{t_{reported}}{t_{fix}}$ etc.

Nominator and denominator are ordinary throughput tests

t_{ue}, t_{rnd}, $t_{ue,follow1,follow2}$, $t_{rnd1,rnd2}$, $t_{reported}$, t_{fix} , $t_{subband}$, t_{median}, $t_{wideband}$ are throughputs, derived under different conditions and are defined in clause s 9.3, 9.4 and 9.5.

SNR_{rnd} and $SNR_{follow1,follow2}$ are the signal noise ratio, derived together with t_{rnd} and $t_{ue,follow1,follow2}$, and are defined in clause 9.4.

G.5.2 Establishing t_{rnd}

Adjust SNR such that the measured throughput is $58\% \leq t_{rnd} \leq 62\%$ using random precoding.

The resulting SNR is declared SNR_{rnd}

To achieve statistical significance the final throughput measurement must be done with MNS samples, given table G.5.4-1

The approach, leading to t_{rnd} and SNR_{rnd} is not specified.

G.5.2a Establishing $t_{ue,\,follow1,\,follow2}$

Adjust SNR such that the measured throughput is $68\% \leq t_{ue,\,follow1,\,follow2} \leq 72\%$ using the precoders configured according to the UE reports.

The resulting SNR is declared $SNR_{follow1,\,follow2}$.

To achieve statistical significance the final throughput measurement must be done with MNS samples, given table G.5.4-1

The approach, leading to $t_{ue,\,follow1,\,follow2}$ and $SNR_{follow1,\,follow2}$ is not specified.

G.5.3 Measuring T-put

To achieve statistical significance the final throughput measurement must be done with MNS samples, given in table.G.5.4 -1. Number of samples due to statistical significance is not applicable.

For measuring $t_{subband}$, $t_{wideband}$, $t_{reported}$ and t_{fix}, the SS collects ACK, NACK and statDTX from the UE and records the time, elapsed from the beginning of the test. The payload size, received by the UE and acknowledged towards the SS, may vary within a test versus time (e.g. due to subband changes upon a UE report) Throughput is calculated in the SS by summing up the payload, associated to each ACK, from the start of the test and dividing the accumulated payload in kilobits by the time in seconds, elapsed from the beginning of the test. This is similar but not same as in G.2.2. (Main difference in bullet d, where the payload size is constant).

For measuring t_{median}, t_{ue}, t_{rnd}, $t_{ue,follow1,follow2}$ and $t_{ue,rnd1,rnd2}$, the SS collects ACK, NACK and statDTX from the UE and records the time, elapsed from the beginning of the test. The payload size, received by the UE and acknowledged towards the SS, is constant. Throughput can be calculated in the SS by multiplying the payload size with the number of ACKs and dividing the accumulated payload in kilobits by the time in seconds, elapsed from the beginning of the test, being associated to the following ratio: ACK/ (ACK+NACK + DTX).

G.5.4 Number of samples for throughput ratios

TT for γ and MNS are based on theoretical estimations.

Table G.5.4-1: Test time for testing throughput ratios

Test	Demodulation scenario: RMC (Bandwidth, allocated RBs, modulation, coding) [Antenna configuration, correlation] Propagation condition, Doppler	Γ	Minimum Number of Subframes (MNS) (MNS = active and inactive Subframes, more details in Annex G.3.5 and table G.3.5-1)		Γ including TT	BLER
			FDD	TDD		
9.3.1.1.1 9.3.1.1.2	(10 MHz, 6, variable modulation and coding) [1x2, full] Special propagation according to clause B.2.4, 5Hz	1.1	100000 For denominator- and nominator-measurement each	170000 For denominator- and nominator-measurement each	γ =1.09	BLER=0.05, no TT No of samples: subset of ACKs and NACKs in the MNS for throughput.
9.3.1.2.1_D	(10 MHz, 6, variable modulation and coding) [2x2, full] Special propagation according to clause B.2.4, 5Hz	1.1	100000 For denominator- and nominator-measurement each	NA	γ =1.09	BLER=0.05, no TT No of samples: subset of ACKs and NACKs in the MNS for throughput.
9.3.1.2.2_D	(10 MHz, 6, variable modulation and coding) [2x2, full] Special propagation according to clause B.2.4, 5Hz	1.1	NA	170000 For denominator- and nominator-measurement each	γ =1.09	BLER=0.05, no TT No of samples: subset of ACKs and NACKs in the MNS for throughput.
9.3.1.3.1_E	(10 MHz, 6, variable modulation and coding) [1x2, full] Special propagation according to clause B.2.4, 5Hz	1.1	200000 For denominator- and nominator-measurement each	NA	γ =1.09	BLER=0.01, no TT No of samples: subset of ACKs and NACKs in the MNS for throughput.
9.3.1.3.2_E	(10 MHz, 6, variable modulation and coding) [1x2, full] Special propagation according to clause B.2.4, 5Hz	1.1	NA	680000 For denominator- and nominator-measurement each	γ =1.09	BLER=0.01, no TT No of samples: subset of ACKs and NACKs in the MNS for throughput.
9.3.2.1.1	(10 MHz or	1.05	100000	170000	γ =1.04	BLER=0.02, no TT

9.3.2.1.2	5MHz according to test, full, variable modulation and coding) [1x2, high] EPA5		For denominator- and nominator-measurement each	For denominator- and nominator-measurement each		No of samples for FDD: subset of ACKs and NACKs in the MNS for throughput. No of samples for TDD: subset of *filtered* ACKs and NACKs in the MNS for throughput.
9.3.2.1.1_1 9.3.2.1.2_1	(10 MHz or 5MHz according to test, partial, variable modulation and coding) [1x2, high] EPA5	1.05	100000 For denominator- and nominator-measurement each	170000 For denominator- and nominator-measurement each	γ =1.04	BLER=0.02, no TT No of samples for FDD: subset of ACKs and NACKs in the MNS for throughput. No of samples for TDD: subset of *filtered* ACKs and NACKs in the MNS for throughput.
9.3.2.2.1_D	(10 MHz, full, variable modulation and coding) [4x2, high] EPA5	1.05	100000 For denominator- and nominator-measurement each	NA	γ =1.04	BLER=0.02, no TT No of samples for FDD: subset of ACKs and NACKs in the MNS for throughput.
9.3.2.2.2_D	(10 MHz, full, variable modulation and coding) [8x2, high] EPA5	1.05	NA	170000 For denominator- and nominator-measurement each	γ =1.04	BLER=0.02, no TT No of samples for TDD: subset of *filtered* ACKs and NACKs in the MNS for throughput.
9.3.3.1.1 9.3.3.1.2	10 MHz, full(however unequal SNR), variable modulation and coding) [1x2, full] Special: propagation according to clause B.2.4, 5Hz	1.6	100000 For denominator- and nominator-measurement each	170000 For denominator- and nominator-measurement each	1.50	
9.3.4.1.1 9.3.4.1.2	Same as 9.3.3	1.2	100000	170000	1.19	
9.3.4.2.1 9.3.4.2.2	Same as 9.3.3	1.15	100000	170000	1.14	
9.3.5.1.1 9.3.5.1.2	variable modulation and coding, 1x2 Low, EPA5	1.8	100000	170000	1.79	
9.3.5.2.1 9.3.5.2.2	variable modulation and coding, 2x2 Low, EPA5	1.8	100000	170000	1.79	
9.3.7.1 9.3.7.2	Test1: (10 MHz, full, variable modulation and coding) [4x2, low]EVA5 Test2: (10 MHz, full, variable	Test 1: α: 1.05 Test 2: β: 1.15	100000	170000	Test1: α: 1.04 Test2: β: 1.14	

	modulation and coding) [4x2, High XP] EVA5					
9.3.8.1.1 9.3.8.1.2	variable modulation and coding, 2x2 Low, EPA5	0.925	100000	170000	0.915	
9.3.8.2.1 9.3.8.2.2	variable modulation and coding, 2x2 Low, EPA5	0.925	100000	170000	0.915	
9.3.8.3.1 9.3.8.3.2	variable modulation and coding, 2x2 Low, EPA5	0.925	100000	170000	0.915	
9.4.1.1.1 9.4.1.1.2	R.10 (10 MHz, full, QPSK, 1/3) [2x2, Low] EVA5	1.1	100000	170000	γ =1.09	
9.4.1.2.1 9.4.1.2.2	R.14-1 (10 MHz, partial, 16QAM,1/2) [4x2, Low] EVA5	1.2	100000	170000	1.19	
9.4.2.1.1 9.4.2.1.2	R.30 (20 MHz, full, 16QAM, 1/2) [2x2, Low] EPA5	1.2	100000	170000	γ =1.19	
9.4.2.1.1 _1 9.4.2.1.2 _1	R.11-3 or R.11 (10 MHz, partial or full, 16QAM, 1/2) [2x2, Low] EPA5	1.2	100000	170000	γ =1.19	
9.4.2.2.1	R.14-2 FDD (10MHz, 3, 16 QAM, ½) [4x2, low] EVA5	1.2	100000	NA	1.19	
9.4.2.2.2	R.14-2 TDD (10MHz, 3, 16QAM, ½) [4x2, low] EVA5	1.15	NA	170000	1.14	
9.4.1.3.1 _D	R.44 (10 MHz, partial, QPSK, 1/3) [4x2, Low] EPA5	1.2	100000	NA	γ =1.19	
9.4.1.3.2 _D	R.45-1 or R.45 (10 MHz, partial or full, 16QAM, 1/2) [8x2, High] EVA5	3	NA	170000	γ =2.99	
9.4.1.4.1 9.4.1.4.2	R.60 (10MHz, full, QPSK, 1/2) [4x2, High XP]	1.8	100000	170000	γ =1.79	

	EVA5					
9.4.2.3.1_D	R.45-1 or R.45 (10 MHz, partial or full, 16QAM, 1/2) [4x2, Low] EVA5	1.3	100000	NA	γ =1.29	
9.4.2.3.2_D	R.45-1 or R.45 (10 MHz, partial or full, 16QAM, 1/2) [8x2, High] EVA5	3.5	NA	170000	γ =3.49	
9.4.2.3.3	R.45-1 or R.45 (10 MHz, partial or full, 16QAM, 1/2) [4x2, High XP] EVA5	1.2	100000	NA	γ =1. 19	
9.4.2.3.4	R.61-1 or R.61(10MHz, full, 16QAM, 1/2) [4x2, High XP] EVA5	1.2	NA	170000	γ =1. 19	
9.5.1.1 9.5.1.2	(10MHz, full, variable modulation and coding) [2x2, low or high according to test] EPA5	Test 2 γ_1=1.05 Test 1 γ_2=1 Test 3 γ_2=1.1	100000	170000	Test2 γ_1= 1.04 Test1 γ_2= 0.99 Test3 γ_2= 1.09	
9.5.1.1_1 9.5.1.2_1	(10MHz, full, variable modulation and coding) [2x2, low or high according to test] EPA5	Test 2 γ_1=1.05 Test 1 γ_2=1 Test 3: γ_1=0.90 γ_2=1.10	100000	170000	Test2 γ_1= 1.04 Test1 γ_2= 0.99 Test3: γ_1=0.89 γ_2=1.09	
9.5.1.1_2 9.5.1.2_2	(10MHz, full, variable modulation and coding) [2x2, low or high according to test] EPA5	Test 2 γ_1=1.05 Test 1 γ_2=1 Test 3: γ_1=0.90	100000	170000	Test2 γ_1= 1.04 Test1 γ_2= 0.99 Test3: γ_1=0.89	
9.5.2.1_D 9.5.2.2_D	(10MHz, full, variable modulation and coding) [2x2, low or high according to test] EPA5	Test 2 γ_1=1.05 Test 3 γ_1=0.9 Test 1 γ_2=1.00	100000	170000	Test2 γ_1= 1.04 Test3 γ_1= 0.89 Test1 γ_2= 0.99	
9.5.3.1_	(10MHz, full,	Test	800000	680000	Test1 γ_1=	

C.1 9.5.3.2_ C.1	variable modulation and coding) [2x2, low according to test] EPA5	1γ_1=0.9 Test 2γ_1=1.05			0.89 Test2γ_1= 1.04	
9.5.4.1_ E 9.5.4.2_ E	(10MHz, full, variable modulation and coding) [2x2, low or high according to test] EPA5	Test 2γ_1=1.05 Test 3γ_1=0.9 Test 1γ_2=1.00	800000	680000	Test2γ_1= 1.04 Test3γ_1= 0.89 Test1γ_2= 0.99	
9.5.5.1_ F.2 9.5.5.2_ F.2	(10MHz, full, variable modulation and coding) [2x2, low or high according to test] EPA5	Test 2γ_1=1.00	100000	170000	Test2γ_1= 0.99	
9.7.2.1 9.7.2.2	(10 MHz, 6, variable modulation and coding) [1x1, full] Special propagation according to clause B.2.4, 5Hz	1.1	100000	170000	γ =1.09	
9.8.2.1	(10 MHz, 6, variable modulation and coding) [1x1, full] Special propagation according to clause B.2.4, 1Hz	1.30	800000	NA	1.29	
9.9.2.1.1 9.9.2.1.2	variable modulation and coding, 1x4 Low, EPA5	1.8	100000	170000	1.79	
9.9.2.2.1 9.9.2.2.2	variable modulation and coding, 2x4 Low, EPA5	1.8	100000	170000	1.79	
9.9.3.1.1	R.45-2 (10 MHz, full, 64QAM) [8x4, High] EVA5	2.5	NA	170000	γ =2.49	
9.9.4.1.1 9.9.4.1.2	(10MHz, full, variable modulation and coding) [2x4, low or high for test 1, 2 and 3; 4x4, low for test 4	Test 1γ_2=1 Test 2γ_1=1.05 Test 3γ_1=0.9	100000	170000	Test1γ_2= 0.99 Test2γ_1= 1.04 Test3γ_1= 0.89 Test4γ_2= 1.09	

	according to test] EPA5	Test 4 γ_2=1.1				
9.9.4.2.1 9.9.4.2.2	(10MHz, full, variable modulation and coding) [2x4, low or high for test 1, 2 and 3; 4x4, low for test 4 according to test] EPA5	Test 1 γ_2=1 Test 2 γ_1=1.05 Test 3 γ_1=0.9 Test 4 γ_2=1.1	100000	170000	Test1 γ_2= 0.99 Test2 γ_1= 1.04 Test3 γ_1= 0.89 Test4 γ_2= 1.09	

G.6 Statistical testing of MBMS Performance

G.6.1 General

The system simulator sends MBMS packets to the UE under test. The number of packets, the SS sends, is predefined by the test time in G.6.4. The UE under tests demodulates the MBMS packets and counts the successfully received number of MBMS packets into the UE internal MBMS packet counter. The SS reads out the counter and issues a pass fail decision.

G.6.2 Mapping of MBMS Packet ratio to BLER

The minimum requirements are designed in terms of BLER = 1%. 10 MBMS packets are included in one Transport block, constant throughout the test. The ratio of correct received MBMS packets (M_{ok}) to transmitted packets (M_{tot}) is assumed to be equal to the ratio of correct received transport blocks to transmitted transport blocks. This assumption ignores the unlikely case that payload and CRC for a transport block are consistent but wrong.

G.6.3 Design of the test

The minimum requirement for all MBMS tests is BLER = 1%. All MBMS tests are performed under a fading scenario: MBSFN channel model (Table B.2.6-1). It is obvious, that this fading scenario requires a minimum test time, greater than the time, required for statistical significance. In addition the test design with the MBMS packet counter in the UE suggest a fixed test time. Without simulation the test time is set to 200 000 active subframes (Transport blocks), leading to 333 333 subframes (333sec) for FDD and 400 000 subframes (400sec) for TDD. In order to avoid the fail of a good DUT due to statistical uncertainty the minimum requirement of BLER = 1% leads to a

Test limit = 1.2352 %. (refer Table G.4.4-1)

This means a DUT actually on the limit (1%) is measured and passed with a confidence level of greater than 95%.

G.6.4 Test time for MBMS performance tests

Table G.6.4-1: Minimum Test time for MBMS

Test No	Demodulation scenario (info only)	Min No of Sub Frames	
		FDD (6 of 10 subframes are active)	TDD (5 of 10 subframes are active)
1	R.37 (10 MHz, full, QPSK 1/3) (1x2 Low) MBSFN channel model	333 333	400 000
2	R.38 (10MHz, full, 16QAM 1/2) (1x2 Low) MBSFN channel model	333 333	400 000
3	R.39 (10 MHz, full, 64QAM 2/3) (1x2 Low) MBSFN channel model	333 333	400 000
3	R.39-1 (5 MHz, full, 64QAM 2/3) (1x2 Low) MBSFN channel model	333 333	400 000
4	R.40 (1.4 MHz, full, QPSK 1/3) (1x2 Low) MBSFN channel model	333 333	400 000

G.7 Theory to derive the numbers in Table G.2.4-1 (Informative)

Editor's note: This clause of the Annex G is for information only and it described the background theory and information to derive the entries in the table G.2.4-1.

G.7.1 Error Ratio (ER)

The Error Ratio (ER) is defined as the ratio of number of errors (ne) to all results, number of samples (ns).

(1-ER is the success ratio).

G.7.2 Test Design

A statistical test is characterised by:

Test-time, Selectivity and Confidence level.

G.7.3 Confidence level

The outcome of a statistical test is a decision. This decision may be correct or in-correct. The Confidence Level CL describes the probability that the decision is a correct one. The complement is the wrong decision probability (risk) D = 1-CL

G.7.4 Introduction: Supplier Risk versus Customer Risk

There are two targets of decision:

(a) A measurement on the pass-limit shows, that the DUT has the specified quality or is better with probability CL (CL e.g.95%) This shall lead to a "pass decision"

The pass-limit is on the good side of the specified DUT-quality. A more stringent CL (CL e.g.99%) shifts the pass-limit farer into the good direction. Given the quality of the DUTs is distributed, a greater CL passes less and better DUTs.

A measurement on the bad side of the pass-limit is simply “not pass” (undecided or artificial fail).

(aa) Complementary:

A measurement on the fail-limit shows, that the DUT is worse than the specified quality with probability CL.

The fail-limit is on the bad side of the specified DUT-quality. A more stringent CL shifts the fail-limit farer into the bad direction. Given the quality of the DUTs is distributed, a greater CL fails less and worse DUTs.

A measurement on the good side of the fail-limit is simply “not fail”.

(b) A DUT, known to have the specified quality, shall be measured and decided pass with probability CL. This leads to the test limit.

For CL e.g. 95%, the test limit is on the bad side of the specified DUT-quality. CL e.g.99% shifts the pass-limit farer into the bad direction. Given the DUT-quality is distributed, a greater CL passes more and worse DUTs.

(bb) A DUT, known to be an ($\varepsilon \rightarrow 0$) beyond the specified quality, shall be measured and decided fail with probability CL.

For CL e.g.95%, the test limit is on the good side of the specified DUT-quality.

NOTE 1: The different sense for CL in (a), (aa) versus (b), (bb).

NOTE 2: For constant CL in all 4 bullets (a) is equivalent to (bb) and (aa) is equivalent to (b).

G.7.5 Supplier Risk versus Customer Risk

The table below summarizes the different targets of decision.

Table G.X.5-1: Equivalent statements

	Equivalent statements, using different cause-to-effect-directions, and assuming CL = constant >1/2	
cause-to-effect-directions	Known measurement result → estimation of the DUT’s quality	Known DUT’s quality → estimation of the measurement’s outcome
Supplier Risk	A measurement on the pass-limit shows, that the DUT has the specified quality or is better (a)	A DUT, known to have an ($\varepsilon \rightarrow 0$) beyond the specified DUT-quality, shall be measured and decided fail (bb)
Customer Risk	A measurement on the fail-limit shall shows, that the DUT is worse than the specified quality (aa)	A DUT, known to have the specified quality, shall be measured and decided pass (b)

The shaded area shown the direct interpretation of Supplier Risk and Customer Risk.

The same statements can be based on other DUT-quality-definitions.

G.7.6 Introduction: Standard test versus early decision concept

In standard statistical tests, a certain number of results (ns) is predefined in advance to the test. After ns results the number of bad results (ne) is counted and the error ratio (ER) is calculated by ne/ns.

Applying statistical theory, a decision limit can be designed, against which the calculated ER is compared to derive the decision. Such a limit is one decision point and is characterised by:

- D: the wrong decision probability (a predefined parameter)
- ns: the number of results (a fixed predefined parameter)
- ne: the number of bad results (the limit based on just ns)

In the formula for the limit, D and ns can be understood as variable parameter and variable. However the standard test execution requires fixed ns and D. The property of such a test is: It discriminate between two states only, depending on the test design:

- pass (with CL) / undecided (undecided in the sense: finally undecided)
- fail (with CL) / undecided (undecided in the sense: finally undecided)
- pass(with CL) / fail (with CL) (however against two limits).

In contrast to the standard statistical tests, the early decision concept predefines a set of (ne,ns) co-ordinates, representing the limit-curve for decision. After each result a preliminary ER is calculated and compared against the limit-curve. After each result one may make the decision or not (undecided for later decision). The parameters and variables in the limit-curve for the early decision concept have a similar but not equal meaning:

- D: the wrong decision probability (a predefined parameter)
- ns: the number of results (a variable parameter)
- ne: the number of bad results (the limit. It varies together with ns)

To avoid a “final undecided” in the standard test, a second limit must be introduced and the single decision co-ordinate (ne,ns) needs a high ne, leading to a fixed (high) test time. In the early decision concept, having the same selectivity and the same confidence level an “undecided” need not to be avoided, as it can be decided later. A perfect DUT will hit the decision coordinate (ne,ns) with ne=0. This test time is short.

G.7.7 Standard test versus early decision concept

For Supplier Risk:

The wrong decision probability D in the standard test is the probability, to decide a DUT in-correct in the single decision point. In the early decision concept there is a probability of in-correct decisions d at each point of the limit-curve. The sum of all those wrong decision probabilities accumulate to D. Hence $d<D$

For Customer Risk:

The correct decision probability CL in the standard test is the probability, to decide a DUT correct in the single decision point. In the early decision concept there is a probability of correct decisions cl at each point of the limit-curve. The sum of all those correct decision probabilities accumulate to CL. Hence $cl<CL$ or $d>D$

G.7.8 Selectivity

There is no statistical test which can discriminate between a limit DUT and a DUT which is an ($\varepsilon \rightarrow 0$) apart from the limit in finite time and high confidence level CL. Either the test discriminates against one limit with the results pass

(with CL)/undecided or fail (with CL)/undecided, or the test ends in a result pass (with CL)/fail (with CL) but this requires a second limit.

For CL>1/2, a (measurement-result = specified-DUT-quality), generates undecided in test “supplier risk against pass limit” (a, from above) and also in the test “customer risk against the fail limit “ (aa)

For CL>1/2, a DUT, known to be on the limit, will be decided pass for the test “customer risk against pass limit” (b) and also “supplier risk against fail limit” (bb).

This overlap or undecided area is not a fault or a contradiction, however it can be avoided by introducing a Bad or a Good DUT quality according to:

- Bad DUT quality: specified DUT-quality * M (M>1)
- Good DUT quality: specified DUT-quality * m (m<1)

Using e.g. M>1 and CL=95% the test for different DUT qualities yield different pass probabilities:

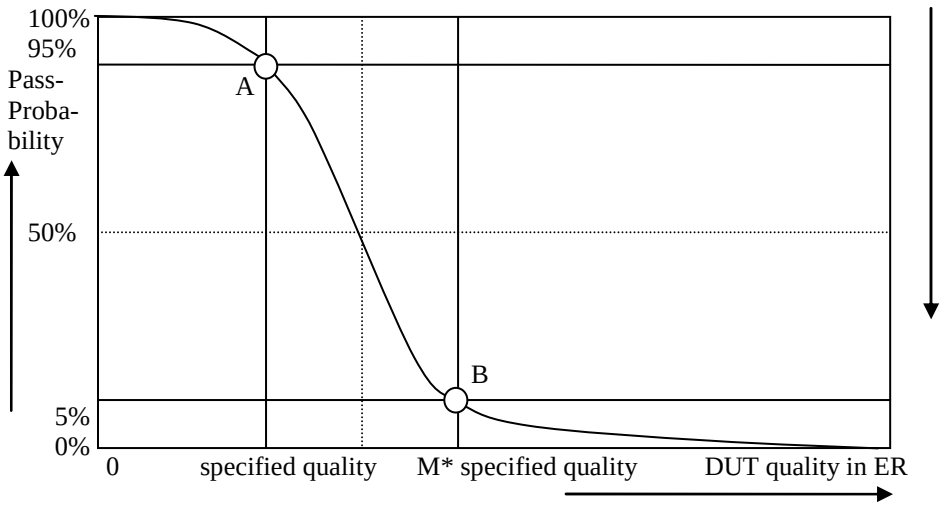


Figure G.X.8-1: Pass probability versus DUT quality

G.7.9 Design of the test

The receiver characteristic test are defined by the following design principles:

1. The early decision concept is applied.
2. A second limit is introduced: Bad DUT factor M>1
3. To decide the test pass:

   Supplier risk is applied based on the Bad DUT quality

   To decide the test fail

   Customer Risk is applied based on the specified DUT quality

The receiver characteristic test are defined by the following parameters:

1. Limit ER = 0.05
2. Bad DUT factor M=1.5 (selectivity)

3. Confidence level CL = 95% (for specified DUT and Bad DUT-quality)

This has the following consequences:

1. A measurement on the fail limit is connected with 2 equivalent statements:

A measurement on the fail-limit shows, that the DUT is worse than the specified DUT-quality	A DUT, known have the specified quality, shall be measured and decided pass

2. A measurement on the pass limit is connected with the complementary statements:

A measurement on the pass limit shows, that the DUT is better than the Bad DUT-quality.	A DUT, known to have the Bad DUT quality, shall be measured and decided fail

   The left column is used to decide the measurement.

   The right column is used to verify the design of the test by simulation.

   The simulation is based on the two fulcrums A and B only in Figure G.x.8-1

3. Test time

   The minimum and maximum test time is fixed.

   The average test time is a function of the DUT's quality.

   The individual test time is not predictable.

4. The number of decision co-ordinates (ne,ns) in the early decision concept is responsible for the selectivity of the test and the maximum test time. Having fixed the number of decision co-ordinates there is still freedom to select the individual decision co-ordinates in many combinations, all leading to the same confidence level.

G.7.10 Simulation to derive the pass fail limits in Table G.2.4-1

There is freedom to design the decision co-ordinates (ne,ns).

The binomial distribution and its inverse is used to design the pass and fail limits. Note that this method is not unique and that other methods exist.

$$fail(ne, d_f) := \frac{ne}{(ne + qnbinom(d_f, ne, ER))}$$

$$pass(ne, cl_p, M) := \frac{ne}{(ne + qnbinom(cl_p, ne, ER \cdot M))}$$

Where

- fail(..) is the error ratio for the fail limit
- pass(..) is the error ratio for the pass limit
- ER is the specified error ratio 0.05
- ne is the number of bad results. This is the variable in both equations
- M is the Bad DUT factor M=1.5
- d_f is the wrong decision probability of a single (ne,ns) co-ordinate for the fail limit.
  It is found by simulation to be $d_f = 0.004$

- cl_p is the confidence level of a single (ne,ns) co-ordinate for the pass limit.
  It is found by simulation to be $cl_p = 0.9975$

- qnbinom(..): The inverse cumulative function of the negative binomial distribution

The simulation works as follows:

- A large population of limit DUTs with true ER = 0.05 is decided against the pass and fail limits.

- cl_p and d_f are tuned such that CL (95%) of the population passes and D (5%) of the population fails.

- A population of Bad DUTs with true ER = M*0.05 is decided against the same pass and fail limits.

- cl_p and d_f are tuned such that CL (95%) of the population fails and D (5%) of the population passes.

- This procedure and the relationship to the measurement is justified in clause G.x.9. The number of DUTs decrease during the simulation, as the decided DUTs leave the population. That number decreases with an approximately exponential characteristics. After 169 bad results all DUTs of the population are decided.

NOTE: The exponential decrease of the population is an optimal design goal for the decision co-ordinates (ne,ns), which can be achieved with other formulas or methods as well.

Annex H (normative): Uplink Physical Channels

H.0 Uplink Signal Levels

Uplink signal power is a UE figure, which is configured by the Test System by means of:

RRC messages (IE-s), such as:

- UplinkPowerControlCommon (-v1020, SCell-r10),
- UplinkPowerControlDedicated (-v1020, SCell-r10),
- Other IE-s affecting directly or indirectly the uplink power,

and L1/2 Power control commands (TPC).

The uplink power settings are specified in the test case.

Otherwise, the uplink power settings result from the default RRC messages described in 3GPP TS 36.508 [7], and appropriate TPC-s, which are sent to the UE to transmit with an UL power level necessary for maintaining the call during the test.

H.0.1 Uplink Signal Levels for NB1

Uplink signal power is a UE figure, which is configured by the Test System by means of:

RRC messages (IE-s), such as:

- NPUSCH-ConfigCommon-NB
- NPUSCH-ConfigDedicated-NB
- UplinkPowerControl-NB
- Other IE-s affecting directly or indirectly the uplink power,

The uplink power settings are specified in the test case.

Otherwise, the uplink power settings result from the default RRC messages described in 3GPP TS 36.508 [7], which are sent to the UE to transmit with an UL power level necessary for maintaining the call during the test.

H.1 General

This annex specifies the uplink physical channels that are needed for setting a connection and channels that are needed during a connection. Table H.1-1 describes the mapping of uplink physical channels and signals to physical resources for FDD. Table H.1-2 describes the mapping of uplink physical channels and signals to physical resources for TDD.

Table H.1-1: Mapping of uplink physical channels and signals to physical resources for FDD

Physical channel	Time Domain Location	Frequency Domain Location	Note
PRACH	Allowed for the parameter *prach-Configuration Index* provided by higher layers	Allowed for the parameter *prach-FrequencyOffset* provided by higher layers	Mapping rule is specified in TS 36.211 [8] Section 5.7.1
DMRS	For PUCCH: Symbols 2 to 4 of each slot (PUCCH format: 1, 1a, 1b) Symbol 1 and 5 of each slot (PUCCH format: 2, 2a, 2b) For PUSCH: Symbol 3 of each slot	Uplink system bandwidth dependent.	Mapping rule of DMRS for PUCCH is specified in TS 36.211 [8] 5.5.2.2.2 Mapping rule of DMRS for PUSCH is specified in TS 36.211 [8] 5.5.2.1.2
PUCCH	Slot 0 and 1 of each subframe	Each 12 subcarriers of both ends of the bandwidth	Mapping rule is specified in TS 36.211 [8] Section 5.4.3
PUSCH	All remaining SC-FDMA symbols of each subframe not allocated to DMRS	RBs allocated according to Reference Measurement channel in Annex A.2	Mapping rule is specified in TS 36.211 [8] Section 5.4.2
SRS	Allowed for the cell-specific parameter *srs-BandwidthConfig* and the UE-specific parameter *srs-Bandwidth* provided by higher layers	Allowed for the cell-specific parameter *srsMaxUpPt* and the UE-specific parameter *transmissionComb* or *transmissionComb-ap* provided by higher layers	Mapping rule is specified in TS 36.211 [8] Section 5.5.3.2

Table H.1-2: Mapping of uplink physical channels and signals to physical resources for TDD

Physical channel	Time Domain Location	Frequency Domain Location	Note
PRACH	Allowed for the parameters $(t_{RA}^0, t_{RA}^1, t_{RA}^2)$ in *prach-Configuration Index* provided by higher layers	For format 0-3, the frequency location allowed is by *prach-FrequencyOffset* and (f_{RA}) in *prach-Configuration Index* provided by higher layers. Preamble format 4 is mapped only on UpPTS, where the frequency location allowed is only by (f_{RA}) in *prach-Configuration Index* provided by higher layers.	Mapping rule is specified in TS 36.211 [8] Section 5.7.1
DMRS	For PUCCH: Symbols 2 to 4 of each slot (PUCCH format: 1, 1a, 1b) Symbol 1 and 5 of each slot (PUCCH format: 2, 2a, 2b) For PUSCH: Symbol 3 of each slot	Uplink system bandwidth dependent.	Mapping rule of DMRS for PUCCH is specified in TS 36.211 [8] 5.5.2.2.2 Mapping rule of DMRS for PUSCH is specified in TS 36.211 [8] 5.5.2.1.2
PUCCH	Slot 0 and 1 of each subframe	Each 12 subcarriers of both ends of the bandwidth	Mapping rule is specified in TS 36.211 [8] Section 5.4.3
PUSCH	All remaining SC-FDMA symbols of each subframe not allocated to DMRS	RBs allocated according to Reference Measurement channel in Annex A.2	Mapping rule is specified in TS 36.211 [8] Section 5.4.2
SRS	Allowed for the cell-specific parameter *srs-BandwidthConfig* and the UE-specific parameter *srs-Bandwidth* provided by higher layers	Allowed for the cell-specific parameter *srsMaxUpPt* and the UE-specific parameter *transmissionComb* or *transmissionComb-ap* provided by higher layers	Mapping rule is specified in TS 36.211 [8] Section 5.5.3.2

NOTE: PUSCH, PUCCH, DMRS are not present in UpPTS for TDD.

H.1.1 General for NB1

This annex specifies the uplink physical channels that are needed for setting a connection and channels that are needed during a connection. Table H.1.1-1 describes the mapping of uplink physical channels and signals to physical resources for NB1 UE.

Table H.1.1-1: Mapping of uplink physical channels and signals to physical resources for NB1

Physical channel	Time Domain Location	Frequency Domain Location	Note
NPRACH	Allowed for the parameter n*prach-Configuration Index* provided by higher layers	Allowed for the parameter *nprach-SubcarrierOffset* provided by higher layers	Mapping rule is specified in TS 36.211 [8] Section 10.1.6
NPUSCH	All the SC-FDMA symbols of each subframe.	RUs allocated according to Reference Measurement channel in Annex A.2	Mapping rule is specified in TS 36.211 [8] Section 10.1.3

H.2 Set-up

Table H.2-1 describes the uplink physical channels that are required for connection set up.

Table H.2-1: Uplink Physical Channels required for connection set-up

Physical Channel
PRACH
DMRS
PUCCH
PUSCH

H.2.1 Set-up for NB1

Table H.2.1-1 describes the uplink physical channels that are required for connection set up.

Table H.2.1-1: Uplink Physical Channels required for connection set-up

Physical Channel
NPRACH
NPUSCH

H.3 Connection

The following clauses describes the uplink physical channels that are transmitted during a connection i.e., when measurements are done.

H.3.0 Measurement of Transmitter Characteristics

As specified in the test case. Otherwise:

- PUSCH + DMRS for PUSCH (and DMRS) measurements.
- PUCCH + DMRS for PUCCH (and DMRS) measurements.
- PRACH for PRACH measurements.

SRS for SRS measurements.

H.3.1 Measurement of Receiver Characteristics

As specified in the test case. Otherwise:

- PUSCH + DMRS for measurements with uplink interference configured.
- PUCCH + DMRS for measurements without uplink interference configured.

H.3.2 Measurement of Performance Requirements

As specified in the test case. Otherwise:

- PUCCH + DMRS for measurements without CSI feedback, or with CSI feedback in PUCCH mode.
- PUSCH + DMRS for measurements with CSI feedback in PUSCH mode.

H.4 Connection for NB1

The following clauses describes the uplink physical channels that are transmitted during a connection i.e., when measurements are done.

H.4.0 Measurement of Transmitter Characteristics

As specified in the test case. Otherwise:

- NPUSCH for measurements.
- NPRACH for PRACH measurements.

H.4.1 Measurement of Receiver Characteristics

As specified in the test case. Otherwise:

- NPUSCH (format 2) for measurements.

H.4.2 Measurement of Performance Requirements

As specified in the test case. Otherwise:

- NPUSCH (format 2) for measurements.

Annex I (informative): Handling requirements and tests for different releases and UE capabilities

This annex gives guidance on how minimum requirements in different releases of 3GPP TS 36.101 [2] and different UE capabilities are handled in the specification 3GPP TS 36.521-1.

I.1 General Considerations

Conformance tests in TS 36.521-1 are derived and specified by RAN WG5 based on minimum requirements in TS 36.101 [2] defined by RAN WG4. The actual practice of RAN WG5 is to specify conformance tests only in a single release of TS 36.521-1, capturing requirements defined by RAN WG4 in all releases of TS 36.101 [2].

1) In general the structure of TS 36.521-1 follows the structure of TS 36.101 [2].

2) In general for minimum requirements specified in a single clause in TS 36.101 [2], a corresponding conformance test is specified in a single clause in TS 36.521-1.

3) Exceptions to rule 2) occur in the following cases:

   a) Coverage of minimum requirements is too wide, in term of different test environments required for verifying all of them.

   b) Coverage of minimum requirements is too wide, in term of different features which need to be tested for verifying all of them.

   c) Coverage of minimum requirements is too wide, in term of different UE capabilities required for verifying all of them.

A set of conformance tests is generated in TS 36.521-1 based on the same clause with minimum requirements in TS 36.101 [2]. This "test group" consists in several "individual tests".

4) Exceptions to rule 2) occur also in the case when minimum requirements (including test conditions, test points etc.) are not the same in different releases of TS 36.101 [2]. More in details the differences may consist in:

   a) Different requirement values / test conditions for the same test points.

   b) Exclusion / Replacement / Addition of test points without introduction of new features

   c) Addition of test points introducing new features.

A set of conformance tests is generated in TS 36.521-1 based on the same clause with minimum requirements in TS 36.101 [2]. This set consists in one "original test" and one or several "additional tests".

5) The clause-number and the title of the "test group" / "original test" is derived based on the number and title of the corresponding minimum requirements in TS 36.101 [2], while the clause-numbers and titles of the "individual tests" / "additional tests" are derived based on those of the "test group" / "original test". In any case it should be avoided to have in TS 36.521-1 specification tests with the same title, even though they have different clause-numbers.

6) In case of high similarity between "individual tests", or between "additional tests" and "original test", in order to reduce the standardization and maintenance work the content of clauses for "individual tests" / "additional tests" may be reduced to a minimum by referencing to the analogue clauses of other "individual tests" / the "original test" and specifying the exceptions (requirement-tables, test parameter tables etc). This method should be applied very carefully considering differences in core functionalities of different E-UTRAN releases.

Details how to apply the above principles to concrete scenarios are defined in Annex I.2.

I.2 Concrete scenarios

I.2.1 Tests for minimum requirements varying between releases, without introduction of new features

Different minimum requirement between different releases of 3GPP TS 36.101 [2] without introduction of new features represent scenarios according to Annex I.1 bullets 4) a) and b).

In TS 36.521-1 are specified one "original test" and several "additional tests" respectively applicable to the appropriate releases. This is shown graphically in Figure I.2.1-1.

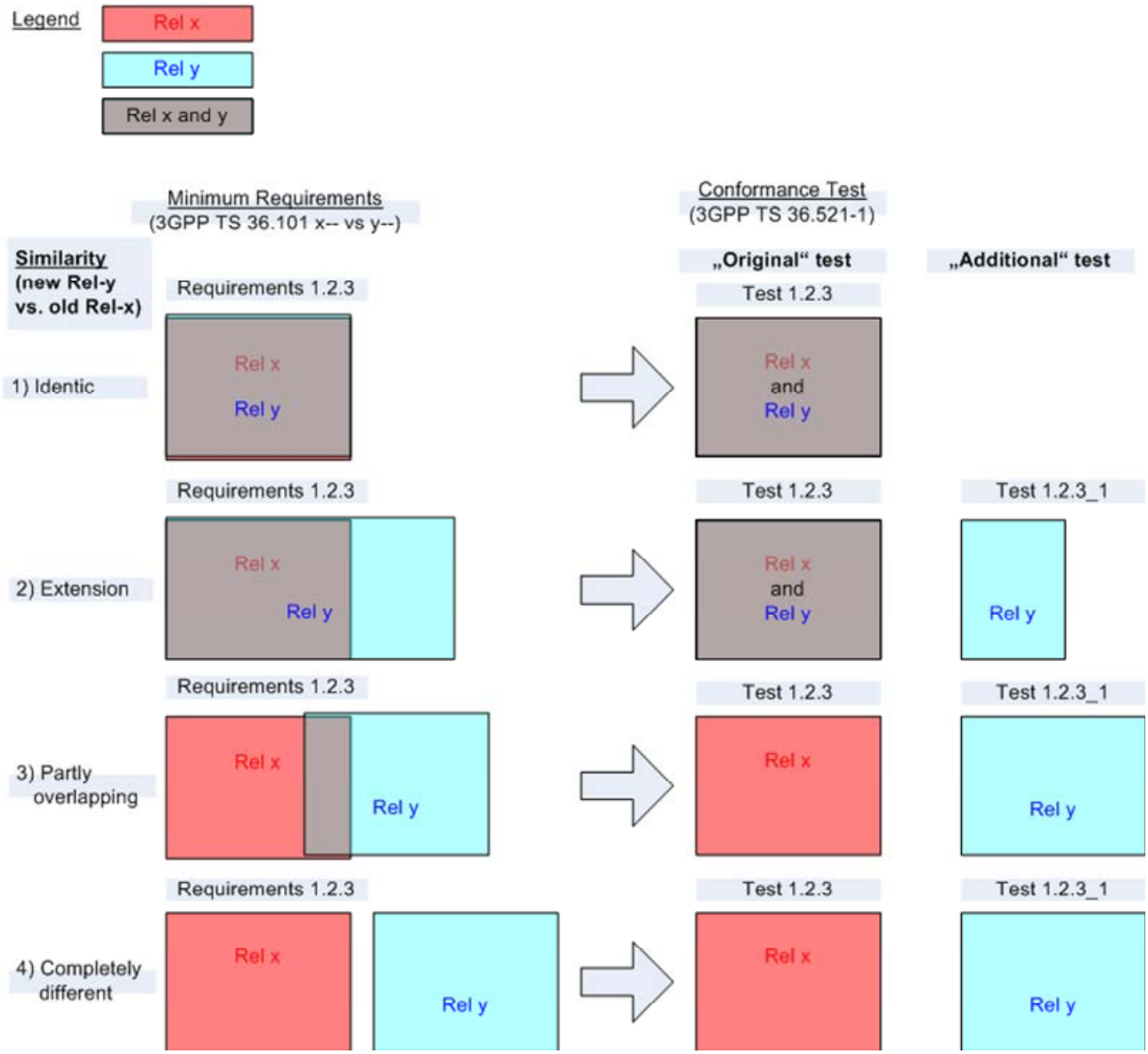


Figure I.2.1-1: Mapping of minimum requirements to conformance tests, when minimum requirements are specified in multiple releases

Rule:

Following tests and clauses are specified in TS 36.521-1:

Original tests:

<x.x.x> <Test>

Additional tests:

<x.x.x>_<y> <Test> (<Release> <UE capability>)

where:

<x.x.x> = number of the original test

<y> = incrementing clause number (Arabic numeral)

<Test> = title of the original test

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

<UE capability> = optional identifier showing the UE capability, which leads to additional test. To be included only when there is already a test with the same title for the same release.

Examples:

1.2.3 Virtual test

1.2.3_1 Virtual test (Rel-9 and forward)

1.2.3_2 Virtual test (Rel-10 and forward)

I.2.2 Tests for CA (Carrier aggregation)

I.2.2.1 CA Tx tests (Chapter 6)

CA Transmitter minimum requirements in 3GPP TS 36.101 [2] are already specified in separate clauses from the legacy requirements, bearing the suffix "A" in the number and "for CA" in the title. However minimum requirements have a wide coverage in terms of Annex I.1 bullet 3).

In TS 36.521-1 are specified several separate "individual tests" for different CA scenarios and UE capabilities.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test group clause:

<x.x.x>A <Test> for CA

Individual tests:

<x.x.x>A.<y> <Test> for CA (<CA type> <DL/UL support> <BW Class> <Release>)

where:

<x.x.x> = number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix "A" (if no legacy test available)

<y> = incrementing clause number (Arabic numeral)

<Test> = title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential suffix "for CA" (if no legacy test available)

<CA type> = mandatory identifier {intra-band contiguous; intra-band non-contiguous; inter-band}

<DL/UL support>= mandatory identifier {DL CA without UL CA; DL CA and UL CA}

<BW Class> = optional identifier showing UE CA Bandwidth class {Class B; Class C; Class D; Class E; Class F}. To be included only for intra-band contiguous scenarios, if there is already a test with the same title.

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3 Virtual test

1.2.3A Virtual test for CA

1.2.3A.1 Virtual test for CA (intra-band contiguous DL CA and UL CA)

1.2.3A.2 Virtual test for CA (inter-band DL CA and UL CA)

1.2.3A.3 Virtual test for CA (intra-band non-contiguous DL CA and UL CA)

1.2.3A.4 Virtual test for CA (3UL CA)

I.2.2.2 CA Rx tests (Chapter 7)

Same as for Transmitter tests (Chapter 6) in Annex I.2.2.1 with following exception:

Examples:

1.2.3 Virtual test

1.2.3A Virtual test for CA

1.2.3A.1 Virtual test for CA (intra-band contiguous DL CA and UL CA)

1.2.3A.2 Virtual test for CA (intra-band contiguous DL CA without UL CA)

1.2.3A.3 Virtual test for CA (inter-band DL CA without UL CA)

1.2.3A.4 Virtual test for CA (intra band non-contiguous DL CA without UL CA)

1.2.3A.5 Virtual test for CA (3DL CA)

1.2.3A.6 Virtual test for CA (inter-band DL CA and UL CA)

1.2.3A.7 Virtual test for CA (4DL CA)

1.2.3A.8 Virtual test for CA (5DL CA)

I.2.2.3 CA Performance tests (Chapter 8)

CA Performance minimum requirements in 3GPP TS 36.101 [2] are specified mostly in the same clause with the legacy requirements, as additional test points marked with CA capability identifiers. CA introduces a new feature in terms of Annex I.1 bullet 4) c). Furthermore the set of CA test points has a wide coverage in terms of Annex I.1 bullet 3).

In TS 36.521-1 are specified several separate "individual tests" for different CA scenarios and UE capabilities.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test group clause:

<x.x.x>_A <Test> for CA

Individual tests:

<x.x.x>_A.<y> <Test> for CA (<CA type > <DL/UL support> <Release>)

where:

<x.x.x> = number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix "A" (if no legacy test available)

<y> = incrementing clause number (Arabic numeral)

<Test> = title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential "for CA" (if no legacy test available)

<CA type> = mandatory identifier {intra-band contiguous; intra-band non-contiguous; inter-band}

<DL/UL support> = mandatory identifier {DL CA}

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3 Virtual test

1.2.3_A Virtual test for CA

1.2.3_A.1 Virtual test for CA (2DL CA)

1.2.3_A.2 Virtual test for CA (3DL CA)

1.2.3_A.3 Virtual test for CA (4DL CA)

1.2.3_A.4 Virtual test for CA (5DL CA)

I.2.3 Tests for UL-MIMO (Uplink Multiple Antenna Transmission)

I.2.3.1 UL-MIMO Tx tests (Chapter 6)

UL-MIMO Transmitter minimum requirements in 3GPP TS 36.101 [2] are already specified in separate clauses from the legacy requirements, bearing the suffix "B" in the number and "for UL-MIMO" in the title.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test group clause:

<x.x.x>B <Test> for UL-MIMO

Individual tests:

<x.x.x>B.<y> <Test> for UL-MIMO (<Release>)

where:

<x.x.x> = number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix "B" (if no legacy test available)

<y> = incrementing clause number (Arabic numeral)

<Test> = title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential suffix "for UL-MIMO" (if no legacy test available)

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test
1.2.3B	Virtual test for UL-MIMO

I.2.3.2 UL-MIMO Rx tests (Chapter 7)

Same as for Transmitter tests (Chapter 6) in Annex I.2.3.1.

I.2.4 Tests for eDL-MIMO (Enhanced Downlink Multiple Antenna Transmission)

I.2.4.1 eDL MIMO Performance tests (Chapter 8)

eDL MIMO Performance minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements. In some cases the minimum requirements have a wide coverage in terms of Annex I.1 bullet 3) a) with respect of the presence of a simultaneous interfering transmission a) with respect of the presence of a simultaneous interfering transmission.

In TS 36.521-1 are specified several separate "individual tests" for eDL-MIMO.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test group clause:

<x.x.x>_D	<Test> for eDL-MIMO

Individual tests:

<x.x.x>_D.<y>	<Test> for eDL-MIMO (<Release>)

where:

<x.x.x>	= number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix (if no legacy test available).
<y>	=optional incrementing clause number (Arabic numeral) (if many individual tests).
<Test>	= title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential suffix potential suffix (if no legacy test available).
<Release>	= optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.4	Virtual test
1.2.4_D	Virtual test for eDL-MIMO

I.2.4.2 eDL MIMO CSI tests (Chapter 9)

eDL MIMO CSI minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from legacy requirements.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test group clause:

<x.x.x>_D <Test> for eDL-MIMO

Individual tests:

<x.x.x>_D.<y> <Test> for eDL-MIMO (<Release>)

where:

<x.x.x> = number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix (if no legacy test available).

<y> =optional incrementing clause number (Arabic numeral) (if many individual tests).

<Test> = title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential suffix (if no legacy test available).

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.4 Virtual test

1.2.4_D Virtual test for eDL-MIMO

I.2.5 Tests for eICIC (Enhanced Intercarrier Interference Cancellation / Coordination)

I.2.5.1 eICIC Performance tests (Chapter 8)

eICIC Performance minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements. The set of eICIC test points have a wide coverage in terms of Annex I.1 bullet 3)a) with respect of the ABS type (Non-MBSFN / MBSFN). In TS 36.521-1 are specified several separate "individual tests" for eICIC.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test group clause:

<x.x.x>_C <Test> for eICIC

Individual tests:

<x.x.x>_C.<y> <Test> for eICIC (<ABS-type> <Release>)

where:

<x.x.x> = number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix (if no legacy test available).

<y> =optional incrementing clause number (Arabic numeral) (if many individual tests).

<Test> = title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential suffix (if no legacy test available).

<ABS-Type> = mandatory identifier {non-MBSFN ABS, MBSFN ABS}

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.4 Virtual test

1.2.4_C Virtual test for eICIC

1.2.4_C.1 Virtual test for eICIC (non-MBSFN ABS)

1.2.4_C.2 Virtual test for eICIC (MBSFN ABS)

I.2.5.2 eICIC CSI tests (Chapter 9)

Same as for Performance tests (Chapter 8) in Annex I.2.5.1.

I.2.6 Tests for feICIC (Further Enhanced Non CA-based ICIC for LTE)

I.2.6.1 feICIC Performance tests (Chapter 8)

feICIC Performance minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements. The set of feICIC test points have a wide coverage in terms of Annex I.1 bullet 3)a) with respect of the ABS type (Non-MBSFN / MBSFN). In TS 36.521-1 are specified several separate "individual tests" for feICIC.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test group clause:

<x.x.x>_E<Test> for feICIC

Individual tests:

<x.x.x>_E.<y> <Test> for feICIC (<ABS-type> <Release>)

where:

<x.x.x> = number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix (if no legacy test available).

<y> =optional incrementing clause number (Arabic numeral) (if many individual tests).

<Test> = title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential suffix (if no legacy test available).

<ABS-Type> = mandatory identifier {non-MBSFN ABS, MBSFN ABS}

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.6 Virtual test

1.2.6_E Virtual test for feICIC

1.2.6_E.1 Virtual test for feICIC (non-MBSFN ABS)

1.2.6_E.2 Virtual test for eICIC (MBSFN ABS)

I.2.6.2 feICIC CSI tests (Chapter 9)

Same as for Performance tests (Chapter 8) in Annex I.2.6.1.

I.2.7 Tests for DL ComP (Downlink Coordinated Multipoint Transmission)

I.2.7.1 CoMP Performance tests (Chapter 8)

CoMP Performance minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements. The set of CoMP test points may have a wide coverage in terms of Annex I.1 bullet 3)a) with respect of the number of CSI processes (Single / Multiple CSI process) etc. In such cases in TS 36.521-1 are specified several separate "individual tests" for CoMP.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test (group) clause:

<x.x.x>_F <Test> for CoMP

Individual tests:

<x.x.x>_F.<y> <Test> < CSI Process number > for CoMP (<Release>)

where:

<x.x.x>	= number derived from TS 36.101.
<y>	= optional incrementing clause number (Arabic numeral) (if many individual tests).
<Test>	= title derived from TS 36.101.
<CSI Process number>	= optional identifier {with Single CSI process, with Multiple CSI processes} (if many individual tests)
<Release>	= optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test
1.2.3_F	Virtual test for CoMP
1.2.3_F.1	Virtual test with Single CSI process for CoMP
1.2.3_F.2	Virtual test with Multiple CSI processes for CoMP

I.2.7.2 CoMP CSI tests (Chapter 9)

Same as for Performance tests (Chapter 8) in Annex I.2.7.1.

I.2.8 Tests for Further eDL-MIMO (Enhanced Downlink Multiple Antenna Transmission) Enhancement for LTE-A

I.2.8.1 eDL MIMO Enhancement CSI tests (Chapter 9)

Further eDL MIMO Enhancement for LTE-A CSI minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements.

Rule:

Following tests and clauses are specified in TS 36.521-1:

<x.x.x> <Test> for eDL-MIMO Enhancement

Individual tests:

<x.x.x>< _y> <Test> for eDL-MIMO Enhancement (<Release>)

where:

<x.x.x> = number derived from the corresponding requirement clause in TS 36.101.

<_y> = optional incrementing clause number (Arabic numeral) with preceding underscore. To be applied only when there is already a test with the same title for earlier releases.

<Test> = title derived from the corresponding requirement clause in TS 36.101.

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3 Virtual test for eDL-MIMO Enhancement

1.2.3_1 Virtual test for eDL-MIMO Enhancement (Rel-13 and forward)

I.2.9 Tests for UE category 0

I.2.9.1 UE category 0 Tx tests (Chapter 6)

UE category 0 specific Transmitter minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements, bearing the suffix "E" in the number and "for UE category 0" in the title. In other cases where no category 0 specific requirements exist, the legacy requirements apply. To maintain consistency all test cases for UE category 0 to be specified in TS 36.521-1 are handled similarly.

Rule:

Following tests and clauses are specified in TS 36.521-1:

<x.x.x>E <Test> for UE category 0

<x.x.x>E<_y> <Test> for UE category 0 (<Release>)

where:

<x.x.x> = number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix "E" (if no legacy test available)

<_y> = optional incrementing clause number (Arabic numeral) with preceding underscore. To be applied only when there is already a test with the same title for earlier releases.

<Test> = title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential "for UE category 0" (if no legacy test available)

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test
1.2.3E	Virtual test for UE category 0
1.2.3E_1	Virtual test for UE category 0 (Rel-13 and forward)

I.2.9.2 UE category 0 Rx tests (Chapter 7)

Same as for Transmitter tests (Chapter 6) in Annex I.2.9.1.

I.2.9.3 UE category 0 Performance tests (Chapter 8)

UE category 0 Performance minimum requirements in 3GPP TS 36.101 [2] are already specified in separate clauses from the legacy requirements.

Rule:

Following tests and clauses are specified in TS 36.521-1:

<x.x.x>	<Test> for UE category 0
<x.x.x><_y>	<Test> for UE category 0 (<Release>)

where:

<x.x.x>	= number derived from the corresponding requirement clause in TS 36.101
<_y>	= optional incrementing clause number (Arabic numeral) with preceding underscore. To be applied only when there is already a test with the same title for earlier releases.
<Test>	= title derived from the corresponding requirement clause in TS 36.101
<Release>	= optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test for UE category 0
1.2.3_1	Virtual test for UE category 0 (Rel-13 and forward)

I.2.9.4 UE category 0 CSI tests (Chapter 9)

Same as for Performance tests (Chapter 8) in Annex I.2.9.3.

I.2.9A Tests for UE category M1

I.2.9A.1 UE category M1 Tx tests (Chapter 6)

UE category M1 specific Transmitter minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements, bearing the suffix "E" in the number and "for UE category M1" in the title. Suffix “E” is also used for UE category 0. In other cases, where no category M1 specific requirements exist, the legacy requirements apply. To maintain consistency all test cases for UE category M1 to be specified in TS 36.521-1 are handled similarly, but suffix "EA" is used to distinguish from UE category 0 test cases using suffix "E".

Rule:

Following tests and clauses are specified in TS 36.521-1:

<x.x.x>EA	<Test> for UE category M1

<x.x.x>EA<_y> <Test> for UE category M1 (<CEMode><Release>)

where:

<x.x.x> = number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix "E" (if no legacy test available)

<_y> = optional incrementing clause number (Arabic numeral) with preceding underscore. To be applied only when there is already a test for CEModeA or a test with the same title for earlier releases.

<Test> = title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential "for UE category M1" (if no legacy test available)

<CEMode> = optional identifier showing the CEMode applicability of the test. Can only take value CEModeB and is applied only if a corresponding CEModeA test exists.

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3 Virtual test

1.2.3EA Virtual test for UE category M1

1.2.3EA_1 Virtual test for UE category M1 (Rel-13 and forward)

I.2.9A.2 UE category M1 Rx tests (Chapter 7)

Same as for Transmitter tests (Chapter 6) in Annex I.2.9A.1.

I.2.9A.3 UE category M1 Performance tests (Chapter 8)

UE category M1 Performance minimum requirements in 3GPP TS 36.101 [2] are already specified in separate clauses from the legacy requirements.

Rule:

Following tests and clauses are specified in TS 36.521-1:

<x.x.x> <Test> for UE category M1

<x.x.x><_y> <Test> for UE category M1 (<CEMode><Release>)

where:

<x.x.x> = number derived from the corresponding requirement clause in TS 36.101

<_y> = optional incrementing clause number (Arabic numeral) with preceding underscore. To be applied only when there is already a test for CEModeA or a test with the same title for earlier releases.

<Test> = title derived from the corresponding requirement clause in TS 36.101

<CEMode> = optional identifier showing the CEMode applicability of the test. Can only take value CEModeB and is applied only if a corresponding CEModeA test exists.

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test for UE category M1
1.2.3_1	Virtual test for UE category M1 (Rel-13 and forward)

I.2.9A.4 UE category M1 CSI tests (Chapter 9)

Same as for Performance tests (Chapter 8) in Annex I.2.9A.3.

I.2.9B Tests for UE category M2

I.2.9B.1 UE category M2 Tx tests (Chapter 6)

UE category M2 specific Transmitter minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements and category M1 requirements, bearing the suffix "E" in the number and "for UE category M2" in the title. Suffix “E” is also used for UE category 0. In other cases, where no category M2 specific requirements exist, the legacy requirements apply. To maintain consistency all test cases for UE category M2 to be specified in TS 36.521-1 are handled similarly, but suffix "EC" is used to distinguish from UE category 0 test cases using suffix "E", category M1 test cases using suffix "EA" and category 1bis test cases using suffix “EB”.

Rule:

Following tests and clauses are specified in TS 36.521-1:

<x.x.x>EC	<Test> for UE category M2
<x.x.x>EC<_y>	<Test> for UE category M2 (<CEMode><Release>)

where:

<x.x.x>	= number of the corresponding legacy test (if available), or number derived from TS 36.101 without potential suffix "E" (if no legacy test available)
<_y>	= optional incrementing clause number (Arabic numeral) with preceding underscore. To be applied only when there is already a test for CEModeA or a test with the same title for earlier releases.
<Test>	= title of the corresponding legacy test (if available), or title derived from TS 36.101 without potential "for UE category M2" (if no legacy test available)
<CEMode>	= optional identifier showing the CEMode applicability of the test. Can only take value CEModeB and is applied only if a corresponding CEModeA test exists.
<Release>	= optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test
1.2.3EC	Virtual test for UE category M2
1.2.3EC_1	Virtual test for UE category M2 (Rel-14 and forward)

I.2.9B.2 UE category M2 Rx tests (Chapter 7)

Same as for Transmitter tests (Chapter 6) in Annex I.2.9B.1.

I.2.9B.3 UE category M2 Performance tests (Chapter 8)

UE category M2 Performance minimum requirements in 3GPP TS 36.101 [2] are already specified in separate clauses from the legacy requirements.

Rule:

Following tests and clauses are specified in TS 36.521-1:

<x.x.x> <Test> for UE category M2

<x.x.x><_y> <Test> for UE category M2 (<CEMode><Release>)

where:

<x.x.x> = number derived from the corresponding requirement clause in TS 36.101

<_y> = optional incrementing clause number (Arabic numeral) with preceding underscore. To be applied only when there is already a test for CEModeA or a test with the same title for earlier releases.

<Test> = title derived from the corresponding requirement clause in TS 36.101

<CEMode> = optional identifier showing the CEMode applicability of the test. Can only take value CEModeB and is applied only if a corresponding CEModeA test exists.

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3 Virtual test for UE category M2

1.2.3_1 Virtual test for UE category M2 (Rel-14 and forward)

I.2.9B.4 UE category M2 CSI tests (Chapter 9)

Same as for Performance tests (Chapter 8) in Annex I.2.9B.3.

I.2.10 Tests for SCE-L1 (Small Cell Enhancements-Physical layer)

I.2.10.1 SCE-L1 Receiver tests (Chapter 7)

The set of 256QAM test points may have a wide coverage in terms of Annex I.1 bullet 3)c) with respect of the different UE capabilities (UE category 11-16), modulation mode and coding rate required and Annex I.1 bullet 4)a)etc with the addition of new requirements and new defined RMC for SCE-L1. In such cases in TS 36.521-1 are specified several separate "individual tests" for SCE-L1.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test (group) clause:

<x.x.x>_H <Test> for SCE-L1

Individual tests:

<x.x.x>_H.<y> <Test> for SCE-L1 (<Release>)

where:

<x.x.x> = number derived from TS 36.101.

<y> = optional incrementing clause number (Arabic numeral) (if many individual tests).

<Test> = title derived from TS 36.101.

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test
1.2.3_H	Virtual test for SCE-L1

I.2.10.2 SCE-L1 Performance tests (Chapter 8)

The set of 256QAM test points may have a wide coverage in terms of Annex I.1 bullet 3)c) with respect of the different UE capabilities (UE category 11-16) and demodulation mode required and Annex I.1 bullet 4)c)etc with the addition of new test points introducing new features of 256QAM for SCE-L1. In such cases in TS 36.521-1 are specified several separate "individual tests" for SCE-L1.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test (group) clause:

<x.x.x>_H <Test> for SCE-L1

Individual tests:

<x.x.x>_H.<y> <Test> for SCE-L1 (<Release>)

where:

<x.x.x>	= number derived from TS 36.101.
<y>	= optional incrementing clause number (Arabic numeral) (if many individual tests).
<Test>	= title derived from TS 36.101.
<Release>	= optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test
1.2.3_H	Virtual test for SCE-L1
1.2.3_H.1	Virtual test for SCE-L1(Single Carrier)
1.2.3_H.2	Virtual test for SCE-L1(2DL CA)
1.2.3_H.3	Virtual test for SCE-L1(3DL CA)

I.2.10.3 SCE-L1 CSI tests (Chapter 9)

SCE-L1 Performance minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements. The set of SCE-L1 test points may have a wide coverage in terms of Annex I.1 bullet 3)b) and c) etc. In such cases in TS 36.521-1 are specified several separate "individual tests" for SCE-L1.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test (group) clause:

<x.x.x>_H <Test> for SCE-L1

Individual tests:

<x.x.x>_H.<y> <Test> for SCE-L1 (<Release>)

where:

<x.x.x>	= number derived from TS 36.101.
<y>	= optional incrementing clause number (Arabic numeral) (if many individual tests).
<Test>	= title derived from TS 36.101.
<Release>	= optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3	Virtual test
1.2.3_H	Virtual test for SCE-L1

I.2.11 Tests for ProSe

I.2.11.1 ProSe Tx tests (Chapter 6)

ProSe specific Transmitter minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements, bearing the suffix "D" in the number and "for ProSe" in the title. The set of ProSe test points may have a wide coverage in terms of Annex I.1 bullet 3)b) and c) with respect of type of ProSe operation and UE capability (Discovery / Communication) etc. In such cases in TS 36.521-1 are specified several separate "individual tests" for ProSe.

Rule:

Following tests and clauses are specified in TS 36.521-1:

<x.x.x>D <Test> for ProSe

<x.x.x>D<.y><_z> <Test> for ProSe <Mode> (<Release>)

where:

<x.x.x> = number derived from TS 36.101 without suffix "D"

<.y> = incrementing clause number (Arabic numeral).

<_z> = optional incrementing clause number (Arabic numeral) with preceding underscore. To be applied only when there is already a test with the same title for earlier releases.

<Test> = title derived from TS 36.101 without "for ProSe"

<Mode> = mandatory identifier {Direct Discovery; Direct Communication}

<Release> = optional identifier showing the release applicability of the test. To be included only when there is already a test with the same title for earlier releases.

Examples:

1.2.3D Virtual test for ProSe

1.2.3D.1 Virtual test for ProSe Direct Discovery

1.2.3D.2 Virtual test for ProSe Direct Communication

1.2.3D.2_1 Virtual test for ProSe Direct Communication (Release 13 and forward)

I.2.11.2 ProSe Rx tests (Chapter 7)

Same as for Transmitter tests (Chapter 6) in Annex I.2.11.1.

I.2.11.3 ProSe Performance tests (Chapter 8)

ProSe Performance minimum requirements in 3GPP TS 36.101 [2] are already specified in separate clauses from the legacy requirements.

Rule:

Following tests and clauses are specified in TS 36.521-1:

FFS

I.2.11.4 ProSe CSI tests (Chapter 9)

Same as for Performance tests (Chapter 8) in Annex I.2.11.3.

I.2.12 Tests for 4 Rx antenna ports

I.2.12.1 4 Rx antenna ports Rx tests (Chapter 7)

4 Rx antenna ports minimum requirements in 3GPP TS 36.101 [2] are specified in the same clauses as the legacy requirements. The reference sensitivity requirements in section 7.3 are separate from the old test, but the rest of the Receiver tests have the same requirements as the old tests (tested at a level based on REFSENS). But since the test points are different, new variant test cases are still needed.

In TS 36.521-1 separate 2Rx and 4Rx tests are specified for Rel8 and Rel9 tests, but 4Rx is added to the existing tests starting from Rel10 test cases.

Rule:

Following tests and clauses are specified in TS 36.521-1:

Test group before introducing 4Rx:

<x.x.x>	<Test> (Rel8 or Rel9)
<y.y.y>	<Test> (Rel10 or later)

Test group after introducing 4Rx:

<x.x.x>	<Test> for 2Rx
<x.x.x>_1	<Test> for 4Rx
<y.y.y>	<Test> for 2Rx and 4Rx

where:

<x.x.x>	= number of the corresponding legacy test.
<y>	= incrementing clause number (Arabic numeral)
<Test>	= title of the corresponding legacy test
(Release)	= Release applicability (applicable from), which is not part of the title

Examples:

1.2.3	Virtual test (Rel8)
1.2.3_1	Virtual test with 4 Rx antenna ports (Rel10)
1,2,4	Virtual test (Rel10)

I.2.12.2 4 Rx antenna ports Performance tests (Chapter 8)

4 Rx antenna ports Performance minimum requirements in 3GPP TS 36.101 [2] are specified in separate clauses from the legacy requirements. Separate test cases for 4Rx antenna ports are needed in TS 36.521-1 with test case numbering following TS 36.101[2] numbering,

I.2.12.3 4 Rx antenna ports CSI tests (Chapter 9)

TBD

Annex J (normative): Modified MPR behaviour

Editor's note: The *modifiedMPRbehavior* is given in the Annex H.1 of TS 36.101.

J.1 Indication of modified MPR behaviour

This annex contains the definitions of the bits in the field *modifiedMPRbehavior* indicated in the IE UE Radio Access Capability [5] by a UE supporting an MPR or A-MPR modified in a later release of this specification.

Table J.1-1: Definitions of the bits in the field *modifiedMPRbehavior* (Rel-10 and Rel-11)

Index of field (bit number)	Definition (description of the supported functionality if indicator set to one)	Notes
0 (leftmost bit)	The MPR for intra-band contiguous carrier aggregation bandwidth class C with non-contiguous resource allocation specified in Clause 6.2.3A in version 12.5.0 of TS36.101[2]	This bit can be set to 1 by a UE supporting intra-band contiguous CA bandwidth class C
1	The A-MPR associated with NS_05 for Band 1 in Clause 6.2.4 in version 12.10.0 of TS36.101[2]	This bit can be set to 1 by a UE supporting A-MPR associated to NS_05 for Band 1

Table J.1-2: Definitions of the bits in the field *modifiedMPRbehavior* (Rel-12 and Rel-13)

Index of field (bit number)	Definition (description of the supported functionality if indicator set to one)	Notes
0 (leftmost bit)	The MPR for intra-band contiguous carrier aggregation bandwidth class C with non-contiguous resource allocation specified in Clause 6.2.3A in version 12.5.0 of TS36.101 [2]	This bit shall be set to 1 by a UE supporting intra-band contiguous CA bandwidth class C
1	The A-MPR associated with NS_05 for Band 1 in Clause 6.2.4 in version 12.10.0 of TS36.101[2]	This bit shall be set to 1 by a UE supporting A-MPR associated to NS_05 for Band 1
2	The A-MPR associated with NS_04 for Band 41 in Table 6.2.4-4 in version 14.2.0 of this specification.	This bit can be set to 1 by a power class 3 UE supporting A-MPR associated to NS_04 for Band 41.

Table J.1-3: Definitions of the bits in the field *modifiedMPRbehavior* (Rel-14 and later)

Index of field (bit number)	Definition (description of the supported functionality if indicator set to one)	Notes

0 (leftmost bit)	The MPR for intra-band contiguous carrier aggregation bandwidth class C with non-contiguous resource allocation specified in Clause 6.2.3A in version 12.5.0 of TS36.101 [2]	This bit shall be set to 1 by a UE supporting intra-band contiguous CA bandwidth class C
1	The A-MPR associated with NS_05 for Band 1 in Clause 6.2.4 in version 12.10.0 of TS36.101[2]	This bit shall be set to 1 by a UE supporting A-MPR associated to NS_05 for Band 1
2	The A-MPR associated with NS_04 for Band 41 in Table 6.2.4-4 in version 14.2.0 of this specification.	This bit shall be set to 1 by a power class 3 UE supporting A-MPR associated to NS_04 for Band 41.

Annex K (normative): NB-IoT Test Frequencies

K.1 NB-IoT Test frequencies for TRx Tests

Testing frequencies for all NB-IoT TRx test cases (sections 6 and 7 in TS 36.521-1) should be selected across the bands UE supports from any of the following subclauses indicated by each test case.

For transmitter test cases (section 6 in TS 36.521-1), UL frequencies should be considered on the test frequency selection algorithm described above, while DL frequencies should be used for receiver test cases (section 7 in TS 36.521-1).

Refer to TS 36.508 [7] section 8.1.3.1 for testing frequencies associated to each frequency band and each operation mode.

K.1.1 Test frequencies selection criteria 1

Among all frequency bands ranges below 1GHz supported by the UE, testing points are defined as:

- @ low range of the lowest supported band
- @ high range of the highest supported band

If the UE does not support any frequency band below 1GHz, these test points are not applicable.

Among all frequency bands ranges above 1GHz supported by the UE, testing points are defined as:

- @ low range of the lowest supported band
- @ high range of the highest supported band

If the UE does not support any frequency band above 1GHz, these test points are not applicable.

K.1.2 Test frequencies selection criteria 2

Among all frequency bands ranges below 1GHz supported by the UE, testing points are defined as:

- @ low range of the lowest supported band
- @ high range of the highest supported band
- All mid range of all supported mid bands (supported bands between lowest supported band and highest supported band below 1GHz)

If the UE does not support any frequency band below 1GHz, these test points are not applicable.

Among all frequency bands ranges above 1GHz supported by the UE, testing points are defined as:

- @ low range of the lowest supported band
- @ high range of the highest supported band
- All mid range of all supported mid bands (supported bands between lowest supported band and highest supported band above 1GHz)

If the UE does not support any frequency band above 1GHz, these test points are not applicable.

K.1.3 Test frequencies selection criteria 3

Among all frequency bands ranges supported by the UE, testing points are defined as:

- @ low range of each supported band
- @ high range of each supported band

K.2 NB-IoT Test frequencies for Demodulation Tests

Testing frequencies for all NB-IOT demodulation (Section 8 and 9 in TS 36.521-1) should be selected across the bands UE supports from any of the following subclauses indicated by each test case.

For NB-IOT demodulation (section 8 and 9 in TS 36.521-1) DL frequencies should be used from the frequency selection algorithm described below.

Refer to section 8.1.3.1 in TS 36.508 [7] for testing frequencies associated to each frequency band and each operation mode.

K.2.1 Test frequencies selection criteria 1

Among all frequency bands ranges supported by the UE, testing points are defined as:

- @ mid range of any one of the NB1 UE supported band

Annex L (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2007-08	RAN5 #36	R5-072185			Skeleton proposed for RAN5#36Athens		0.0.1
2007-08	RAN5 #36	R5-072419			Update the skeleton base on R4-071234_TR36.803.0.4.0.doc	0.0.1	0.0.2
2007-08	RAN5 #36	R5-072424			Update with editorial changes	0.0.2	0.0.3
2007-11	RAN5 #37	R5-073043			Update document with some info as following: Section 5: Frequency band information Section 6.2: Maximum output power Section 6.5: Output RF spectrum emissions Section 6.5.1: Occupied bandwidth Section 6.5.2: Out of band emission Section 6.5.3: Spurious emissions	0.0.3	0.0.4
2007-11	RAN5 #37	R5-073360			Editorial change to split MOP and UE Power classes	0.0.4	0.0.5
2008-03	RAN5 #38	R5-080069			Editorial changes to sync up with 36.101 v1.0.0 as much as feasible for the moment: Update definitions, symbols and abbreviations Update frequency bands, channel bandwidth, channel numbers information. Restructure document to move “frequency error” sub-section inside Transmit signal quality. Add “additional spectrum Emission Mask” sub-test (mask A,B,C) section to address the regulatory requirements that are not met with the general mask (OOB and spurious emission). Add “Additional ACLR requirements” to address additional requirements that the network might indicate to the UE via signalling for a specific deployment scenario (in terms of additional requirements for UTRA/ACLR2 Restructure “Spurious Emission” to indicate we need to have 3 test cases to address: “E-UTRA Spurious Emission” requirements , “Spurious Emission band UE co-existence” requirements, and “Additional spurious emissions” requirements Separate wide band and narrow band intermodulation in the intermodulation characteristics	0.0.5	0.0.6
2008-03	RAN5 #38	R5-080408			LTE Reference Sensitivity test Text proposal		0.0.7
2008-03	RAN5 #38	R5-080409			LTE Maximum Rx input level test Text proposal		0.0.7
2008-03	RAN5 #38	R5-080410			LTE Adjacent Channel Selectivity test Text proposal		0.0.7
2008-03	RAN5 #38	R5-080064			LTE RF Receiver tests, General section Text proposal		0.0.7
2008-03	RAN5 #38	R5-080412			LTE RF: transmission modulation initial EVM test proposal		0.0.7
2008-03	RAN5 Workshop-UE LTE Test (9-11 April)	R5w0800027			Modify styles and formats of tables and others according to drafting rules. Add some definitions and abbreviations Modified section 6.2 structure to be aligned with 36.101 v8.1.0 Modify tables of requirements to remove 1.6 MHz and 3.2MHz channel bandwidth according to new requirements 36.101 v8.1.0		0.0.9
2008-03	RAN5 Workshop-UE LTE Test (9-11 April)	R5w0800028			Following TPs have been included: R5w080013r1 R5w080014r1 R5w080008r2 R5w080009r2 R5w080040r1 R5w080015r1 R5w080016r1 R5w080017r1 R5w080018r2	0.0.9	0.1.0
2008-05	RAN5#39	R5-081046			36-521-1 alignment of measurement state for test cases	0.1.0	0.1.1

2008-05	RAN5#39	R5-081042			Following approved TPs have been included: R5-081040 36.521-1 after April LTE-RF workshop R5-081415 36-521-1 alignment of measurement state for test cases – also the measurement state for each test cases has been updated according to R5-081404 R5-081416 Cover for LTE E-UTRAN RRC_IDLE State Mobility text proposal R5-081417 Cover for LTE E-UTRAN RRC_CONNECTED State Mobility text proposal R5-081404 LTE Rx Intermodulation test case text proposal R5-081409 Annex structure for Measurement uncertainty & Test Tools R5-081405 Text Proposal for TS 36.521-1 TC7.6 Blocking Characteristics R5-081406 Text Proposal for TS 36.521-1 TC7.7 Spurious Response R5-081403 Text Proposal for TS 36.521-1 TC7.9 Spurious Emissions R5-081410 Uncertainties and Test Tools for subset of UE tests R5-081331 Clarification of diversity characteristics section for multiple UE antennas R5-081335 36-521-1 update of nominal and additional channel bandwidths	0.1.1	0.2.0
2008-06	RAN5 #39bis	R5-082029			Following approved TPs have been included: R5-082129: Restructure of TS 36.521-1 and RRM proposal (Split of RRM from 36.521-1 v0.2.0 in its own specification 36.521-3.) R5-082166: Text Proposal for Annex C Downlink Physical Channels R5-082130: Text Proposal for Chan bandwidths in TS 36.521-1 R5-082155: Text Proposal for LTE Tx Minimum Output Power R5-082027: Text Proposal for Occupied bandwidth in TS 36.521-1 R5-082171: Text Proposal for LTE Adjacent Channel Leakage power Ratio R5-082134: Text Proposal for LTE Tx Spurious Emissions R5-082135: Text Proposal for LTE UE Maximum Output Power R5-082136: Text Proposal for LTE Spectrum Emission Mask R5-082138: UE Spurious Emissions Measurement uncertainty & Test Tolerances R5-082169: LTE Spectrum Emission Mask test uncertainties and TTs R5-082151: LTE UE Max Power and ACLR tests uncertainties and TTs R5-082152: Text proposal for LTE Transmit OFF Power R5-082153: LTE UE Max Rx Input and ACS test cases update R5-082082: LTE Rx Intermodulation test case uncertainties and TTs R5-082093: Text Proposal for TS 36.521-1 TC7.6 Blocking Characteristics R5-082154: Text Proposal for TS 36.521-1 TC7.7 Spurious Response R5-082167: OBW Measurement uncertainty & Test Tolerances R5-082158: Cover for LTE Performance Requirement text proposal R5-082159: Text Proposal for LTE Demodulation of PCFICH/PDCCH and PHICH R5-082156: Text proposal for LTE Tx Minimum Output Power Uncertainty R5-082157: Text proposal for LTE Tx Minimum Output Power Tolerance R5-082164: Statistical testing of receiver characteristics R5-082170: Cover for LTE Propagation Conditions Text Proposal Editorial changes to align tables and figures numbering with R5-082025	0.2.0	0.3.0

2008-08	RAN5 #40	R5-083163			Following approved TPs have been included: R5-083804: LTE Demodulation Performance text proposal R5-083159: LTE-RF Occupied bandwidth test case / measurement uncertainty and TT text proposal R5-083160: Transmission OFF power: TP, measurement uncertainty and test tolerances proposal R5-083805: Frequency Error test case / measurement uncertainty and TT test proposal R5-083162: Propagation conditions correction text proposal R5-083220:Text Proposal for LTE Tx Minimum Output Power R5-083806: TP of section 8 for E-UTRAN TDD in 36.521-1 R5-083344: Test Tolerance and System uncertainty for OBW test R5-083848:Test Tolerance and System uncertainty for Reference sensitivity test R5-083840: Test Tolerances for Spectrum Emission Mask R5-083808: Reference Measurement Channel for LTE UE Receiver tests R5-083350: Test Tolerance and System uncertainty for Blocking and Spurious response R5-083366: Text Proposal for LTE Reporting of CQI/PMI R5-083810: LTE PBCH Demodulation Performance Requirements R5-083482: LTE-RF TP for Test Case 7.6 Blocking Characteristics R5-083809: LTE-RF TP for Test Case 7.7 Spurious Response R5-083484: LTE-RF TP for Test Case 7.9 Spurious Emissions R5-083811: Annex E Global In-Channel TX-Test R5-083163: TS 36.521-1 after RAN5#40	0.3.0	1.0.0
2008-10	RAN5 #40Bis	R5-084072			Following approved TPs have been included: R5-084072 TS 36.521-1 after RAN5#40Bis R5-084300 LTE-RF TP for Definitions Symbols and Abbreviations R5-084304 LTE-RF-TP for general section R5-084036 Test Tolerances for additional SEM R5-084303 LTE-RF TP for Channel bandwidths and frequency range R5-084305 LTE-RF TP for new Absolute Power Tolerance test case R5-084067 LTE-RF TP for Transmission OFF test case R5-084318 LTE-RF TP for Transmission Modulation test cases R5-084069 LTE-RF Investigation of E-UTRA-TDD Frequency Error test case applicability R5-084319 LTE-RF TP for Frequency Error test case R5-084309 Text Proposal for LTE Tx Spurious Emissions R5-084111 Text Proposal for LTE Adjacent Channel Leakage power Ratio R5-084320 Text Proposal for LTE Additional Spectrum Emission Mask R5-084310 Test Tolerances for additional spurious emission R5-084311 Text Proposal for Occupied bandwidth R5-084321 Text Proposal for LTE Spectrum Emission Mask R5-084060 Modification to section 7.2 Diversity characteristics R5-084312 References in 36.521-1 tests initial conditions R5-084148 Update of Reference Measurement Channel for LTE UE Rx tests R5-084167 LTE-RF TP for TC7.9 Spurious Emissions R5-084075 LTE DL Reference Measurement Channel for PDSCH (FDD) text proposal R5-084077 LTE Measurement of Performance Requirements text proposal R5-084313 LTE Demodulation of PDSCH Test Requirements text proposal R5-084147 Specification of DL propagation conditions for LTE UE tests R5-084315 Text Proposal for LTE Demodulation of PCFICH/PDCCH R5-084323 Text Proposal for Annex E Global In-Channel	1.0.0	1.1.0
2008-12	RAN#42	RP-080863			Approval of version 2.0.0 at RAN#42, then put to version 8.0.0.	2.0.0	8.0.0
2008-01					Editorial corrections.	8.0.0	8.0.1
2009-03	RAN#43	R5-086011	0001	-	TP for In-band emissions	8.0.1	8.1.0
2009-03	RAN#43	R5-086012	0002	-	TP for Spectrum flatness	8.0.1	8.1.0
2009-03	RAN#43	R5-086013	0003	-	TP for IQ-component	8.0.1	8.1.0
2009-03	RAN#43	R5-086064	0004	-	LTE-RF: UE max output power	8.0.1	8.1.0

2009-03	RAN#43	R5-086093	0005	-	Clarification of measurement period in minimum output power test procedure	8.0.1	8.1.0
2009-03	RAN#43	R5-086094	0006	-	Clarification of measurement period in transmit OFF power test procedure	8.0.1	8.1.0
2009-03	RAN#43	R5-086120	0007	-	Update of Max.input level test	8.0.1	8.1.0
2009-03	RAN#43	R5-086125	0008	-	Addition of UL Reference Measurement Channels in Annex A2	8.0.1	8.1.0
2009-03	RAN#43	R5-086160	0009	-	correction for Maximum Power Reduction (MPR)	8.0.1	8.1.0
2009-03	RAN#43	R5-086167	0010	-	LTE-RF: TDD applicability and CR for Blocking Characteristics and Spurious Response	8.0.1	8.1.0
2009-03	RAN#43	R5-086168	0011	-	LTE-RF: TDD applicability and CR for Spurious Emissions	8.0.1	8.1.0
2009-03	RAN#43	R5-086239	0012	-	Update of Symbols	8.0.1	8.1.0
2009-03	RAN#43	R5-086401	0013	-	LTE-RF: TX-RX channel freq separation	8.0.1	8.1.0
2009-03	RAN#43	R5-086405	0014	-	Update of 6.7 Transmit intermodulation test	8.0.1	8.1.0
2009-03	RAN#43	R5-086406	0015	-	Update of initial conditions for Tx and Rx test cases	8.0.1	8.1.0
2009-03	RAN#43	R5-086408	0016	-	Update of Adjacent Channel Leakage power Ratio	8.0.1	8.1.0
2009-03	RAN#43	R5-086409	0017	-	Removal of [ ] from Clause 7 Receiver Characteristics	8.0.1	8.1.0
2009-03	RAN#43	R5-086413	0018	-	Updates to Demodulation of PCFICH/PDCCH test case	8.0.1	8.1.0
2009-03	RAN#43	R5-086414	0019	-	Text proposal for Reporting of Channel State Information	8.0.1	8.1.0
2009-03	RAN#43	R5-086415	0020	-	Correction of RS_EPRE powers for default DL signal levels	8.0.1	8.1.0
2009-03	RAN#43	R5-086416	0021	-	Update of DL Reference Measurement Channels in Annex A3	8.0.1	8.1.0
2009-03	RAN#43	R5-086417	0022	-	Update to Annex E	8.0.1	8.1.0
2009-03	RAN#43	R5-086425	0023	-	Update of General text in clause 6	8.0.1	8.1.0
2009-03	RAN#43	R5-086426	0024	-	Clarification of measurement bandwidth in spectrum emission mask test	8.0.1	8.1.0
2009-03	RAN#43	R5-086428	0025	-	Demodulation of TDD PHICH test requirements text proposal	8.0.1	8.1.0
2009-03	RAN#43	R5-086429	0026	-	Demodulation of TDD PCFICH/PDCCH test requirements text proposal	8.0.1	8.1.0
2009-03	RAN#43	R5-090306	0027	-	New Annex H for Uplink Physical Channels	8.0.1	8.1.0
2009-03	RAN#43	R5-090308	0028	-	Text proposal for Reporting of Channel State Information	8.0.1	8.1.0
2009-03	RAN#43	R5-090403	0029	-	CR to 36.521-1: Update of Spurious Emissions test cases	8.0.1	8.1.0
2009-03	RAN#43	R5-090404	0030	-	CR to 36.521-1: Update of ACLR test case	8.0.1	8.1.0
2009-03	RAN#43	R5-090443	0031	-	LTE-RF: Correction to 36.521-1 Frequency error test case	8.0.1	8.1.0
2009-03	RAN#43	R5-090488	0032	-	LTE TDD applicability for Transmit intermodulation test case	8.0.1	8.1.0
2009-03	RAN#43	R5-091002	0033	-	LTE Demodulation of PDSCH Test Requirements text proposal	8.0.1	8.1.0
2009-03	RAN#43	R5-091004	0034	-	LTE-RF: CR for UE max power test case	8.0.1	8.1.0
2009-03	RAN#43	R5-091007	0035	-	LTE-RF: TDD Applicability and CR for Spectrum Emission Mask and Additional Spectrum Emission Mask	8.0.1	8.1.0
2009-03	RAN#43	R5-091008	0036	-	LTE-RF Investigation of E-UTRA-TDD for Occupied bandwidth test case applicability	8.0.1	8.1.0
2009-03	RAN#43	R5-091009	0037	-	LTE-RF: Investigation of E-UTRA-TDD for Adjacent Channel Leakage power Ratio test case applicability	8.0.1	8.1.0
2009-03	RAN#43	R5-091011	0038	-	LTE-RF: TDD applicability and CR for Maximum Input Level	8.0.1	8.1.0
2009-03	RAN#43	R5-091012	0039	-	LTE-RF: TDD applicability and CR for Adjacent Channel Selectivity (ACS)	8.0.1	8.1.0
2009-03	RAN#43	R5-091017	0040	-	Removal of Rx Narrowband Intermod 7.8.2	8.0.1	8.1.0
2009-03	RAN#43	R5-091019	0041	-	Relocation of 36.521-1 Annex C DL mapping	8.0.1	8.1.0
2009-03	RAN#43	R5-091020	0042	-	Removal of "Out-of-synchronization handling of output power" heading	8.0.1	8.1.0
2009-03	RAN#43	R5-091023	0043	-	Test requirements of TDD PDSCH demodulation performance with user-specific reference symbols	8.0.1	8.1.0
2009-03	RAN#43	R5-091024	0044	-	CR to 36.521-1: Update of Annex F.3.2 Measurement of transmitter	8.0.1	8.1.0
2009-03	RAN#43	R5-091025	0045	-	CR to 36.521-1: Update of SEM and Additional SEM test cases	8.0.1	8.1.0
2009-03	RAN#43	R5-091077	0046	-	CR to 36.521-1: Addition of test combinations for test cases with MPR application	8.0.1	8.1.0
2009-03	RAN#43	R5-091082	0047	-	Spurious emission requirements on PHS band including the future plan in Japan	8.0.1	8.1.0
2009-03	RAN#43	R5-091101	0048	-	LTE-RF: CR for MPR test case	8.0.1	8.1.0
2009-03	RAN#43	R5-091106	0049	-	Update of Reference sensitivity test in 7.3	8.0.1	8.1.0
2009-03	RAN#43	R5-091111	0050	1	Update of initial conditions for Rx tests	8.0.1	8.1.0
2009-05	RAN#44	R5-092144	0051	-	LTE-RF: Resubmission of R5-086424 UE output power dynamics 36.521-1 v8.1.0 (re-submit no changes)	8.1.0	8.2.0
2009-05	RAN#44	R5-092146	0052	-	LTE-RF: CR for UE configured UE transmitted output power test case (re-submit no changes)	8.1.0	8.2.0
2009-05	RAN#44	R5-092147	0053	-	LTE-RF: CR for UE minimum output power test case (re-submit no change)	8.1.0	8.2.0
2009-05	RAN#44	R5-092149	0054	-	LTE-RF: CR for Power Control Absolute power tolerance test case (re-submit no changes)	8.1.0	8.2.0
2009-05	RAN#44	R5-092150	0055	-	LTE-RF: CR for Power Control Relative power tolerance test case (re-submit no changes)	8.1.0	8.2.0

2009-05	RAN#44	R5-092151	0056	-	LTE-RF: New test case for Aggregate power control tolerance (re-submit no changes)	8.1.0	8.2.0
2009-05	RAN#44	R5-092263	0057	-	Text proposal for Reporting of Channel State Information	8.1.0	8.2.0
2009-05	RAN#44	R5-092264	0058	-	Propagation conditions for CQI tests	8.1.0	8.2.0
2009-05	RAN#44	R5-092265	0059	-	Correction to Demodulation of PDCCH/PCFICH test cases	8.1.0	8.2.0
2009-05	RAN#44	R5-092273	0060	-	Mapping of downlink physical channels for TDD	8.1.0	8.2.0
2009-05	RAN#44	R5-092277	0061	-	Annex A RMC updates	8.1.0	8.2.0
2009-05	RAN#44	R5-092369	0062	-	Update of A.3.4.3 for RMC with UE-specific RS	8.1.0	8.2.0
2009-05	RAN#44	R5-092372	0063	-	Maintenance on Initial configurations for Perf TCs	8.1.0	8.2.0
2009-05	RAN#44	R5-092436	0064	-	CR to 36.521-1: Update of ACLR test case	8.1.0	8.2.0
2009-05	RAN#44	R5-092442	0065	-	CR to 36.521-1: Update of Spurious Emissions test case	8.1.0	8.2.0
2009-05	RAN#44	R5-092467	0066	-	LTE-RF: Transmit OFF Power update	8.1.0	8.2.0
2009-05	RAN#44	R5-092473	0067	-	LTE_RF - Update on TC 7.7 Spurious Response (re-submit with no changes)	8.1.0	8.2.0
2009-05	RAN#44	R5-092474	0068	-	LTE_RF - Update on TC 7.9 Spurious Emissions (re-submit with no changes)	8.1.0	8.2.0
2009-05	RAN#44	R5-092527	0069	-	Update of TDD PDSCH test cases	8.1.0	8.2.0
2009-05	RAN#44	R5-092602	0070	-	LTE-RF: CR for Maximum Power Reduction test case (re-submit no changes)	8.1.0	8.2.0
2009-05	RAN#44	R5-092603	0071	-	TP for Demodulation of TDD PDCCH/PCFICH	8.1.0	8.2.0
2009-05	RAN#44	R5-092605	0072	-	Mapping of uplink physical channels for FDD	8.1.0	8.2.0
2009-05	RAN#44	R5-092606	0073	-	Update of Annex C	8.1.0	8.2.0
2009-05	RAN#44	R5-092607	0074	-	CR to 36.521-1: Update of test parameters for Demodulation of PDSCH (FDD) tests	8.1.0	8.2.0
2009-05	RAN#44	R5-092614	0075	-	Update of SEM test case	8.1.0	8.2.0
2009-05	RAN#44	R5-092642	0076	-	Update of transmit quality test cases	8.1.0	8.2.0
2009-05	RAN#44	R5-092643	0077	-	Text proposal for TDD part of CQI Reporting under Fading conditions	8.1.0	8.2.0
2009-05	RAN#44	R5-092644	0078	-	Text proposal for TDD part of CQI Reporting under AWGN conditions	8.1.0	8.2.0
2009-05	RAN#44	R5-092645	0079	-	LTE-RF: Update of Additional Spectrum Emission mask Test case with TDD Uplink Test configuration	8.1.0	8.2.0
2009-05	RAN#44	R5-092649	0080	-	LTE-RF: CR for TDD DL RMC to be used in TX test cases	8.1.0	8.2.0
2009-05	RAN#44	R5-092653	0081	-	LTE-RF: CR for Additional Maximum Power Reduction test case	8.1.0	8.2.0
2009-05	RAN#44	R5-092661	0082	-	RMC update for PDCCH/PCFICH performance requirement	8.1.0	8.2.0
2009-05	RAN#44	RP-090444	1161	-	Test frequencies for Additional Spurious Emission test case	8.6.0	8.7.0
2009-05	RAN#44	R5-092366	0084	-	Update of 7.3.1	8.1.0	8.2.0
2009-05	RAN#44	R5-092440	0085	-	LTE-RF: CR for UE max output power test case	8.1.0	8.2.0
2009-05	RAN#44	R5-092472	0086	-	LTE_RF - Update on TC 7.6 Blocking Characteristics (re-submit with changes)	8.1.0	8.2.0
2009-05	RAN#44	R5-092636	0087	-	CR to 36.521-1 Addition of frequencies for band 18 and band 19	8.1.0	8.2.0
2009-05	RAN#44	R5-092652	0088	2	Improved stability of TC 7.8.5 Power Control in the DL from F-DPCH to HSUPA TC 5.2D and 5.13.2B	8.1.0	8.2.0
-	-	-	-	-	Editorial corrections	8.2.0	8.2.1
2009-09	RAN#45	R5-094032	0089	-	Correction CR to 36.521-1: Update of Requirements for Demodulation of PDSCH (FDD) tests	8.2.1	8.3.0
2009-09	RAN#45	R5-094034	0090	-	Correction CR to 36.521-1: Update of General Requirements for Demodulation tests	8.2.1	8.3.0
2009-09	RAN#45	R5-094214	0091	-	Update of In-band emissions	8.2.1	8.3.0
2009-09	RAN#45	R5-094215	0092	-	TDD Initial downlink channel setting	8.2.1	8.3.0
2009-09	RAN#45	R5-094216	0093	-	Correction to Annex B	8.2.1	8.3.0
2009-09	RAN#45	R5-094248	0094	-	CR to 36.521-1: Update to ACLR test case	8.2.1	8.3.0
2009-09	RAN#45	R5-094250	0095	-	CR to 36.521-1: Update to UE max output power test case	8.2.1	8.3.0
2009-09	RAN#45	R5-094281	0096	-	Mapping of uplink physical channels for TDD	8.2.1	8.3.0
2009-09	RAN#45	R5-094282	0097	-	LTE-RF: CR for notes in TDD DL RMC to be used in TX test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094283	0098	-	LTE-RF: message update to keep Tx power constant for some Rx test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094313	0099	-	LTE-RF: CR to test case for Aggregate power control tolerance	8.2.1	8.3.0
2009-09	RAN#45	R5-094317	0100	-	LTE-RF: CR for UE minimum output power test case for TDD	8.2.1	8.3.0
2009-09	RAN#45	R5-094318	0101	-	LTE-RF: CR for Power Control Relative power tolerance test case	8.2.1	8.3.0
2009-09	RAN#45	R5-094319	0102	-	In band emission for non-allocated RB	8.2.1	8.3.0
2009-09	RAN#45	R5-094320	0103	-	LTE RF: correction for subclause 6.6.2.2.5 (A-SEM) supported band list	8.2.1	8.3.0
2009-09	RAN#45	R5-094362	0104	-	Correction of RMCs (36.521 Annex A)	8.2.1	8.3.0
2009-09	RAN#45	R5-094363	0105	-	Usage of the Global In-Channels TX-Test across different Signal Quality tests.	8.2.1	8.3.0
2009-09	RAN#45	R5-094365	0106	-	LTE TX: 1to2 RX antenna	8.2.1	8.3.0
2009-09	RAN#45	R5-094367	0107	-	Correction to 6.6.2.2 Additional Spectrum Emission Mask	8.2.1	8.3.0

2009-09	RAN#45	R5-094370	0108	-	Correction to 6.6.2.3 ACLR	8.2.1	8.3.0
2009-09	RAN#45	R5-094371	0109	-	Correction to 6.7 TX Intermodulation	8.2.1	8.3.0
2009-09	RAN#45	R5-094374	0110	-	Correction to 7.6.1 In-Band Blocking	8.2.1	8.3.0
2009-09	RAN#45	R5-094375	0111	-	UE category (36.521 clause 8)	8.2.1	8.3.0
2009-09	RAN#45	R5-094378	0112	-	Completion of Global in-Channel TX-Test (36.521 Annex E)	8.2.1	8.3.0
2009-09	RAN#45	R5-094379	0113	-	Completion of Global in-Channel TX-Test with PRACH (36.521 Annex E)	8.2.1	8.3.0
2009-09	RAN#45	R5-094380	0114	-	Completion of Statistical testing (36.521 Annex G)	8.2.1	8.3.0
2009-09	RAN#45	R5-094385	0115	-	Correction to Annex D.2 Interference signals	8.2.1	8.3.0
2009-09	RAN#45	R5-094439	0116	-	Update for ACS	8.2.1	8.3.0
2009-09	RAN#45	R5-094661	0117	-	LTE RF - Core update on TC7.6.2 Out-of-band Blocking	8.2.1	8.3.0
2009-09	RAN#45	R5-094663	0118	-	LTE RF - Symbols Update on UL transmission configurations	8.2.1	8.3.0
2009-09	RAN#45	R5-094665	0119	-	LTE RF - Clarification for Test Configurations in General Section	8.2.1	8.3.0
2009-09	RAN#45	R5-094668	0120	-	LTE RF - Applicability of 6.2.3 MPR	8.2.1	8.3.0
2009-09	RAN#45	R5-094671	0121	-	LTE RF - Verification of UE Output Power in Out of Band Emission tests	8.2.1	8.3.0
2009-09	RAN#45	R5-094684	0122	-	CR to 36.521-1: Update to UE max output power test case	8.2.1	8.3.0
2009-09	RAN#45	R5-094686	0123	-	LTE-RF CR to 36.521-1: Update the E-UTRA channel numbers	8.2.1	8.3.0
2009-09	RAN#45	R5-094687	0124	-	LTE-RF: CR for UE maximum power reduction(MPR) test case	8.2.1	8.3.0
2009-09	RAN#45	R5-094699	0125	-	Update to SEM and spurious emissions TC	8.2.1	8.3.0
2009-09	RAN#45	R5-094706	0126	-	Resubmission-Update to the Requirements for frequency-selective fading test	8.2.1	8.3.0
2009-09	RAN#45	R5-094717	0127	-	Update of SEM	8.2.1	8.3.0
2009-09	RAN#45	R5-094718	0128	-	Update of initial conditions with Annex references	8.2.1	8.3.0
2009-09	RAN#45	R5-094721	0129	-	Update of 6.7 Tx Inter Mod	8.2.1	8.3.0
2009-09	RAN#45	R5-094725	0130	-	Correction to E-UTRA channel numbers for Band 2	8.2.1	8.3.0
2009-09	RAN#45	R5-094726	0131	-	Correction to Tx spurious emissions	8.2.1	8.3.0
2009-09	RAN#45	R5-094757	0132	-	Update of TDD PHICH test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094874	0133	-	Correction to Demodulation of PDCCH/PCFICH test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094902	0134	-	Addition of 15 MHz and 20 MHz bandwidths and corresponding sensitivity requirements into band 38	8.2.1	8.3.0
2009-09	RAN#45	R5-094903	0135	-	Correction CR to 36.521-1: Update of Transmitter tests network signalled parameter value	8.2.1	8.3.0
2009-09	RAN#45	R5-094905	0136	-	Update of TDD PDSCH test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094908	0137	-	LTE-RF: CR for Power Control Absolute power tolerance test case	8.2.1	8.3.0
2009-09	RAN#45	R5-094909	0138	-	Update to Output Power dynamics test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094913	0139	-	Clarification for downlink signal setting in RX tests	8.2.1	8.3.0
2009-09	RAN#45	R5-094914	0140	-	UL RB allocation for receiver tests	8.2.1	8.3.0
2009-09	RAN#45	R5-094915	0141	-	Update of TDD PCFICH/PDCCH test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094921	0142	-	Correction to CQI performance test case	8.2.1	8.3.0
2009-09	RAN#45	R5-094922	0143	-	Test description for CQI test cases under AWGN conditions	8.2.1	8.3.0
2009-09	RAN#45	R5-094923	0144	-	Resubmission - Requirements for PMI reporting (Single and Multiple PMI)	8.2.1	8.3.0
2009-09	RAN#45	R5-094966	0145	-	CR to 36.521-1: Addition of A-MPR for band 19	8.2.1	8.3.0
2009-09	RAN#45	R5-094976	0146	-	Without loop back: 6.2.2 UE maximum output power	8.2.1	8.3.0
2009-09	RAN#45	R5-094977	0147	-	Without loop back: 6.3.2 Minimum output power	8.2.1	8.3.0
2009-09	RAN#45	R5-094979	0148	-	LTE-RF: CR for UE configured UE transmitted output power test case	8.2.1	8.3.0
2009-09	RAN#45	R5-094980	0149	-	CR to 36.521-1: Definition of Maximum Power state in TX/RX test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094982	0150	1	Correction of Tx general description	8.2.1	8.3.0
2009-09	RAN#45	R5-094986	0151	-	Update of 6.6.1OBW	8.2.1	8.3.0
2009-09	RAN#45	R5-094989	0152	-	Correction to 1PRB tests in Demodulation of PDSCH	8.2.1	8.3.0
2009-09	RAN#45	R5-094995	0153	-	Correction CR to 36.521-1: Update of Requirements for Additional Maximum Power Reduction (A-MPR) test	8.2.1	8.3.0
2009-09	RAN#45	R5-094996	0154	-	Correction to Demodulation of PHICH test cases	8.2.1	8.3.0
2009-09	RAN#45	R5-094997	0155	-	EVM TC update	8.2.1	8.3.0
2009-09	RAN#45	R5-095300	0156	-	LTE-RF: test description update	8.2.1	8.3.0
2009-09	RAN#45	R5-095301	0157	-	Correction CR to 36.521-1: Addition of measurement uncertainty and test tolerances for A-MPR	8.2.1	8.3.0
2009-09	RAN#45	R5-095304	0158	-	Sorting out Demodulation of PDSCH for FDD	8.2.1	8.3.0
2009-09	-	-	-	-	TOC update and Annexes' titles formattings	8.3.0	8.3.1
2009-12	RAN#46	R5-095515	0159	-	Correction CR to 36.521-1: Additional Spectrum Emission Mask test need to be updated to include the network signalled value "NS_07ö message contents exceptions	8.3.1	8.4.0
2009-12	RAN#46	R5-095589	0160	-	Update for test period description in the general section	8.3.1	8.4.0
2009-12	RAN#46	R5-095657	0161	-	LTE-RF: CR for Power Control Absolute power tolerance test case	8.3.1	8.4.0
2009-12	RAN#46	R5-095661	0162	-	LTE-RF: CR for UE minimum output power test case	8.3.1	8.4.0

2009-12	RAN#46	R5-095735	0163	-	Corrections to Annex A.4	8.3.1	8.4.0
2009-12	RAN#46	R5-095766	0164	-	LTE-RF: CR for In band emission for non-allocated RB	8.3.1	8.4.0
2009-12	RAN#46	R5-095790	0165	-	Completion of Statistical testing (36.521 Annex G)	8.3.1	8.4.0
2009-12	RAN#46	R5-095791	0166	-	Corrections to Annex E	8.3.1	8.4.0
2009-12	RAN#46	R5-096058	0167	-	Removal of [ ] from 7.6.1, 7.8.1, and 7.5 of Annex F3.3	8.3.1	8.4.0
2009-12	RAN#46	R5-096096	0168	-	Update on 8.2.1	8.3.1	8.4.0
2009-12	RAN#46	R5-096105	0169	-	LTE RF: Symbols Update on Configured UE Transmitted Power	8.3.1	8.4.0
2009-12	RAN#46	R5-096204	0170	-	LTE-RF: CR to Transmission signal quality	8.3.1	8.4.0
2009-12	RAN#46	R5-096208	0171	-	LTE-RF: CR for Power Control Relative power tolerance test case	8.3.1	8.4.0
2009-12	RAN#46	R5-096210	0172	-	LTE-RF: CR to ON/OFF Time mask test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096211	0173	-	Measurement period for TX-Tests	8.3.1	8.4.0
2009-12	RAN#46	R5-096213	0174	-	CR to 36.521-1: Update to Spurious Emissions test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096214	0175	-	CR to 36.521-1: Update to ACLR test case	8.3.1	8.4.0
2009-12	RAN#46	R5-096219	0176	-	LTE-RF: CR for UE configured UE transmitted output power test case	8.3.1	8.4.0
2009-12	RAN#46	R5-096222	0177	-	Test description for CQI test cases under AWGN conditions	8.3.1	8.4.0
2009-12	RAN#46	R5-096223	0178	-	LTE RF: Blocking Characteristics update	8.3.1	8.4.0
2009-12	RAN#46	R5-096224	0179	-	LTE RF: Spurious Response Update	8.3.1	8.4.0
2009-12	RAN#46	R5-096228	0180	-	LTE-RF: CR for MPR test case	8.3.1	8.4.0
2009-12	RAN#46	R5-096229	0204	2	CR to 36.521-1: Update to A-MPR test case	8.3.1	8.4.0
2009-12	RAN#46	R5-096230	0181	-	LTE RF: Applicability of 6.2.4 A-MPR	8.3.1	8.4.0
2009-12	RAN#46	R5-096231	0182	-	Correction to Demodulation of PHICH test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096235	0183	-	Introduction of CQI reporting test with frequency-selective interference	8.3.1	8.4.0
2009-12	RAN#46	R5-096239	0184	-	Update to the test procedure and message contents of TDD PMI reporting test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096240	0205	-	CR to 36.521-1: Update to Derivation of Test Requirements for A-MPR	8.3.1	8.4.0
2009-12	RAN#46	R5-096241	0185	-	Measurement uncertainties and Test Tolerances for transmit quality test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096242	0186	-	Update for 36.521-1 Annex A	8.3.1	8.4.0
2009-12	RAN#46	R5-096289	0187	-	CR on 36.521-1, 'Introduction of clause 8.2.1.1 test case uncertainties and Test Tolerances'	8.3.1	8.4.0
2009-12	RAN#46	R5-096306	0188	-	Update to the test procedure of SEM test cases of 36.521-1	8.3.1	8.4.0
2009-12	RAN#46	R5-096311	0189	-	Update of 6.6.1 OBW	8.3.1	8.4.0
2009-12	RAN#46	R5-096312	0190	-	Correction to SEM	8.3.1	8.4.0
2009-12	RAN#46	R5-096313	0191	-	Update of 6.7 Transmit intermodulation	8.3.1	8.4.0
2009-12	RAN#46	R5-096315	0192	-	CR to 36.521-1: Update to UE max output power test case	8.3.1	8.4.0
2009-12	RAN#46	R5-096316	0193	-	CR to 36.521-1: Update to Additional Spurious Emissions test case	8.3.1	8.4.0
2009-12	RAN#46	R5-096317	0194	-	CR to TDD PHICH demodulation test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096318	0195	-	Correction to FDD PMI reporting test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096320	0196	-	Tx power range and core update for Receiver tests	8.3.1	8.4.0
2009-12	RAN#46	R5-096322	0197	-	Update on 7.4, 7.5, and 7.8.1	8.3.1	8.4.0
2009-12	RAN#46	R5-096323	0198	-	Introduction of RI reporting test	8.3.1	8.4.0
2009-12	RAN#46	R5-096333	0199	-	Update to 6.5 Transmit signal quality test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096334	0200	-	LTE-RF: CR for Aggregate power control tolerance test case	8.3.1	8.4.0
2009-12	RAN#46	R5-096335	0201	-	Correction CR to 36.521-1: Update for Demodulation of PDSCH (FDD) tests to correct CR merges results from RAN5#44	8.3.1	8.4.0
2009-12	RAN#46	R5-096336	0206	1	Update TDD PDSCH test cases	8.3.1	8.4.0
2009-12	RAN#46	R5-096338	0202	-	Number of used HARQ processes in DL Performance tests	8.3.1	8.4.0
2009-12	RAN#46	R5-096342	0207	2	Minimum test time for performance tests	8.3.1	8.4.0
2009-12	RAN#46	R5-096718	0203	-	LTE RF: A-SEM update and A-MPR verification	8.3.1	8.4.0
2010-03	RAN#47	R5-100353	0208	-	LTE-RF CR to 36.521-1:TIME MASK test case updated	8.4.0	8.5.0
2010-03	RAN#47	R5-100354	0209	-	LTE-RF: CR for A-MPR notation in NS_07	8.4.0	8.5.0
2010-03	RAN#47	R5-100403	0210	-	LTE-RF: CR for Tx Intermodulation test case	8.4.0	8.5.0
2010-03	RAN#47	R5-100404	0211	-	LTE-RF: CR for OBW measurement period alignment	8.4.0	8.5.0
2010-03	RAN#47	R5-100408	0212	-	Reporting mode, Reporting Interval and Editorial corrections for demodulation	8.4.0	8.5.0
2010-03	RAN#47	R5-100456	0213	-	Misc update on MAC padding in Rx and performance sections	8.4.0	8.5.0
2010-03	RAN#47	R5-100566	0214	-	Missing Test limits in 36.521-1 Annex G	8.4.0	8.5.0
2010-03	RAN#47	R5-100567	0215	-	Wrong references from 36.521-1 clauses 8.4 and 8.5 into Annex G	8.4.0	8.5.0
2010-03	RAN#47	R5-100569	0216	-	Typos in 36.521-1, Annex E	8.4.0	8.5.0
2010-03	RAN#47	R5-100571	0217	-	Minimum test time for performance tests	8.4.0	8.5.0
2010-03	RAN#47	R5-100572	0218	-	Correction to 6.6.3.3 Additional spurious emissions	8.4.0	8.5.0
2010-03	RAN#47	R5-100790	0219	-	DL-RMC-s for transmitter tests: Corrections	8.4.0	8.5.0
2010-03	RAN#47	R5-100800	0220	-	Update of Test environment for RF test	8.4.0	8.5.0
2010-03	RAN#47	R5-100803	0221	-	Spectrum emission mask: Correction to uplink configuration	8.4.0	8.5.0

2010-03	RAN#47	R5-100807	0222	-	Performance tests: Scheduling of retransmissions	8.4.0	8.5.0
2010-03	RAN#47	R5-100810	0223	-	UL-RMC-s: Corrections and completion	8.4.0	8.5.0
2010-03	RAN#47	R5-100814	0224	-	Corrections to Cl 5.4.2.1 of TS 36.521-1	8.4.0	8.5.0
2010-03	RAN#47	R5-100815	0225	-	LTE-RF: CR for UE configured UE transmitted output power test case	8.4.0	8.5.0
2010-03	RAN#47	R5-100816	0226	-	LTE-RF: CR for Power Control Relative power tolerance test case	8.4.0	8.5.0
2010-03	RAN#47	R5-100822	0227	-	CR to 36.521-1: Update to Maximum output power	8.4.0	8.5.0
2010-03	RAN#47	R5-100823	0228	-	CR to 36.521-1: Update to ACLR test case	8.4.0	8.5.0
2010-03	RAN#47	R5-100825	0229	-	CR to 36.521-1: Update to Additional Tx spurious emissions test case	8.4.0	8.5.0
2010-03	RAN#47	R5-100826	0230	-	RMC-s and OCNG patterns: Update according 36.101 8.8.0	8.4.0	8.5.0
2010-03	RAN#47	R5-100827	0231	-	Receiver and performance tests: Update use of OCNG according 36.101 8.8.0	8.4.0	8.5.0
2010-03	RAN#47	R5-100828	0232	-	Update of PDSCH Demodulation Tests	8.4.0	8.5.0
2010-03	RAN#47	R5-100831	0233	-	Introduction of clause 8.2.1.2, 8.2.1.3, 8.2.1.4 test case uncertainties and Test Tolerances	8.4.0	8.5.0
2010-03	RAN#47	R5-100832	0234	-	Clarifications on DRS performance test case	8.4.0	8.5.0
2010-03	RAN#47	R5-100833	0235	-	Misc update on MAC padding in PDCCH, CSI test	8.4.0	8.5.0
2010-03	RAN#47	R5-100834	0236	-	Updates to the TDD portion of CQI reporting test cases under AWGN	8.4.0	8.5.0
2010-03	RAN#47	R5-100838	0237	-	Editorial Correction to 8.2.1.3	8.4.0	8.5.0
2010-03	RAN#47	R5-100839	0238	-	Update on Annex C for 36.521-1	8.4.0	8.5.0
2010-03	RAN#47	R5-100840	0239	-	Update on MAC padding in TDD PMI test case 9.4 of 36.521-1.	8.4.0	8.5.0
2010-03	RAN#47	R5-100841	0240	-	Correction to CQI test cases under AWGN conditions	8.4.0	8.5.0
2010-03	RAN#47	R5-100842	0241	-	Correction to CQI test cases under fading conditions	8.4.0	8.5.0
2010-03	RAN#47	R5-100843	0242	-	Correction to PMI reporting test cases	8.4.0	8.5.0
2010-03	RAN#47	R5-100845	0243	-	CSI: Corrections to tests titles and RI clause structure	8.4.0	8.5.0
2010-03	RAN#47	R5-100848	0244	-	CR to 36.521-1: Update LTE RF test cases with test requirements for extended LTE1500MHz	8.4.0	8.5.0
2010-03	RAN#47	R5-100886	0245	-	Transmitter characteristics: UE Categories and other corrections	8.4.0	8.5.0
2010-03	RAN#47	R5-100887	0246	-	CR to 36.521-1: Update to Tx spurious emissions and Spurious emission band UE co-existence	8.4.0	8.5.0
2010-03	RAN#47	R5-100888	0247	-	Clarification on notes in Max Power	8.4.0	8.5.0
2010-03	RAN#47	R5-100889	0248	-	Maximum input level: Corrections w.r.t. UE categories	8.4.0	8.5.0
2010-03	RAN#47	R5-100891	0249	-	Correction to PDCCH demodulation test cases	8.4.0	8.5.0
2010-03	RAN#47	R5-100892	0250	-	Correction to PHICH demodulation test cases	8.4.0	8.5.0
2010-03	RAN#47	R5-100907	0251	-	Update of RI reporting test case	8.4.0	8.5.0
2010-03	RAN#47	R5-100909	0252	-	Correction to set UL power in Rx TCs	8.4.0	8.5.0
2010-03	RAN#47	-	-	-	Moved to v9.0.0 with no change	8.5.0	9.0.0
2010-06	RAN#48	R5-103102	0253	-	CR to 36.521-1: Update of EARFCN for band 21	9.0.0	9.1.0
2010-06	RAN#48	R5-103103	0254	-	CR to 36.521-1: Update of A-MPR test case with band 21	9.0.0	9.1.0
2010-06	RAN#48	R5-103104	0255	-	CR to 36.521-1: Update of Additional Spurious test case with band 21	9.0.0	9.1.0
2010-06	RAN#48	R5-103106	0256	-	CR to 36.521-1: Update to ACLR test case	9.0.0	9.1.0
2010-06	RAN#48	R5-103108	0257	-	CR to 36.521-1: Update of Reference sensitivity level test case	9.0.0	9.1.0
2010-06	RAN#48	R5-103226	0258	-	CR to 36.521-1: Update of UE RF requirements for LTE, Band 20	9.0.0	9.1.0
2010-06	RAN#48	R5-103263	0259	-	LTE-RF: Updates of PDCCH demodulation test cases (FDD and TDD)	9.0.0	9.1.0
2010-06	RAN#48	R5-103265	0260	-	LTE-RF:CR for TDD ACK/NACK feedback mode in CQI BLER test cases	9.0.0	9.1.0
2010-06	RAN#48	R5-103288	0261	-	PDCCH Aggregation level for RF tests	9.0.0	9.1.0
2010-06	RAN#48	R5-103291	0262	-	Update and correction to UE maximum output power requirements	9.0.0	9.1.0
2010-06	RAN#48	R5-103293	0263	-	Editorial correction in In-band blocking test	9.0.0	9.1.0
2010-06	RAN#48	R5-103296	0264	-	Correction to additional spectrum emission mask test configuration	9.0.0	9.1.0
2010-06	RAN#48	R5-103300	0265	-	Corrections to Uplink RMC-s	9.0.0	9.1.0
2010-06	RAN#48	R5-103450	0266	-	LTE-RF: editorial CR for TC 7.6.2 and 7.7	9.0.0	9.1.0
2010-06	RAN#48	R5-103471	0267	-	Minimum test time for performance tests	9.0.0	9.1.0
2010-06	RAN#48	R5-103476	0268	-	EVM with exclusion period (annex)	9.0.0	9.1.0
2010-06	RAN#48	R5-103521	0269	-	CR on 36.521-1 for updating the "Reporting of Channel State Information"	9.0.0	9.1.0
2010-06	RAN#48	R5-103525	0270	-	CR on 36.521-1 for corrections in UE RF requirements	9.0.0	9.1.0
2010-06	RAN#48	R5-103598	0271	-	Correction to notes in Max Power	9.0.0	9.1.0
2010-06	RAN#48	R5-103602	0272	-	Clarification of measurement conditions for Rx spurious emission	9.0.0	9.1.0
2010-06	RAN#48	R5-103726	0273	-	CR to 36.521-1: Update of Spurious emission band UE co-existence test case	9.0.0	9.1.0
2010-06	RAN#48	R5-103727	0274	-	LTE-RF: CR for Prach time mask test case	9.0.0	9.1.0

2010-06	RAN#48	R5-103728	0275	-	LTE-RF: CR for General ON/OFF time mask test case	9.0.0	9.1.0
2010-06	RAN#48	R5-103729	0276	-	LTE-RF: Update to spectrum flatness test case and relevant annexes	9.0.0	9.1.0
2010-06	RAN#48	R5-103730	0277	-	LTE-RF:CR for test case of In-band emissions	9.0.0	9.1.0
2010-06	RAN#48	R5-103731	0278	-	EVM with exclusion period (test)	9.0.0	9.1.0
2010-06	RAN#48	R5-103732	0279	-	CR to 36.521-1 on Correction to Demodulation Requirements for PDSCH	9.0.0	9.1.0
2010-06	RAN#48	R5-103733	0280	-	CR to 36.521-1: Update PDCCH DCI Formats for Open Loop and Closed Loop Spatial Multiplexing Test Cases	9.0.0	9.1.0
2010-06	RAN#48	R5-103751	0281	-	Misc update in CSI tests	9.0.0	9.1.0
2010-06	RAN#48	R5-103752	0282	-	Correction of the statistical part in PMI and RI tests	9.0.0	9.1.0
2010-06	RAN#48	R5-103753	0283	-	LTE-RF:CR to downlink RMCs for TX characteristics	9.0.0	9.1.0
2010-06	RAN#48	R5-103754	0284	-	LTE-RF: Update of annex C	9.0.0	9.1.0
2010-06	RAN#48	R5-103756	0285	-	Measuring throughput ratios (Annex G)	9.0.0	9.1.0
2010-06	RAN#48	R5-103763	0286	-	LTE-RF: CR for Minimum output power test case	9.0.0	9.1.0
2010-06	RAN#48	R5-103764	0287	-	Performance, CSI reporting and uncertainties for UEs with multiple Rx antennas	9.0.0	9.1.0
2010-06	RAN#48	R5-103771	0288	-	Introduction of clause 8.4.1 and 8.5.1 test case uncertainties and Test Tolerances	9.0.0	9.1.0
2010-06	RAN#48	R5-103778	0291	-	Uplink power for receiver tests	9.0.0	9.1.0
2010-06	RAN#48	R5-103780	0292	1	Addition of the exceptional message for In-band emissions	9.0.0	9.1.0
2010-06	RAN#48	R5-103781	0289	-	Correction to 6.5.2.1 EVM	9.0.0	9.1.0
2010-06	RAN#48	R5-103782	0290	-	Correction to CQI reporting	9.0.0	9.1.0
2010-09	RAN#49	R5-104090	0294	-	Corrections to Spectrum emission mask test regarding UE category	9.1.0	9.2.0
2010-09	RAN#49	R5-104091	0295	-	Missing note in Additional spurious emission test with NS_07	9.1.0	9.2.0
2010-09	RAN#49	R5-104095	0296	-	PDCCH Aggregation level for CSI tests	9.1.0	9.2.0
2010-09	RAN#49	R5-104096	0297	-	Default initial and connection Uplink power for RF tests	9.1.0	9.2.0
2010-09	RAN#49	R5-104212	0298	-	Limits on Uplink power for Receiver tests	9.1.0	9.2.0
2010-09	RAN#49	R5-104244	0299	-	Correction to Demodulation Requirements	9.1.0	9.2.0
2010-09	RAN#49	R5-104461	0300	-	CR to 36.521-1: Editorial Corrections for Closed Loop Spatial Multiplexing Test Cases	9.1.0	9.2.0
2010-09	RAN#49	R5-104478	0301	-	Correction to Test requirements in 6.5.2.2	9.1.0	9.2.0
2010-09	RAN#49	R5-104482	0302	-	Correction to 8.2.1.1	9.1.0	9.2.0
2010-09	RAN#49	R5-104520	0303	-	36521-1 General update of sections 00 to 08: missing Introduction references formatting	9.1.0	9.2.0
2010-09	RAN#49	R5-104583	0304	-	No necessity to apply - consecutive time slots for EVM	9.1.0	9.2.0
2010-09	RAN#49	R5-104584	0305	-	Correction to E.4.4 EVM equalizer spectrum flatness	9.1.0	9.2.0
2010-09	RAN#49	R5-104630	0306	-	Correction of table reference in In-band emissions test	9.1.0	9.2.0
2010-09	RAN#49	R5-104808	0307	-	CR to 36.521-1: Update to Additional Spectrum Emission Mask test case	9.1.0	9.2.0
2010-09	RAN#49	R5-104809	0308	-	CR to 36.521-1: Update to Spurious emission band UE co-existence test case	9.1.0	9.2.0
2010-09	RAN#49	R5-104810	0309	-	LTE-RF: CR for Max Output Power	9.1.0	9.2.0
2010-09	RAN#49	R5-104811	0310	-	LTE-RF: CR for Freq Error	9.1.0	9.2.0
2010-09	RAN#49	R5-104812	0311	-	Introduction of exclusion period for PUCCH-EVM test in clause 6.5.3	9.1.0	9.2.0
2010-09	RAN#49	R5-104813	0312	-	Correction to Demodulation UE-Specific Reference Symbols	9.1.0	9.2.0
2010-09	RAN#49	R5-104814	0313	-	Uncertainties and Test Tolerances for CSI Test cases 9.2.1.1 and 9.2.1.2	9.1.0	9.2.0
2010-09	RAN#49	R5-104815	0314	-	Uncertainties and Test Tolerances for CSI Test cases 9.2.2.1 and 9.2.2.2	9.1.0	9.2.0
2010-09	RAN#49	R5-104816	0315	-	UE applicability for CSI test cases	9.1.0	9.2.0
2010-09	RAN#49	R5-104817	0316	-	Update of CQI reporting TCs under fading conditions	9.1.0	9.2.0
2010-09	RAN#49	R5-104818	0317	-	Update of Reporting of Precoding Matrix Indicator TCs	9.1.0	9.2.0
2010-09	RAN#49	R5-104819	0318	-	Correction of the statistical part 9.3.1.1.1 (CQI Reporting under fading conditions)	9.1.0	9.2.0
2010-09	RAN#49	R5-104820	0319	-	Correction of the statistical part 9.3.3.1.1 (CQI Reporting under fading conditions)	9.1.0	9.2.0
2010-09	RAN#49	R5-104821	0320	-	Correction of the statistical part 9.3.2.1.1 (CQI Reporting under fading conditions)	9.1.0	9.2.0
2010-09	RAN#49	R5-104822	0321	-	Update and new RMC-s for CQI tests	9.1.0	9.2.0
2010-09	RAN#49	R5-104823	0322	-	Correction of EVM calculation in annex	9.1.0	9.2.0
2010-09	RAN#49	R5-104824	0323	-	Introduction of exclusion period for PUCCH-EVM test in Annex E	9.1.0	9.2.0
2010-09	RAN#49	R5-104844	0324	-	Pcmax changes to Configured UE Transmitted Output Power	9.1.0	9.2.0
2010-09	RAN#49	R5-104845	0325	-	Clarification on the frequency range with net work signal in 6.6.3.2	9.1.0	9.2.0
2010-09	RAN#49	R5-104846	0326	-	Update of editor's notes	9.1.0	9.2.0
2010-09	RAN#49	R5-104847	0327	-	Removal of Extreme Conditions in 6.2.3	9.1.0	9.2.0
2010-09	RAN#49	R5-104850	0328	-	Corrections to Test procedure loop in CSI tests	9.1.0	9.2.0
2010-09	RAN#49	R5-104851	0329	-	Introduction of TDD CQI Reporting under fading conditions and frequency-selective interference test case	9.1.0	9.2.0

2010-09	RAN#49	R5-104852	0330	-	Introduction of TDD RI Reporting test case	9.1.0	9.2.0
2010-09	RAN#49	R5-104853	0331	-	Update of CQI reporting TCs under AWGN conditions	9.1.0	9.2.0
2010-09	RAN#49	R5-104854	0332	-	Update of FDD RI Reporting TC	9.1.0	9.2.0
2010-09	RAN#49	R5-104857	0333	-	CR to 36.521-1 LTE UE Tx_RX test cases band 20	9.1.0	9.2.0
2010-09	RAN#49	R5-104861	0334	-	Corrections to Test requirements for MPR test	9.1.0	9.2.0
2010-09	RAN#49	R5-104863	0335	-	Clarification on notes in Max Power	9.1.0	9.2.0
2010-09	RAN#49	R5-104872	0336	-	Correction to 6.3.5.2	9.1.0	9.2.0
2010-09	RAN#49	R5-104873	0337	-	Numbering and alignment of TDD PHICH demod test cases	9.1.0	9.2.0
2010-09	RAN#49	R5-104874	0338	-	Correction to test numbering for exceptional messages in 8.2.x.x	9.1.0	9.2.0
2010-09	RAN#49	R5-104875	0339	-	Correction to 9.2.2	9.1.0	9.2.0
2010-09	RAN#49	R5-104876	0340	-	Correction to the test procedures of 9.3.x	9.1.0	9.2.0
2010-09	RAN#49	R5-104877	0341	-	Correction to 9.4.x	9.1.0	9.2.0
2010-09	RAN#49	R5-104878	0342	-	The new reference of connection diagram for 9.3.3	9.1.0	9.2.0
2010-09	RAN#49	R5-104879	0343	-	Correction to 6.3.4.1 and 6.3.5.1	9.1.0	9.2.0
2010-09	RAN#49	R5-104888	0344	-	Update of Annex C.2 for AG level	9.1.0	9.2.0
2010-09	RAN#49	R5-105055	0345	-	Introduction of a new RF test case (8.7) to verify downlink sustained data rate performance	9.1.0	9.2.0
2010-09	RAN#49	R5-105061	0347	-	CR to 36.521-1: Modification to Additional Maximum Power Reduction Test Case	9.1.0	9.2.0
2010-09	RAN#49	R5-105062	0348	-	Modification to Additional Spectrum Emission Mask	9.1.0	9.2.0
2010-09	RAN#49	R5-105063	0349	-	Modification to Additional Spurious Emissions	9.1.0	9.2.0
2010-09	RAN#49	R5-105064	0350	-	Modification to Maximum Power Reduction	9.1.0	9.2.0
2010-09	RAN#49	R5-105065	0351	-	Modification to Adjacent Channel Leakage Power Ratio	9.1.0	9.2.0
2010-09	RAN#49	RP-100987	0352	-	Correction of status for RF performance test case	9.1.0	9.2.0
2010-12	RAN#50	R5-106073	0353	-	Corrections to receiver spurious emissions test	9.2.0	9.3.0
2010-12	RAN#50	R5-106074	0354	-	Update of downlink power for receiver tests	9.2.0	9.3.0
2010-12	RAN#50	R5-106076	0355	-	CQI: Side condition when CQI median equals min or max CQI-values	9.2.0	9.3.0
2010-12	RAN#50	R5-106077	0356	-	Update of the throughput-definition for multi-data stream transmission	9.2.0	9.3.0
2010-12	RAN#50	R5-106078	0357	-	Update of RF OCNG patterns	9.2.0	9.3.0
2010-12	RAN#50	R5-106092	0358	-	Correction of DCI format used in PDSCH performance test 8.2.1.4.2	9.2.0	9.3.0
2010-12	RAN#50	R5-106249	0359	-	CR to 36.521-1: Correction to Spurious emission band UE co-existence test case	9.2.0	9.3.0
2010-12	RAN#50	R5-106250	0360	-	CR to 36.521-1: Correction to Additional Tx spurious emissions test case	9.2.0	9.3.0
2010-12	RAN#50	R5-106374	0361	-	Correction of FDD CQI reporting test under AWGN - PUCCH 1-1	9.2.0	9.3.0
2010-12	RAN#50	R5-106394	0362	-	Correction of clause 9.3.1 and 9.3.3	9.2.0	9.3.0
2010-12	RAN#50	R5-106399	0363	-	"Correction of G.2.5 Pass fail decision rules"	9.2.0	9.3.0
2010-12	RAN#50	R5-106420	0364	-	Introduction of test uncertainties and tolerances for TDD PDSCH DRS test cases	9.2.0	9.3.0
2010-12	RAN#50	R5-106440	0365	-	Correction to unsigned numbers in Annex F.1.2	9.2.0	9.3.0
2010-12	RAN#50	R5-106443	0366	-	Correction to the exceptional messages in 9.4 Reporting of PMI TCs	9.2.0	9.3.0
2010-12	RAN#50	R5-106491	0367	-	CR to 36.521-1: Correction to Table Numbering Error in TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2	9.2.0	9.3.0
2010-12	RAN#50	R5-106512	0368	-	Transport format table clarification in CSI test cases	9.2.0	9.3.0
2010-12	RAN#50	R5-106801	0369	-	HARQ scheduling in TDD performance tests using special subframes	9.2.0	9.3.0
2010-12	RAN#50	R5-106803	0370	-	Correction to Fading Profiles in TCs 8.4 and 8.5	9.2.0	9.3.0
2010-12	RAN#50	R5-106816	0372	-	CR to 36.521-1: Modification to Spectrum Emissions Mask	9.2.0	9.3.0
2010-12	RAN#50	R5-106817	0373	-	Introduction of test uncertainties and tolerances for TDD PCFICH/PDCCH and PHICH test cases	9.2.0	9.3.0
2010-12	RAN#50	R5-106818	0374	-	Update of TDD PDSCH CRS Demodulation test cases	9.2.0	9.3.0
2010-12	RAN#50	R5-106821	0375	-	PUSCH-EVM with exclusion period	9.2.0	9.3.0
2010-12	RAN#50	R5-106822	0376	-	Maintenance of Band 20 for receiver tests	9.2.0	9.3.0
2010-12	RAN#50	R5-106823	0377	-	Completion of clause 9.3.1 and 9.3.2	9.2.0	9.3.0
2010-12	RAN#50	R5-106824	0378	-	Update of FDD RI Reporting TC	9.2.0	9.3.0
2010-12	RAN#50	R5-106825	0379	-	Correction to 9.2.2 CQI TCs	9.2.0	9.3.0
2010-12	RAN#50	R5-106826	0380	-	G.3.5 on PDCCH&PHICH Minimum Test Times	9.2.0	9.3.0
2010-12	RAN#50	R5-106827	0381	-	Completion of test time and  -TT for clauses 9.3 to 9.5	9.2.0	9.3.0
2010-12	RAN#50	R5-106828	0382	-	EVM window length for PRACH	9.2.0	9.3.0
2010-12	RAN#50	R5-106842	0383	-	Modification of TC 8.3.2.1 - TDD PDSCH Single-layer SM Performance (UE-Specific Reference Symbols)	9.2.0	9.3.0
2010-12	RAN#50	R5-106843	0384	-	Power control relative power tolerance: Missing band edge relaxation	9.2.0	9.3.0
2010-12	RAN#50	R5-106844	0385	-	SRS time mask test procedure update	9.2.0	9.3.0
2010-12	RAN#50	R5-106845	0386	-	Correction of TC General ON/OFF time mask	9.2.0	9.3.0

2010-12	RAN#50	R5-106846	0387	-	Update of TDD CQI reporting test under frequency selective interference conditions	9.2.0	9.3.0
2010-12	RAN#50	R5-106847	0388	-	Update of TDD RI reporting test	9.2.0	9.3.0
2010-12	RAN#50	R5-106848	0389	-	Iot setting in CQI test clarification	9.2.0	9.3.0
2010-12	RAN#50	R5-106850	0390	-	Correction of Test Uncertainties and Test Tolerances for Reference Sensitivity-Band 4	9.2.0	9.3.0
2010-12	RAN#50	R5-106855	0391	-	Correction to DL and UL RMC configurations in 6.5.1 Frequency Error	9.2.0	9.3.0
2010-12	RAN#50	R5-106858	0392	-	CR to 36.521-1: Update LTE RF test cases with test requirements for EUTRA TDD LTE band 41.	9.2.0	9.3.0
2011-03	RAN#51	R5-110138	0393	-	Spurious emission band co-existence test: Remaining old test requirement table	9.3.0	9.4.0
2011-03	RAN#51	R5-110139	0394	-	Transmit intermodulation test: Interferer offset for Band 20, Bandwidth 20 MHz	9.3.0	9.4.0
2011-03	RAN#51	R5-110141	0395	-	PMI Performance tests: Corrections to test settings	9.3.0	9.4.0
2011-03	RAN#51	R5-110143	0396	-	PDCCH Performance test: Correction to TDD DL RMC-s	9.3.0	9.4.0
2011-03	RAN#51	R5-110144	0397	-	OCNG for RF tests: Updates	9.3.0	9.4.0
2011-03	RAN#51	R5-110158	0398	-	CQI Performance tests: Clarification on subbands used in the test	9.3.0	9.4.0
2011-03	RAN#51	R5-110302	0399	-	LTE RF: PCFICH/PDCCH Transmit Diversity Performance	9.3.0	9.4.0
2011-03	RAN#51	R5-110349	0401	-	Correction of OFF power measurements in 6.3.4 ON/OFF time mask	9.3.0	9.4.0
2011-03	RAN#51	R5-110354	0402	-	Correction of Annex E (Global In-Channel TX-Test)	9.3.0	9.4.0
2011-03	RAN#51	R5-110506	0403	-	Addition of 3500 MHz TDD bands into chapter 5 of 36.521-1	9.3.0	9.4.0
2011-03	RAN#51	R5-110747	0404	-	Updates to section 8.7 DL sustained data rate test case	9.3.0	9.4.0
2011-03	RAN#51	R5-110850	0405	-	Sustained data rate: Definition of UL RMC-s	9.3.0	9.4.0
2011-03	RAN#51	R5-110860	0400	-	Update measurement period from test procedure of 6.2.2	9.3.0	9.4.0
2011-03	RAN#51	R5-110861	0428	-	A-MPR Test requirement update	9.3.0	9.4.0
2011-03	RAN#51	R5-110862	0437	-	Measuring throughput with different payload size.	9.3.0	9.4.0
2011-03	RAN#51	R5-110900	0406	-	Correction to SNR reference in FDD PCFICH/PDCCH Single Antenna Port Performance Test	9.3.0	9.4.0
2011-03	RAN#51	R5-110901	0407	-	CR to 36.521-1: Correction of Additional Maximum Power Reduction (A-MPR) test case	9.3.0	9.4.0
2011-03	RAN#51	R5-110915	0408	-	Uncertainties and Test Tolerances for CSI Test cases 9.3.1.1.x and 9.3.2.1.x	9.3.0	9.4.0
2011-03	RAN#51	R5-110916	0409	-	Uncertainties and Test Tolerances for CSI Test cases 9.3.3.1.x	9.3.0	9.4.0
2011-03	RAN#51	R5-110917	0410	-	Uncertainties and Test Tolerances for CSI Test cases 9.4.1.1.x and 9.4.2.1.x	9.3.0	9.4.0
2011-03	RAN#51	R5-110918	0411	-	Uncertainties and Test Tolerances for CSI Test cases 9.5.1.x	9.3.0	9.4.0
2011-03	RAN#51	R5-110919	0412	-	Editorial errors in CSI test cases 9.2.1.x Test procedure	9.3.0	9.4.0
2011-03	RAN#51	R5-110933	0413	-	Handling of different releases in RAN5 LTE RF specification	9.3.0	9.4.0
2011-03	RAN#51	R5-110938	0414	-	PRACH Time mask and EVM tests: TDD Special subframe configuration	9.3.0	9.4.0
2011-03	RAN#51	R5-110939	0415	-	Update on PRACH time mask for TDD	9.3.0	9.4.0
2011-03	RAN#51	R5-110940	0416	-	Correction of the connection diagram reference in the initial conditions for Transmitter Characteristics	9.3.0	9.4.0
2011-03	RAN#51	R5-110941	0417	-	Update of the reference sensitivity requirement for the 1.4MHz and 3MHz bandwidths and note correction for Band 3 and Band 9	9.3.0	9.4.0
2011-03	RAN#51	R5-110942	0418	-	CR Removing brackets of band 41 reference sensitivity in 36.521-1	9.3.0	9.4.0
2011-03	RAN#51	R5-110949	0419	-	PDCCH and PHICH performance tests: Updates and corrections	9.3.0	9.4.0
2011-03	RAN#51	R5-110950	0420	-	Addition of CodeBookSubsetRestriction bitmap for Multi-Layer Spatial Multiplexing	9.3.0	9.4.0
2011-03	RAN#51	R5-110951	0421	-	Addition of exceptional message in 8.4.1.2.2	9.3.0	9.4.0
2011-03	RAN#51	R5-110952	0422	-	CQI test 9.2.2.2: Update acc TS 36.101	9.3.0	9.4.0
2011-03	RAN#51	R5-110953	0423	-	Maximum input level test: Correction to DL-RMC	9.3.0	9.4.0
2011-03	RAN#51	R5-110954	0424	-	Correction of E.7, EVM with exclusion period	9.3.0	9.4.0
2011-03	RAN#51	R5-110967	0425	-	Updates to Additional Spurious emissions and Spurious emission band UE co-existence test	9.3.0	9.4.0
2011-03	RAN#51	R5-110970	0426	-	LTE RF: references to state 3A in 36.521-1	9.3.0	9.4.0
2011-03	RAN#51	R5-110973	0429	-	RI Performance tests: Corrections	9.3.0	9.4.0
2011-03	RAN#51	R5-110975	0430	-	Completion of annex G.3.5 (Minimum test time, performance tests)	9.3.0	9.4.0
2011-03	RAN#51	R5-110978	0431	-	Correction to Band 12 frequency range	9.3.0	9.4.0
2011-03	RAN#51	R5-110979	0432	-	Additional in-band blocking requirement for Band 12	9.3.0	9.4.0
2011-03	RAN#51	R5-110989	0433	-	Completion of annex G.3.6 (test conditions, performance tests)	9.3.0	9.4.0
2011-03	RAN#51	R5-110990	0434	-	Addition of test cases of TDD PDSCH Single-layer and Dual-layer Spatial Multiplexing Performance	9.3.0	9.4.0
2011-03	RAN#51	R5-110991	0435	-	Correction to Times Mask and Power Control tests	9.3.0	9.4.0
2011-03	RAN#51	R5-110992	0436	-	Add requirement of QPSK with partial RB allocation into test requirement of 6.2.3	9.3.0	9.4.0

2011-04	-	-	-	-	Added approved R5-110967 which was missing.	9.4.0	9.4.1
2011-06	RAN#52	R5-112148	0438	-	ON/OFF time mask for PRACH: PRACH configuration index	9.4.1	9.5.0
2011-06	RAN#52	R5-112149	0439	-	CQI tests with frequency selective scheduling mode: Random selection of Sub-Bands	9.4.1	9.5.0
2011-06	RAN#52	R5-112150	0440	-	DL-RMC for receiver tests: Obsolete editors note	9.4.1	9.5.0
2011-06	RAN#52	R5-112211	0441	-	Adding Band 24 to TS 36.521-1	9.4.1	9.5.0
2011-06	RAN#52	R5-112311	0442	-	Correction to the sustained data rate tests	9.4.1	9.5.0
2011-06	RAN#52	R5-112312	0443	-	Correction to the multi-antenna transmission tests	9.4.1	9.5.0
2011-06	RAN#52	R5-112349	0444	-	Update Annex G.3.6 for spatial multiplexing test cases	9.4.1	9.5.0
2011-06	RAN#52	R5-112412	0445	-	Correction to DL RMC for Max input for UE category 2	9.4.1	9.5.0
2011-06	RAN#52	R5-112459	0446	-	EVM window length for PRACH	9.4.1	9.5.0
2011-06	RAN#52	R5-112460	0447	-	Removal of square brackets in Annex G.5.4	9.4.1	9.5.0
2011-06	RAN#52	R5-112462	0448	-	Test tolerances for EVM with exclusion period	9.4.1	9.5.0
2011-06	RAN#52	R5-112808	0449	-	LTE RF - UEs Demodulation and CSI Band applicability	9.4.1	9.5.0
2011-06	RAN#52	R5-112810	0450	-	Correction on test requirement of test case 6.5.2.3	9.4.1	9.5.0
2011-06	RAN#52	R5-112811	0451	-	LTE RF - TC6.3.5.2 Change in Minimum Requirements	9.4.1	9.5.0
2011-06	RAN#52	R5-112812	0452	-	Removable of NS values for TDD	9.4.1	9.5.0
2011-06	RAN#52	R5-112813	0453	-	Correction on initial condition for test cases of 9.3.3	9.4.1	9.5.0
2011-06	RAN#52	R5-112814	0454	-	Correction to 9.4 PMI test cases	9.4.1	9.5.0
2011-06	RAN#52	R5-112816	0455	-	Test procedure change on Tx spurious emissions test cases	9.4.1	9.5.0
2011-06	RAN#52	R5-112850	0456	-	Update of Initial conditions according to table 7.3.3-2 for the 5MHz and 10MHz bandwidths	9.4.1	9.5.0
2011-06	RAN#52	R5-112851	0457	-	Iot modelling in frequency-selective interference CQI tests	9.4.1	9.5.0
2011-06	RAN#52	R5-112852	0458	-	Correction to test procedure in 9.5.1	9.4.1	9.5.0
2011-06	RAN#52	R5-112859	0459	-	Introduction of additional PDCCH test cases for Rel-9	9.4.1	9.5.0
2011-06	RAN#52	R5-112860	0460	-	Introduction of additional PHICH test cases for Rel-9	9.4.1	9.5.0
2011-06	RAN#52	R5-112861	0461	-	Introducing UE-selected subband CQI tests for Rel-9	9.4.1	9.5.0
2011-06	RAN#52	R5-112862	0462	-	Introduction of new PMI test cases for UE-selected sub-band reporting for Rel-9	9.4.1	9.5.0
2011-06	RAN#52	R5-112863	0463	-	Addition of a new TC for FDD MBMS performance	9.4.1	9.5.0
2011-06	RAN#52	R5-112864	0464	-	Addition of a new TC for TDD MBMS performance	9.4.1	9.5.0
2011-06	RAN#52	R5-112866	0465	-	Addition of UE category 1 coverage for single-layer spatial multiplexing transmission on antenna port 7 or 8	9.4.1	9.5.0
2011-06	RAN#52	R5-112870	0466	-	Removal of square brackets in annex G.3.5 (Minimum test time, performance tests)	9.4.1	9.5.0
2011-06	RAN#52	R5-112871	0467	-	Update minimum requirements and test requirements for spatial multiplexing test cases	9.4.1	9.5.0
2011-06	RAN#52	R5-112873	0468	-	Test procedure change on few Rx test cases	9.4.1	9.5.0
2011-09	RAN#53	R5-113178	0506	-	RF TC 8.7.2: Correction of the ACK/NACK feedback mode	9.5.0	9.6.0
2011-09	RAN#53	R5-113179	0469	-	RF TC-s 9.3.4: Updates to minimum requirements and corrections to test procedures	9.5.0	9.6.0
2011-09	RAN#53	R5-113180	0470	-	RF: New UL RMC for 10 MHz 15RB-s	9.5.0	9.6.0
2011-09	RAN#53	R5-113181	0471	-	RF: Use of State 3A-RF	9.5.0	9.6.0
2011-09	RAN#53	R5-113233	0472	-	LTE RF: EVM Annex E correction	9.5.0	9.6.0
2011-09	RAN#53	R5-113238	0473	-	RF TC 6.3.4.2.2: Correction to SRS configuration	9.5.0	9.6.0
2011-09	RAN#53	R5-113368	0474	-	Correction in test cases of 8.2.2.1.2 and 8.5.1	9.5.0	9.6.0
2011-09	RAN#53	R5-113369	0475	-	Correction in test cases of 9.5	9.5.0	9.6.0
2011-09	RAN#53	R5-113380	0476	-	Update of minimum test time for PCFICH/PDCCH and PHICH tests	9.5.0	9.6.0
2011-09	RAN#53	R5-113383	0477	-	Correction of Table G.3.5-1 (minimum test time)	9.5.0	9.6.0
2011-09	RAN#53	R5-113419	0478	-	Correction for spurious emission band UE co-existence limits of Band 3	9.5.0	9.6.0
2011-09	RAN#53	R5-113454	0479	-	Correction to test procedure in 6.5.1	9.5.0	9.6.0
2011-09	RAN#53	R5-113455	0480	-	Correction to Minimum requirement in 6.6.2.2	9.5.0	9.6.0
2011-09	RAN#53	R5-113456	0481	-	Correction to RMC for PDCCH/PCFICH performance requirements	9.5.0	9.6.0
2011-09	RAN#53	R5-113458	0482	-	Correction to CSI TCs	9.5.0	9.6.0
2011-09	RAN#53	R5-113541	0483	-	Introduction of Expanded 1900MHz Band (Band 25) into section 5 of 36.521-1	9.5.0	9.6.0
2011-09	RAN#53	R5-113596	0506	-	Abbreviation update and Editorial corrections in TS 36.521-1	9.5.0	9.6.0
2011-09	RAN#53	R5-114000	0484	-	Correction in 6.3.5.2 Power Control Relative power tolerance	9.5.0	9.6.0
2011-09	RAN#53	R5-114001	0485	-	Correction in 6.3.4.2.2 SRS time mask	9.5.0	9.6.0
2011-09	RAN#53	R5-114002	0486	-	Addition of PDSCH TDD performance tests for Low UE categories	9.5.0	9.6.0
2011-09	RAN#53	R5-114003	0487	-	Additional FDD scenarios	9.5.0	9.6.0
2011-09	RAN#53	R5-114004	0488	-	Addition of RMC-s for PDSCH performance tests for low UE categories	9.5.0	9.6.0
2011-09	RAN#53	R5-114032	0489	-	Introduction of Expanded 1900MHz Band (Band 25) into section 6 of 36.521-1	9.5.0	9.6.0
2011-09	RAN#53	R5-114033	0490	-	Correction on TDD MBMS performance requirements for 64QAM mode	9.5.0	9.6.0

2011-09	RAN#53	R5-114034	0491	-	Correction on FDD MDMS performance requirements for 64QAM mode	9.5.0	9.6.0
2011-09	RAN#53	R5-114038	0492	-	RF TC 6.3.5.2: Consideration of band edge relaxation in test requirements	9.5.0	9.6.0
2011-09	RAN#53	R5-114039	0493	-	Band 19 A-MPR refinement	9.5.0	9.6.0
2011-09	RAN#53	R5-114040	0494	-	Test system uncertainty and TT for 6.6.3.3 additional spurious emissions NS_07	9.5.0	9.6.0
2011-09	RAN#53	R5-114041	0495	-	Correction to Additional Maximum Power Reduction	9.5.0	9.6.0
2011-09	RAN#53	R5-114042	0496	-	Correction to 6.3.4.2.1 PRACH time mask	9.5.0	9.6.0
2011-09	RAN#53	R5-114043	0497	-	Correction to Receiver Characteristics Minimum Requirements	9.5.0	9.6.0
2011-09	RAN#53	R5-114044	0498	-	Addition of PDSCH FDD performance tests for Low UE categories	9.5.0	9.6.0
2011-09	RAN#53	R5-114045	0499	-	Additional Rel-9 TDD scenarios	9.5.0	9.6.0
2011-09	RAN#53	R5-114046	0500	-	Update of CQI/PMI test cases	9.5.0	9.6.0
2011-09	RAN#53	R5-114047	0501	-	Update of RI test cases	9.5.0	9.6.0
2011-09	RAN#53	R5-114048	0502	-	Release dependent RMCs in PCFICH/PDCCH and PHICH tests	9.5.0	9.6.0
2011-09	RAN#53	R5-114049	0503	-	Addition of tests scenarios in Annex	9.5.0	9.6.0
2011-09	RAN#53	R5-114073	0504	-	Introduction of Expanded 1900MHz Band (Band 25) into section 7 of 36.521-1	9.5.0	9.6.0
2011-09	RAN#53	R5-114091	0505	-	Correction to test cases 10.1 and 10.2	9.5.0	9.6.0
2011-12	RAN#54	R5-115112	0507	-	RF: Coverage of MPR and A-MPR requirements in emissions tests	9.6.0	9.7.0
2011-12	RAN#54	R5-115113	0508	-	RF: Update to names of some RMC-s used in different releases	9.6.0	9.7.0
2011-12	RAN#54	R5-115114	0509	-	RF TC 6.2.4, 6.6.2.2, 6.6.3.3: Corrections to A-MPR related tests	9.6.0	9.7.0
2011-12	RAN#54	R5-115115	0510	-	RF TC-s 9: Corrections to UL allocation for some CQI tests	9.6.0	9.7.0
2011-12	RAN#54	R5-115116	0511	-	RF TC 6.3.5.2: Missing extreme conditions in test requirements	9.6.0	9.7.0
2011-12	RAN#54	R5-115117	0512	-	RF TC 6.2.3: Missing test requirements for band 25	9.6.0	9.7.0
2011-12	RAN#54	R5-115118	0513	-	RF TC 6.5.2.1: Redundant conflicting IE-s in message contents	9.6.0	9.7.0
2011-12	RAN#54	R5-115119	0514	-	RF TC 6.6.3.1: Correction of reference to the connection diagram	9.6.0	9.7.0
2011-12	RAN#54	R5-115324	0517	-	LTE RF: CSI test case update	9.6.0	9.7.0
2011-12	RAN#54	R5-115472	0518	-	Corrections to the dual-layer beamforming demodulation requirements	9.6.0	9.7.0
2011-12	RAN#54	R5-115475	0519	-	Correction to Code Block Numbers	9.6.0	9.7.0
2011-12	RAN#54	R5-115800	0522	-	Delete note in PUSCH-EVM	9.6.0	9.7.0
2011-12	RAN#54	R5-115812	0526	-	RF: Corrections to tests with release dependent requirements	9.6.0	9.7.0
2011-12	RAN#54	R5-115815	0527	-	Test Frequency for Relative Power Tolerance	9.6.0	9.7.0
2011-12	RAN#54	R5-115821	0531	-	RF: General review of the reference measurement channels	9.6.0	9.7.0
2011-12	RAN#54	R5-115822	0532	-	Correction for codebook subset restriction in single-layer closed loop spatial multiplexing test	9.6.0	9.7.0
2011-12	RAN#54	R5-115830	0533	-	Uncertainties and Test Tolerances for 3000MHz to 4200MHz, Tx Test cases	9.6.0	9.7.0
2011-12	RAN#54	R5-115831	0534	-	Uncertainties and Test Tolerances for 3000MHz to 4200MHz, Rx Test cases	9.6.0	9.7.0
2011-12	RAN#54	R5-115832	0535	-	Support for band 22, 42 and 43	9.6.0	9.7.0
2011-12	RAN#54	R5-115837	0536	-	Update LTE RF test cases with test requirements for FDD LTE Band 23 in 36.521-1	9.6.0	9.7.0
2011-12	RAN#54	R5-115875	0537	-	Correction on FDD and TDD MBMS conformance requirements	9.6.0	9.7.0
2011-12	RAN#54	R5-115877	0538	-	Introduction of test system uncertainties and TT to new TCs in clauses 9.3.4 to 9.4.2.2.2	9.6.0	9.7.0
2011-12	RAN#54	R5-115879	0539	-	Uncertainties and Test Tolerances for Sustained data rate test cases	9.6.0	9.7.0
2011-12	RAN#54	R5-115891	0540	-	Requirement change in UE spurious emissions for Band 7 and 38 co-existence (Rel-8 only)	9.6.0	9.7.0
2011-12	RAN#54	R5-115162	0515	-	Definitions, symbols and abbreviations for CA RF	9.7.0	10.0.0
2011-12	RAN#54	R5-115565	0520	-	In-band blocking for CA (New)	9.7.0	10.0.0
2011-12	RAN#54	R5-115568	0521	-	Spurious Response for CA (New)	9.7.0	10.0.0
2011-12	RAN#54	R5-115801	0523	-	Out-of-Band blocking for CA (new)	9.7.0	10.0.0
2011-12	RAN#54	R5-115802	0524	-	Narrow band blocking for CA (new)	9.7.0	10.0.0
2011-12	RAN#54	R5-115803	0525	-	Addition of new RMCs for CA feature related Chapter8 test cases	9.7.0	10.0.0
2011-12	RAN#54	R5-115816	0528	-	General Section for CA RF	9.7.0	10.0.0
2011-12	RAN#54	R5-115817	0529	-	Frequency Band and Channel Assignments for CA RF	9.7.0	10.0.0
2011-12	RAN#54	R5-115818	0530	-	UE Maximum Output Power for intra-band contiguous CA (new)	9.7.0	10.0.0
2012-03	RAN#55	R5-120080	0587	-	Removal of technical content in 36.521-1 v9.7.0 and substitution with pointer to the next Release	10.0.0	10.1.0

2012-03	RAN#55	R5-120134	0541	-	RF: General clarification on the count of ACK / NACKs in throughput calculation in CQI tests	10.0.0	10.1.0
2012-03	RAN#55	R5-120137	0542	-	RF: Corrections to message contents in some MIMO demodulation performance tests	10.0.0	10.1.0
2012-03	RAN#55	R5-120138	0543	-	RF: Updates to handling requirements and tests for different releases	10.0.0	10.1.0
2012-03	RAN#55	R5-120140	0544	-	RF: Coverage of MPR and A-MPR requirements in Tx emissions tests	10.0.0	10.1.0
2012-03	RAN#55	R5-120243	0545	-	Tx Test cases Uplink power limit window for 3000MHz to 4200MHz	10.0.0	10.1.0
2012-03	RAN#55	R5-120244	0546	-	Rx Test cases Uplink power limit window for 3000MHz to 4200MHz	10.0.0	10.1.0
2012-03	RAN#55	R5-120252	0547	-	Global in-channel TX-test, delete note	10.0.0	10.1.0
2012-03	RAN#55	R5-120288	0548	-	LTE RF - Update of abbreviations and addition of RBstart	10.0.0	10.1.0
2012-03	RAN#55	R5-120314	0549	-	Clarification for the starting point of RB in 6.3.5.2 Relative Power test	10.0.0	10.1.0
2012-03	RAN#55	R5-120338	0550	-	Correction to MCS value in Table A.4-3	10.0.0	10.1.0
2012-03	RAN#55	R5-120343	0551	-	Introduction of new maximum input level test case for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120351	0552	-	CA RF - Changes in aggregated CC configurations	10.0.0	10.1.0
2012-03	RAN#55	R5-120355	0553	-	CA RF - updates to 7.7A Spurious response for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120370	0554	-	Test Tolerance for 6.6.3.3 additional spurious emissions NS_07	10.0.0	10.1.0
2012-03	RAN#55	R5-120426	0555	-	Correction to Frequency Range for Spurious Emission Requirements	10.0.0	10.1.0
2012-03	RAN#55	R5-120521	0556	-	Introduction to Maximum Power Reduction for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120524	0557	-	Introduction to Maximum Power Reduction for CA in Annex	10.0.0	10.1.0
2012-03	RAN#55	R5-120526	0558	-	Introduction to Adjacent Channel Leakage power Ratio (ACLR) for CA in Annex	10.0.0	10.1.0
2012-03	RAN#55	R5-120801	0559	-	Correction of TC 6.5.2.1 Error Vector Magnitude (EVM) for Test requirement	10.0.0	10.1.0
2012-03	RAN#55	R5-120802	0560	-	Correction of TC 8.2.1.3.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for 8.2.1.3.1.4.1 Initial conditions	10.0.0	10.1.0
2012-03	RAN#55	R5-120803	0561	-	Correction of TC8.2.1.3.2 FDD PDSCH Open Loop Spatial Multiplexing 4x2 for 8.2.1.3.2.4.1 Initial conditions	10.0.0	10.1.0
2012-03	RAN#55	R5-120804	0562	-	Correction of TC 8.2.2.3.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for 8.2.2.3.1.4.1 Initial conditions	10.0.0	10.1.0
2012-03	RAN#55	R5-120805	0563	-	Correction of TC 8.2.2.3.2 TDD PDSCH Open Loop Spatial Multiplexing 4x2 for 8.2.2.3.2.4.1 Initial conditions	10.0.0	10.1.0
2012-03	RAN#55	R5-120816	0564	-	Addition of frequency band and channel assignments for UL MIMO	10.0.0	10.1.0
2012-03	RAN#55	R5-120825	0565	-	Introduction of Chapter8 Single antenna port and Open loop spatial Multiplexing test cases for CA capable UE's.	10.0.0	10.1.0
2012-03	RAN#55	R5-120828	0566	-	LTE RF - UE Co-ex test point clarification for bands 7 and 38	10.0.0	10.1.0
2012-03	RAN#55	R5-120833	0567	-	Addition of receiver image section 7.10	10.0.0	10.1.0
2012-03	RAN#55	R5-120835	0568	-	Correction to Reporting of Rank Indicator (RI) FDD Test	10.0.0	10.1.0
2012-03	RAN#55	R5-120837	0569	-	Introduction to Adjacent Channel Leakage power Ratio (ACLR) for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120839	0570	-	Addition of a new TC 6.2.2B for UE Maximum Output Power for UL-MIMO	10.0.0	10.1.0
2012-03	RAN#55	R5-120842	0571	-	Harmonic exceptions in LTE UE to UE co-existence tests	10.0.0	10.1.0
2012-03	RAN#55	R5-120843	0572	-	Clarification for upper and lower interferers in 7.6.3 Narrow Band Blocking	10.0.0	10.1.0
2012-03	RAN#55	R5-120844	0573	-	RF: Correction of frequency range for out of band blocking test	10.0.0	10.1.0
2012-03	RAN#55	R5-120845	0574	-	Correction and completion to clause 10 MBMS performance	10.0.0	10.1.0
2012-03	RAN#55	R5-120874	0575	-	RF: New RMC-s and updates to the RMC-s overview tables	10.0.0	10.1.0
2012-03	RAN#55	R5-120875	0576	-	RF: Test frequencies for UE co-existence emissions under Note 13	10.0.0	10.1.0
2012-03	RAN#55	R5-120877	0577	-	UE Transmit OFF power for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120878	0578	-	Frequency error for Intraband CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120879	0579	-	Occupied bandwidth for intra-band contiguous CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120880	0580	-	Transmitter Spurious emissions for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120881	0581	-	Reference sensitivity level for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120882	0582	-	CA RF - Addition of test description to 6.2.2A MOP for intra-band CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120884	0583	-	CA RF - updates to 7.6.2A OOB blocking for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120885	0584	-	CA RF - updates to 7.6.3A Narrow-band blocking for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120899	0585	-	CA RF - updates to 7.6.1A In-band Blocking for CA	10.0.0	10.1.0
2012-03	RAN#55	R5-120900	0586	-	Correction to UE Spurious Emissions	10.0.0	10.1.0
2012-06	RAN#56	R5-121138	0588	-	Correction of TC 6.3.5.2 Power Control Relative power tolerance	10.1.0	10.2.0
2012-06	RAN#56	R5-121155	0589	-	Correction in test configuration table of sections 7.4 and 7.5	10.1.0	10.2.0
2012-06	RAN#56	R5-121206	0590	-	Correction of test procedure for intermodulation	10.1.0	10.2.0
2012-06	RAN#56	R5-121208	0591	-	Correction of test procedure for out-of-band blocking	10.1.0	10.2.0

2012-06	RAN#56	R5-121221	0592	-	Relative frequency error for CA performance tests	10.1.0	10.2.0
2012-06	RAN#56	R5-121241	0593	-	RF: Corrections to derivation of test requirements for some test points of TC 6.2.4	10.1.0	10.2.0
2012-06	RAN#56	R5-121242	0594	-	RF: Updates to Annex I (Handling of different releases)	10.1.0	10.2.0
2012-06	RAN#56	R5-121253	0595	-	RF: Clarification of test frequencies for UE co-existence emissions under Note 13	10.1.0	10.2.0
2012-06	RAN#56	R5-121254	0596	-	RF: Minor correction to RMC reference in minimum test time annex for TC 8.3.2.1.3	10.1.0	10.2.0
2012-06	RAN#56	R5-121305	0597	-	Removal of test description from Transmit off power for CA and introducing ON/OFF time mask for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121322	0598	-	Update of 6.3.4.2.2	10.1.0	10.2.0
2012-06	RAN#56	R5-121337	0599	-	Clarifications to Maximum Power Reduction for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121438	0600	-	Modification to Configured UE transmitted Output Power	10.1.0	10.2.0
2012-06	RAN#56	R5-121451	0601	-	Correction of the Band 23 for UE coexistence requirements	10.1.0	10.2.0
2012-06	RAN#56	R5-121459	0602	-	Correction of RF Test case: 8.7.2.1 TDD sustained data rate performance	10.1.0	10.2.0
2012-06	RAN#56	R5-121463	0603	-	Introduction of Adjacent Channel Selectivity (ACS) for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121475	0604	-	LTE CA general updates to sections 3 - 5	10.1.0	10.2.0
2012-06	RAN#56	R5-121479	0605	-	CA RF - TC 6.2.2A MOP updates	10.1.0	10.2.0
2012-06	RAN#56	R5-121482	0606	-	CA RF - 7.6.1A In-band blocking updates	10.1.0	10.2.0
2012-06	RAN#56	R5-121483	0607	-	CA RF - 7.6.2A Out-of-band blocking updates	10.1.0	10.2.0
2012-06	RAN#56	R5-121484	0608	-	CA RF - 7.6.3A Narrow-band blocking updates	10.1.0	10.2.0
2012-06	RAN#56	R5-121485	0609	-	CA RF - 7.7A Spurious response updates	10.1.0	10.2.0
2012-06	RAN#56	R5-121488	0610	-	LTE RF - TC 6.6.3.2 UE co-existence requirements correction	10.1.0	10.2.0
2012-06	RAN#56	R5-121523	0611	-	Correction to downlink RB allocation in 7.5.4	10.1.0	10.2.0
2012-06	RAN#56	R5-121525	0612	-	Correction to test requirement in 9.2.2.2	10.1.0	10.2.0
2012-06	RAN#56	R5-121678	0613	-	TS 36.521-1: Spurious emission band UE co-existence alignment	10.1.0	10.2.0
2012-06	RAN#56	R5-121680	0614	-	TS 36.521-1: Applicability correction for 9.3.2.1.1 and 9.3.2.1.2	10.1.0	10.2.0
2012-06	RAN#56	R5-121700	0615	-	Suffix definition of Clause 5 for CA, UL-MIMO, and DL-MIMO for 36.521-1 R-10	10.1.0	10.2.0
2012-06	RAN#56	R5-121903	0616	-	Update of Band 41 RF requirements to align with recent core specification changes	10.1.0	10.2.0
2012-06	RAN#56	R5-121906	0617	-	TS 36.521-1: Introduction of Band 26/XXVI in section 5	10.1.0	10.2.0
2012-06	RAN#56	R5-121907	0618	-	TS 36.521-1: Band 26 Test points for A-MPR test	10.1.0	10.2.0
2012-06	RAN#56	R5-121909	0619	-	CA RF - Adding contents to TC 6.2.4A A-MPR for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121918	0620	-	TS 36.521-1: Introduction of Band 26/XXVI in section 6	10.1.0	10.2.0
2012-06	RAN#56	R5-121920	0621	-	Corrections of test parameters and test procedure for ACS	10.1.0	10.2.0
2012-06	RAN#56	R5-121921	0622	-	TS 36.521-1: Introduction of Band 26/XXVI in section 7	10.1.0	10.2.0
2012-06	RAN#56	R5-121925	0623	-	CA RF - addition of test case 8.7.2.1A TDD sustained data rate performance for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121937	0624	-	A-MPR: Band 20, NS_10 not tested	10.1.0	10.2.0
2012-06	RAN#56	R5-121938	0625	-	RF: Several corrections to sustained data rate TC-s 8.7.1 and 8.7.2	10.1.0	10.2.0
2012-06	RAN#56	R5-121939	0626	-	RF: Corrections to CSI tests	10.1.0	10.2.0
2012-06	RAN#56	R5-121944	0627	-	Addition of a new TC 6.3.3B	10.1.0	10.2.0
2012-06	RAN#56	R5-121945	0628	-	Addition of a new TC 6.3.2B for Minimum Output Power for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121946	0629	-	Addition of a new TC 6.3.4B	10.1.0	10.2.0
2012-06	RAN#56	R5-121947	0630	-	Addition of a new TC 6.5.1B for Frequency Error for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121948	0631	-	Addition of a new TC 6.6.1B	10.1.0	10.2.0
2012-06	RAN#56	R5-121949	0632	-	Addition of a new TC 6.7B	10.1.0	10.2.0
2012-06	RAN#56	R5-121950	0633	-	Addition of a new TC for Configured transmitted power for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121951	0634	-	Addition of a new TC for Power Control Absolute Power Tolerance for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121955	0635	-	SEM for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121956	0636	-	Addition of a new TC for Carrier leakage for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121957	0637	-	Addition of a new TC for In-band emissions for non allocated RB for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121958	0638	-	Addition of a new TC for EVM equalizer spectrum flatness for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121959	0639	-	Addition of a new TC for Reference sensitivity level for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121960	0640	-	Addition of a new TC for Maximum input level for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121961	0641	-	Addition of a new TC for Adjacent Channel Selectivity (ACS) for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121962	0642	-	Addition of a new TC for In-band blocking for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121963	0643	-	Addition of a new TC for Narrow band blocking for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121964	0644	-	Addition of a new TC for Wide band Intermodulation for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-121983	0645	-	Introduction of Chapter8 Single antenna port and Open loop spatial Multiplexing TDD test cases for CA capable UEs	10.1.0	10.2.0

2012-06	RAN#56	R5-121984	0646	-	EVM and Global In-Channel TX-Test for intra band CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121985	0647	-	RF: Corrections to applicability of some CA tests	10.1.0	10.2.0
2012-06	RAN#56	R5-121986	0648	-	Addition of test description to Occupied bandwidth for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121987	0649	-	Addition of test description to ACLR for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121988	0650	-	Addition of test description to Transmitter Spurious emissions for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121989	0651	-	Addition of test description to Reference sensitivity level for CA	10.1.0	10.2.0
2012-06	RAN#56	R5-121994	0652	-	Addition of Codebook Subset Restriction in 8.3.2.x	10.1.0	10.2.0
2012-06	RAN#56	R5-121995	0653	-	Update of 6.3.5.2	10.1.0	10.2.0
2012-06	RAN#56	R5-121996	0654	-	TS 36.521-1: 9.4.1.2.1 and 9.4.1.2.2.1 test procedure correction	10.1.0	10.2.0
2012-06	RAN#56	R5-121997	0655	-	TS 36.521-1: Minimum conformance requirements alignments for section 9	10.1.0	10.2.0
2012-06	RAN#56	R5-122003	0656	-	Addition of a new TC for Out-of-band blocking for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-122004	0657	-	Addition of a new TC for Spurious response for UL-MIMO	10.1.0	10.2.0
2012-06	RAN#56	R5-122006	0658	-	Addition of a new TC for Error Vector Magnitude for UL-MIMO	10.1.0	10.2.0
2012-09	RAN#57	R5-123136	0659	-	Correction of TC 6.3.5.2	10.2.0	10.3.0
2012-09	RAN#57	R5-123146	0660	-	Corrections to Transmitter Characteristics Requirements	10.2.0	10.3.0
2012-09	RAN#57	R5-123148	0661	-	Correction to SNR definition	10.2.0	10.3.0
2012-09	RAN#57	R5-123150	0662	-	RF: Several editorial corrections	10.2.0	10.3.0
2012-09	RAN#57	R5-123161	0663	-	RF: PDCCH Padding in Rx spurious emissions test	10.2.0	10.3.0
2012-09	RAN#57	R5-123179	0664	-	Introduction of eDL-MIMO to Propagation Conditions	10.2.0	10.3.0
2012-09	RAN#57	R5-123209	0665	-	RF: Alignment of RMC references in test procedure of CSI tests	10.2.0	10.3.0
2012-09	RAN#57	R5-123234	0666	-	LTE RF - Correction to 7.4 and 7.5 UL allocations	10.2.0	10.3.0
2012-09	RAN#57	R5-123239	0667	-	Addition of test description to CA Maximum input level test case	10.2.0	10.3.0
2012-09	RAN#57	R5-123267	0668	-	Correction to Occupied bandwidth for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123268	0669	-	Correction to Reference sensitivity level for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123324	0670	-	New Annex for: Statistical testing of receiver performance with throughput for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123330	0671	-	Correction to test parameters in 6.6.3.2	10.2.0	10.3.0
2012-09	RAN#57	R5-123332	0672	-	Update of section 8 uncertainties and Test Tolerances for Rel-9 Tests	10.2.0	10.3.0
2012-09	RAN#57	R5-123333	0673	-	Clarification of RB allocation for DRS demodulation tests	10.2.0	10.3.0
2012-09	RAN#57	R5-123334	0674	-	Correction to uplink reference measurement channel	10.2.0	10.3.0
2012-09	RAN#57	R5-123386	0675	-	Addition of a new TC for power control relative power tolerance for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123387	0676	-	Addition of a new TC for aggregate power control tolerance for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123392	0677	-	Update carrier frequency and EARFCN	10.2.0	10.3.0
2012-09	RAN#57	R5-123394	0678	-	Update test case of UE maximum output power for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123395	0679	-	Update test case of configured UE transmitted output power for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123397	0680	-	Update test case of power control absolute power tolerance for UL- MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123507	0681	-	Editorial corrections to blocking characteristics for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123510	0682	-	ACLR for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123521	0683	-	TS 36.521-1: A-MPR and additional spurious corrections	10.2.0	10.3.0
2012-09	RAN#57	R5-123522	0684	-	TS 36.521-1: UL allocation clarification in PUSCH-EVM with exclusion period test	10.2.0	10.3.0
2012-09	RAN#57	R5-123523	0685	-	TS 36.521-1: Section 9 applicability revision (UE categories)	10.2.0	10.3.0
2012-09	RAN#57	R5-123534	0687	-	TS 36.521-1:A-MPR Test tolerances update for NS_12, NS_13, NS_14, NS_15	10.2.0	10.3.0
2012-09	RAN#57	R5-123547	0688	-	Correction to the content of reference table number for TC 7.8.1	10.2.0	10.3.0
2012-09	RAN#57	R5-123783	0689	-	Corrections to EVM and global in channel test for Intra-Band CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123850	0690	-	Correction to ONOFF time mask for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123851	0691	-	Correction to Transmitter Spurious emissions for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123852	0692	-	New Annex for: Statistical testing of receiver characteristics with CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123853	0693	-	Introduction of eDL-MIMO to measurement of performance requirements	10.2.0	10.3.0
2012-09	RAN#57	R5-123854	0694	-	Addition of a new TC for additional maximum power reduction (A-MPR) for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123855	0695	-	Additional texts for Note2 in Spurious emission test	10.2.0	10.3.0
2012-09	RAN#57	R5-123857	0696	-	Additions to test requirements for Maximum Power Reduction for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123859	0697	-	Addition of a new TC for time alignment between transmitter branches for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123900	0698	-	Changes associated with PHS band operation change for LTE	10.2.0	10.3.0
2012-09	RAN#57	R5-123901	0699	-	TS 36.521-1: PDSCH RMC for Rel-9 PCFICH test cases	10.2.0	10.3.0

2012-09	RAN#57	R5-123902	0700	-	TS 36.521-1:Adding missing UL RMCs for test 9.4.1.2.2	10.2.0	10.3.0
2012-09	RAN#57	R5-123910	0701	-	MPR for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123911	0702	-	SEM for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123912	0703	-	ADDITIONAL SEM for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123915	0704	-	RF: Update of Annex I	10.2.0	10.3.0
2012-09	RAN#57	R5-123917	0705	-	Correction of test procedure for 36.521-1 chapter 8 CA test cases	10.2.0	10.3.0
2012-09	RAN#57	R5-123919	0706	-	TS 36.521-1: New test cases for CQI reporting under fading conditions - PUCCH 1-0	10.2.0	10.3.0
2012-09	RAN#57	R5-123932	0707	-	RF: Updates to transmission mode 8 test cases	10.2.0	10.3.0
2012-09	RAN#57	R5-123933	0708	-	RF: Several corrections to MBMS performance tests	10.2.0	10.3.0
2012-09	RAN#57	R5-123934	0709	-	Addition of RF Test case: 8.7.2.1_1 TDD sustained data rate performance (Rel-10 and forward)	10.2.0	10.3.0
2012-09	RAN#57	R5-123943	0710	-	Introduction of FDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123944	0711	-	Introduction of TDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123945	0712	-	FDD RI Reporting for eDL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123946	0713	-	TDD RI Reporting for eDL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123947	0714	-	Introduction of eDL-MIMO to CSI Reference Measurement Channels	10.2.0	10.3.0
2012-09	RAN#57	R5-123948	0715	-	Introduction of eDL-MIMO to structure of subclauses	10.2.0	10.3.0
2012-09	RAN#57	R5-123950	0716	-	RF-CA: Introduction of new specification structure for Tx tests for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123951	0717	-	CA RF - TC 6.2.2A update	10.2.0	10.3.0
2012-09	RAN#57	R5-123952	0718	-	CA RF - Updates to Blocking Test Cases	10.2.0	10.3.0
2012-09	RAN#57	R5-123953	0719	-	CA RF - TC 7.7A Spurious Response update	10.2.0	10.3.0
2012-09	RAN#57	R5-123954	0720	-	New RF TC for 36.521-1 _ 6.3.5A.1 Power Control Absolute power tolerance for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123955	0721	-	New RF TC for 36.521-1 _ 6.3.5A.2 Power Control Relative power tolerance for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123956	0722	-	Correction to Transmit OFF power for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123957	0723	-	Adjusting test procedure and test requirements to new Annex G.3A	10.2.0	10.3.0
2012-09	RAN#57	R5-123958	0724	-	Update of Test case 8.7.2.1A TDD sustained data rate performance for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123961	0725	-	Corrections to A-MPR for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123962	0726	-	Additions to test description for Adjacent Channel Selectivity (ACS) for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123963	0727	-	Introduction to UE configured transmitted output power for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123964	0728	-	Introduction of ACS and UE configured Tx output power for CA in Annex	10.2.0	10.3.0
2012-09	RAN#57	R5-123969	0729	-	Introduction Single-Layer Spatial Multiplexing for eDL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123970	0730	-	updates to 6.6.2.1A SEM for CA	10.2.0	10.3.0
2012-09	RAN#57	R5-123977	0731	-	Addition of a new TC6.6.3B.1 for Transmitter Spurious emissions for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123978	0732	-	Addition of a new TC6.6.3B.2 for Spurious emission band UE co-existence for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123979	0733	-	Addition of a new TC6.6.3B.3 for Additional spurious emissions for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123980	0734	-	Addition of a new TC for narrow band blocking for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123981	0735	-	Update test case of general ON OFF time mask for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123982	0736	-	Update test case of frequency error for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123983	0737	-	Update test case of Error Vector Magnitude (EVM) for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123984	0738	-	Update test case of carrier leakage for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123985	0739	-	Update test case of in-band emissions for non allocated RB for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123986	0740	-	Update test case of EVM equalizer spectrum flatness for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123987	0741	-	Update test case of reference sensitivity level for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123988	0742	-	Update test case of maximum input level for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123989	0743	-	Update test case of in-band blocking for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123990	0744	-	Update test case of out-of-band blocking for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123991	0745	-	Update test case of spurious response for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123992	0746	-	Update test case of wide band Intermodulation for UL-MIMO	10.2.0	10.3.0
2012-09	RAN#57	R5-123994	0747	-	Update test case of Adjacent Channel Selectivity (ACS) for UL-MIMO	10.2.0	10.3.0
2012-12	RAN#58	R5-125109	0749	-	Update of TC6.6.3B.2 for Spurious emissions band UE co-existence for UL-MIMO	10.3.0	10.4.0

2012-12	RAN#58	R5-125110	0750	-	Update of TC6.6.3B.3 for Additional spurious emissions for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125146	0751	-	Corrections to Test Procedure of TC 6.6.2.3 ACLR	10.3.0	10.4.0
2012-12	RAN#58	R5-125147	0752	-	Updates for TC 6.2.3B MPR for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125148	0753	-	Updates for TC 6.6.2.1B SEM for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125149	0754	-	Updates for TC 6.6.2.2B A-SEM for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125150	0755	-	Updates for TC 6.6.2.3B ACLR for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125215	0756	-	Correction of TC 6.6.2.1	10.3.0	10.4.0
2012-12	RAN#58	R5-125252	0757	-	Adding normative reference for core requirements in TC 6.2.4	10.3.0	10.4.0
2012-12	RAN#58	R5-125253	0758	-	Adding normative reference for core requirements for many section 9 tests	10.3.0	10.4.0
2012-12	RAN#58	R5-125254	0759	-	Correction of table references in sub clause G.X	10.3.0	10.4.0
2012-12	RAN#58	R5-125260	0760	-	CR to TC 7.4A: Splitting the CA Maximum input level test case	10.3.0	10.4.0
2012-12	RAN#58	R5-125263	0761	-	RF Cl G.3A: General corrections and completion of Annex G.3A with TDD tests	10.3.0	10.4.0
2012-12	RAN#58	R5-125304	0762	-	Updates for Minimum requirements of 6.2.5 Configured UE transmitted Output Power	10.3.0	10.4.0
2012-12	RAN#58	R5-125309	0763	-	Addition of Band 28 definition to Chap.5	10.3.0	10.4.0
2012-12	RAN#58	R5-125311	0764	-	Addition of Band 28 to 6.2.2 MOP	10.3.0	10.4.0
2012-12	RAN#58	R5-125314	0765	-	Addition of Band 28 to 7.3 Refsens	10.3.0	10.4.0
2012-12	RAN#58	R5-125321	0766	-	Updates for TC6.6.1A: Occupied bandwidth for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125322	0767	-	Updates for TC6.6.2.3A: ACLR for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125323	0768	-	Updates for TC6.6.3.1A: Transmitter Spurious emissions for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125346	0769	-	TC 6.2.4A.1 A-MPR for CA updates	10.3.0	10.4.0
2012-12	RAN#58	R5-125351	0770	-	Correction to LTE Rx TCs UL allocation location	10.3.0	10.4.0
2012-12	RAN#58	R5-125365	0771	-	Uncertainties and Test Tolerances for Rel-9 CQI Reporting under fading conditions, PUCCH 1-0 Tests	10.3.0	10.4.0
2012-12	RAN#58	R5-125374	0772	-	Clean up of Tx tests	10.3.0	10.4.0
2012-12	RAN#58	R5-125405	0773	-	Addition of 15MHz and 20MHz Bandwidths for Band 23	10.3.0	10.4.0
2012-12	RAN#58	R5-125407	0774	-	RF TC 6.6.3.2: Clarification and corrections	10.3.0	10.4.0
2012-12	RAN#58	R5-125417	0775	-	Additions to test description for TC 7.5A.1 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA and UL CA)	10.3.0	10.4.0
2012-12	RAN#58	R5-125422	0776	-	Introduction to CA_1 & CA_40 TC 7.5A.2 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA without UL CA)	10.3.0	10.4.0
2012-12	RAN#58	R5-125443	0777	-	Corrections of RMC for receiver characteristics	10.3.0	10.4.0
2012-12	RAN#58	R5-125445	0778	-	Corrections of FRC subframe allocations for performance requirements	10.3.0	10.4.0
2012-12	RAN#58	R5-125450	0779	-	Introduction of TC 9.2.2.1_D FDD CQI Reporting under AWGN conditions - PUCCH 1-1 for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125451	0780	-	Introduction of TC 9.2.2.2_D TDD CQI Reporting under AWGN conditions - PUCCH 1-1 for eDL-MIMO	10.3.0	10.4.0

2012-12	RAN#58	R5-125452	0781	-	Introduction of TC 9.3.2.2.1_D FDD CQI Reporting under fading conditions - PUCCH 1-1 for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125453	0782	-	Introduction of TC 9.3.2.2.2_D TDD CQI Reporting under fading conditions - PUCCH 1-1 for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125454	0783	-	Additions of eDL-MIMO to Annex A	10.3.0	10.4.0
2012-12	RAN#58	R5-125455	0784	-	Additions of eDL-MIMO to Annex B Propagation Conditions for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125456	0785	-	Additions of eDL-MIMO to Annex F	10.3.0	10.4.0
2012-12	RAN#58	R5-125463	0786	-	Additions to TC 9.4.2.1.1_D FDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125464	0787	-	Additions to TC 9.4.2.1.2_D TDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125465	0788	-	Additions to TC 9.5.1.1_D FDD RI Reporting for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125466	0789	-	Additions to TC 9.5.1.2_D TDD RI Reporting for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125593	0790	-	RF TC 6.2.4: Minor correction to test points for NS_15	10.3.0	10.4.0
2012-12	RAN#58	R5-125594	0791	-	RF TC 6.2.4B: Minor correction to test points for NS_15	10.3.0	10.4.0
2012-12	RAN#58	R5-125610	0792	-	TS 36-521-1: MPR correction for band 26	10.3.0	10.4.0
2012-12	RAN#58	R5-125801	0793	-	Updates of 6.3.3A UE Transmit OFF power for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125802	0794	-	Update of Annex F in 36.521-1	10.3.0	10.4.0
2012-12	RAN#58	R5-125803	0795	-	Updates for 6.3.4A ON/OFF time mask for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125804	0796	-	Addition of Transmitter test case - Transmit intermodulation for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125835	0797	-	Update of TC6.6.3B.1 for Transmitter Spurious emissions for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125851	0798	-	Introduction of TC 8.3.1.2.1_D FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125852	0799	-	Introduction of TC 8.3.2.2.1_D TDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125853	0800	-	Additions to Annex G for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125854	0801	-	Corrections to Annex H for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125855	0802	-	Additions to TC 8.3.2.1.2_D TDD Single-Layer Spatial Multiplexing on antenna ports without a simultaneous transmission for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125856	0803	-	Additions to TC 8.3.2.1.3_D TDD Single-Layer Spatial Multiplexing on antenna ports with a simultaneous transmission for eDL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125857	0804	-	Introduction of Band 27 to TS 36.521-1	10.3.0	10.4.0
2012-12	RAN#58	R5-125858	0805	-	Updates to TC 8.2.2.3.1_A.1 for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125859	0806	-	Addition of new test case 8.2.1.4.2_A.1 for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125860	0807	-	Addition of new test case 8.2.2.4.2_A.1 for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125861	0808	-	Addition of sustained downlink data rate TC 8.7.1.1_A.1 for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125862	0809	-	Addition of sustained downlink data rate TC 8.7.1.1_A.2 for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125866	0810	-	Update of RF TC for 36.521-1 _ 6.3.5A.2.1 Power Control Relative power tolerance for CA	10.3.0	10.4.0

2012-12	RAN#58	R5-125867	0811	-	Update TC 6.6.3.2_1 Spurious emission band UE co-existence(Release 9 and forward)	10.3.0	10.4.0
2012-12	RAN#58	R5-125868	0812	-	Correction to test applicability in 6.2.4 A-MPR test case	10.3.0	10.4.0
2012-12	RAN#58	R5-125869	0813	-	Correction to test parameter in Perf 8.2.1 of 36.521-1	10.3.0	10.4.0
2012-12	RAN#58	R5-125870	0814	-	Clarification of AG level for 8.7 sustained data rate test of 36.521-1	10.3.0	10.4.0
2012-12	RAN#58	R5-125871	0815	-	Correction to SNR test points in test procedure	10.3.0	10.4.0
2012-12	RAN#58	R5-125872	0816	-	Clarification of random precoding granularity	10.3.0	10.4.0
2012-12	RAN#58	R5-125873	0817	-	Update of General sections for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125874	0818	-	Introduction to CA_1-5 TC 7.5A.3 Adjacent Channel Selectivity (ACS) for CA (inter-band DL CA without UL CA)	10.3.0	10.4.0
2012-12	RAN#58	R5-125875	0819	-	Addition of a new TC 6.3.5A.3.1 Aggregate power control tolerance for CA(intra-band contiguous DL CA and UL CA)	10.3.0	10.4.0
2012-12	RAN#58	R5-125876	0820	-	Addition of a new TC 6.6.3.2A.1 Spurious emission band UE co-existence for CA(intra-band contiguous DL CA and UL CA)	10.3.0	10.4.0
2012-12	RAN#58	R5-125890	0821	-	Addition of Band 28 to 6.6.3.2 Spurious emission band UE co-existence	10.3.0	10.4.0
2012-12	RAN#58	R5-125891	0822	-	Addition of Band 28 to 6.6.3.3 Additional spurious emissions	10.3.0	10.4.0
2012-12	RAN#58	R5-125892	0823	-	UE output power definition for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125893	0824	-	Update TC 6.2.4B Additional maximum power reduction (A-MPR) for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125894	0825	-	Update TC 6.5.2B.1 Error vector magnitude (EVM) for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125895	0826	-	Update TC 6.2.5B Configured transmitted output power for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125896	0827	-	Update TC 7.3B Reference sensitivity level for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125897	0828	-	Update TC 7.4B Maximum input level for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125898	0829	-	Update TC 7.5B Adjacent Channel Selectivity (ACS) for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125899	0830	-	Update TC 7.6.1B In-band blocking for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125900	0831	-	Update TC 7.6.2B Out-of-band blocking for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125901	0832	-	Update TC 7.6.3B Narrow band blocking for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125902	0833	-	Update TC 7.7B Spurious response for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125903	0834	-	Update TC 7.8.1B Wide band intermodulation for UL-MIMO	10.3.0	10.4.0
2012-12	RAN#58	R5-125906	0835	-	New RF TC for 36.521-1_8.2.1.2.3_Enhanced ICIC for LTE	10.3.0	10.4.0
2012-12	RAN#58	R5-125907	0836	-	New RF TC for 36.521-1_8.4.1.2.3_Enhanced ICIC for LTE	10.3.0	10.4.0
2012-12	RAN#58	R5-125908	0837	-	TDD CQI Reporting under AWGN conditions-PUCCH 1-0-Demod subframe overlaps with aggressor cell ABS (eICIC)	10.3.0	10.4.0
2012-12	RAN#58	R5-125909	0838	-	TDD PHICH Transmit Diversity 2x2-Demod subframe overlaps with aggressor cell ABS (eICIC)	10.3.0	10.4.0
2012-12	RAN#58	R5-125910	0839	-	TDD PDSCH Open Loop Spatial Multiplexing 2x2 Demod subframe overlaps with aggressor cell ABS (eICIC)	10.3.0	10.4.0
2012-12	RAN#58	R5-125924	0841	-	CR to 8.2.1.1.1_A: Correction to an average throughput measurement	10.3.0	10.4.0

2012-12	RAN#58	R5-125925	0842	-	CR to 8.2.1.3.1_A: Correction to an average throughput measurement	10.3.0	10.4.0
2012-12	RAN#58	R5-125931	0844	-	Additions to test description TC 6.2.5A.1 and 6.2.5A.2 including CA_1A-19A and CA_1A-21A updates	10.3.0	10.4.0
2012-12	RAN#58	R5-125932	0845	-	Updates for TC7.3A: Reference sensitivity level for CA including CA_41C, CA_1-19 and CA_1-21	10.3.0	10.4.0
2012-12	RAN#58	R5-125934	0846	-	Update of RF TC for 36.521-1 _ 6.3.5A.1.1 Power Control Absolute power tolerance for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-125935	0847	-	Updates for TC6.5.1A: Frequency error for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-126043	0849	-	Updates for 5.2A operating bands for CA_7, CA_38, CA_41, CA_1-18, CA_1-19, CA_1-21, CA_2-17, CA_3-5, CA_3-7, CA_3-8, CA_3-20, CA_4-12, CA_4-13, CA_4-17, CA_4-20	10.3.0	10.4.0
2012-12	RAN#58	R5-126044	0850	-	Updates for 5.4.2A channel bandwidth for CA_7, CA_38, CA_41, CA_1-18, CA_1-19, CA_1-21, CA_2-17, CA_3-5, CA_3-7, CA_3-8, CA_3-20, CA_4-12, CA_4-13, CA_4-17, CA_4-20	10.3.0	10.4.0
2012-12	RAN#58	R5-126063	0840	-	Update of Perf 8.7.1.1 and 8.7.2.1 of 36.521-1	10.3.0	10.4.0
2012-12	RAN#58	R5-126065	0843	-	Clarification of RB position in 9.4.1 and 9.4.2	10.3.0	10.4.0
2012-12	RAN#58	R5-126066	0848	-	Update of minimum test time in Annex G.3.5	10.3.0	10.4.0
2012-12	RAN#58	R5-124010	0851	-	RF Cl 8.1.1: Update of the CA capability table	10.3.0	10.4.0
2012-12	RAN#58	R5-124013	0852	-	RF Cl 8.7.2.1A: Update of test structure according to the work plan	10.3.0	10.4.0
2012-12	RAN#58	R5-124082	0853	-	Correction to TC 7.5.1 Adjacent Channel Selectivity (ACS)	10.3.0	10.4.0
2012-12	RAN#58	R5-124116	0854	-	Addition to test description for SEM for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-124123	0855	-	Addition to minimum requirement for TC 6.5.2A.3.1 in-band emissions for non allocated RB for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-124125	0856	-	TC 6.2.2A.1 UE MOP for CA updates	10.3.0	10.4.0
2012-12	RAN#58	R5-124126	0857	-	CR to Annex G.3A.5: Minimum number of samples for CA performance tests	10.3.0	10.4.0
2012-12	RAN#58	R5-124131	0858	-	Additions to test case for TC 6.2.3A.1 Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA)	10.3.0	10.4.0
2012-12	RAN#58	R5-124133	0859	-	Introduction to TC 6.6.3.3A.1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA)	10.3.0	10.4.0
2012-12	RAN#58	R5-124139	0860	-	TC 6.3.2A.1 Minimum Output Power for CA introduction	10.3.0	10.4.0
2012-12	RAN#58	R5-124149	0861	-	RF TC 8.2.2.1.1_A: Adjusting test procedure and requirements to completed Annex G.3A	10.3.0	10.4.0
2012-12	RAN#58	R5-124160	0862	-	TC 7.6.1A.x In-band blocking for CA introduction	10.3.0	10.4.0
2012-12	RAN#58	R5-124163	0863	-	TC 7.6.2A.x Out-of-band blocking for CA introduction	10.3.0	10.4.0
2012-12	RAN#58	R5-124164	0864	-	TC 7.6.3A.x Narrow-band blocking for CA introduction	10.3.0	10.4.0
2012-12	RAN#58	R5-124165	0865	-	TC 7.7A.x Spurious response for CA introduction	10.3.0	10.4.0
2012-12	RAN#58	R5-124166	0866	-	Addition of Receiver test case - Wideband intermodulation for CA	10.3.0	10.4.0
2012-12	RAN#58	R5-124186	0867	-	RF: Addition of references to connection diagrams in CA tests	10.3.0	10.4.0
2013-03	RAN#59	R5-130092	0851	-	Updates of 6.6.3.3 - Addition of Low-channel Band 1 coexistence with PHS condition	10.4.0	10.5.0

2013-03	RAN#59	R5-130105	0854	-	Update of TC6.6.3B.2 for Spurious emissions band UE co-existence for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130125	0856	-	Update of TC6.6.3B.3 for Additional spurious emissions for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130128	0857	-	Update TC 6.2.4B Additional Maximum Power Reduction (A-MPR) for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130129	0858	-	Update TC 6.3.5B.1 Power control absolute power tolerance for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130130	0859	-	Update TC 6.3.5B.2 Power Control Relative power tolerance for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130131	0860	-	Update TC 6.3.5B.3 Aggregate power control tolerance for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130132	0861	-	Update TC 6.5.2B.2 Carrier leakage for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130133	0862	-	Update TC 6.3.2B Minimum Output Power for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130134	0863	-	Update TC 6.6.1B Occupied bandwidth for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130135	0864	-	Update TC 6.7B Transmit intermodulation for UL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130176	0869	-	Introduction of new rel-10 Reporting of RI test cases into annexes	10.4.0	10.5.0
2013-03	RAN#59	R5-130182	0870	-	CA RF: Correction to Annex I	10.4.0	10.5.0
2013-03	RAN#59	R5-130183	0871	-	UL-MIMO RF: Correction to Annex I	10.4.0	10.5.0
2013-03	RAN#59	R5-130184	0872	-	eICIC RF: Correction to Annex I	10.4.0	10.5.0
2013-03	RAN#59	R5-130185	0873	-	eDL-MIMO RF: Correction to Annex I	10.4.0	10.5.0
2013-03	RAN#59	R5-130188	0874	-	RF: Correction to TC 8.2.1.1.1 - Frequency range for partial allocation	10.4.0	10.5.0
2013-03	RAN#59	R5-130245	0877	-	Additions to TC 6.6.2.3A.1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130273	0880	-	Corrections to Annex A DL Reference Measurement and PMI Accuracy Measurements	10.4.0	10.5.0
2013-03	RAN#59	R5-130285	0881	-	Correction to TC 8.3.2.1.3 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission	10.4.0	10.5.0
2013-03	RAN#59	R5-130288	0882	-	Addition to TC 9.2.2.2_D TDD CQI Reporting under AWGN conditions - PUCCH 1-1 for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130291	0883	-	Addition to TC 9.3.2.2.2_D TDD CQI Reporting under fading conditions " PUCCH 1-1 for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130292	0884	-	Additions to TC 9.4.2.1.1_D FDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130293	0885	-	Additions to TC 9.4.2.1.2_D TDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130298	0886	-	CA RF: Correction to TC 7.6.1A	10.4.0	10.5.0
2013-03	RAN#59	R5-130299	0887	-	Uncertainties and Test Tolerances for Test case 7.4A	10.4.0	10.5.0
2013-03	RAN#59	R5-130308	0888	-	Corrections to test procedure of TC 6.2.2 UE Maximum Output Power	10.4.0	10.5.0
2013-03	RAN#59	R5-130309	0889	-	Corrections to test purpose of TC 6.2.3 Maximum Power Reduction (MPR)	10.4.0	10.5.0
2013-03	RAN#59	R5-130310	0890	-	Correction to test procedure of TC 6.7A.1 Transmit Intermodulation for CA	10.4.0	10.5.0

2013-03	RAN#59	R5-130407	0894	-	Correction to test requirement of 6.2.4A	10.4.0	10.5.0
2013-03	RAN#59	R5-130408	0895	-	Correction to test procedure in 6.3.5A.1	10.4.0	10.5.0
2013-03	RAN#59	R5-130411	0896	-	Correction to test procedure in 6.6.2.3A	10.4.0	10.5.0
2013-03	RAN#59	R5-130413	0897	-	Correction to 7.6.3A.3 test procedure	10.4.0	10.5.0
2013-03	RAN#59	R5-130415	0898	-	Correction to 6.6.3.2A and 6.6.3.3A	10.4.0	10.5.0
2013-03	RAN#59	R5-130416	0899	-	Correction to 6.6.3B.2 and 6.6.3B.3	10.4.0	10.5.0
2013-03	RAN#59	R5-130419	0900	-	Correction to 9.3.4 UE-selected subband CQI	10.4.0	10.5.0
2013-03	RAN#59	R5-130421	0901	-	Correction to wideband CQI-samples	10.4.0	10.5.0
2013-03	RAN#59	R5-130427	0902	-	Update of minimum test time in Annex G.5.4	10.4.0	10.5.0
2013-03	RAN#59	R5-130471	0905	-	Update of spurious emission test cases for introduction of Japanese Regulatory Requirements for LTE Band 8	10.4.0	10.5.0
2013-03	RAN#59	R5-130779	0875	1	CA RF: Clarification on Cell ID	10.4.0	10.5.0
2013-03	RAN#59	R5-130780	0903	1	Correction to 941 and 942	10.4.0	10.5.0
2013-03	RAN#59	R5-130801	0908	-	Additions of CA RF test cases to Annex F	10.4.0	10.5.0
2013-03	RAN#59	R5-130804	0909	-	Correction to 6.6.3.2 and 6.6.3.3	10.4.0	10.5.0
2013-03	RAN#59	R5-130806	0911	-	Update TC 6.6.3.2 Spurious emission band UE co-existence	10.4.0	10.5.0
2013-03	RAN#59	R5-130808	0912	-	CA RF - SCC configuration references	10.4.0	10.5.0
2013-03	RAN#59	R5-130809	0913	-	CA RF Rx - Update of blocking characteristics	10.4.0	10.5.0
2013-03	RAN#59	R5-130811	0915	-	LTE RF - Correction to LTE Rx TCs UL allocation location	10.4.0	10.5.0
2013-03	RAN#59	R5-130901	0916	-	Update of TC 8.7.2.1_A.1 TDD sustained data rate performance for CA (intra-band contiguous DL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130902	0917	-	Editorial correction for ON/OFF time mask for CA	10.4.0	10.5.0
2013-03	RAN#59	R5-130903	0918	-	Correction to Band 12 frequency for CA_4-12	10.4.0	10.5.0
2013-03	RAN#59	R5-130908	0920	-	Additions of eDL-MIMO to Annex A.4 CQI Reference Measurement Channels	10.4.0	10.5.0
2013-03	RAN#59	R5-130909	0921	-	Introduction of TC 8.3.1.1.1_D FDD Single-Layer Spatial Multiplexing on antenna ports without a simultaneous transmission for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130910	0922	-	Introduction of FDD TC 8.3.1.1.2_D FDD Single-Layer Spatial Multiplexing on antenna ports with a simultaneous transmission for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130911	0923	-	Additions to TC 8.3.1.2.1_D FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130912	0924	-	Additions to TC 8.3.2.2.1_D TDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130913	0925	-	Additions to TC 8.3.2.1.2_D TDD Single-Layer Spatial Multiplexing on antenna ports without a simultaneous transmission for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130914	0926	-	Additions to TC 8.3.2.1.3_D TDD Single-Layer Spatial Multiplexing on antenna ports with a simultaneous transmission for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130924	0934	-	Update RF TC for 36.521-1_8.2.1.2.3_C FDD PDSCH Transmit div 2x2 Enhanced ICIC for LTE	10.4.0	10.5.0
2013-03	RAN#59	R5-130925	0935	-	Update RF TC for 36.521-1_8.4.1.2.3_C FDD PCFICH PDCCH Transmit div 2x2 Enhanced ICIC for LTE	10.4.0	10.5.0

2013-03	RAN#59	R5-130935	0937	-	SNR uncertainty	10.4.0	10.5.0
2013-03	RAN#59	R5-130936	0938	-	Introduction of new rel-10 Reporting of RI test cases	10.4.0	10.5.0
2013-03	RAN#59	R5-130937	0939	-	RF: Corrections to Annex H - Default uplink settings	10.4.0	10.5.0
2013-03	RAN#59	R5-130938	0940	-	Update of TC 8.7.2.1_1 TDD sustained data rate performance (Rel-10 and forward)	10.4.0	10.5.0
2013-03	RAN#59	R5-130939	0941	-	Clarification to Soft Channel Bit size used by SS and UE	10.4.0	10.5.0
2013-03	RAN#59	R5-130940	0942	-	Correction to sustained data rate performance test	10.4.0	10.5.0
2013-03	RAN#59	R5-130941	0943	-	Clean up on performance tests	10.4.0	10.5.0
2013-03	RAN#59	R5-130944	0944	-	Update TC 6.3.5A.3.1 Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130945	0945	-	Update TC 6.6.3.2A.1 Spurious emission band UE co-existence for CA (intra-band contiguous DL CA and UL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130946	0946	-	Additions to TC 6.2.5A.1 Configured UE transmitted Power for CA (intra-band contiguous DL CA and UL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130947	0947	-	Additions to TC 6.6.3.3A.1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130948	0948	-	Additions to TC 7.5A.1 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA and UL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130949	0949	-	Additions to TC 7.5A.2 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA without UL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130950	0950	-	Additions to TC 7.5A.3 Adjacent Channel Selectivity (ACS) for CA (inter-band contiguous DL CA without UL CA)	10.4.0	10.5.0
2013-03	RAN#59	R5-130951	0951	-	Correction to test point of Frequency Error for CA and addition of TC for intra-band contiguous DL CA without UL CA	10.4.0	10.5.0
2013-03	RAN#59	R5-130961	0955	-	Channel matrix impairments for eDL-MIMO CSI tests	10.4.0	10.5.0
2013-03	RAN#59	R5-130965	0957	-	TC 9.4.1.1.1_D FDD Reporting of PMI - PUSCH 3-1 (Single PMI) for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130966	0958	-	TC 9.4.1.1.2_D TDD Reporting of PMI -PUSCH 3-1 (Single PMI) for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130967	0959	-	Additions of eDL-MIMO to Annex C Measurement of Performance Requirements	10.4.0	10.5.0
2013-03	RAN#59	R5-130968	0960	-	Additions of eDL-MIMO test cases to Annex F	10.4.0	10.5.0
2013-03	RAN#59	R5-130969	0961	-	Additions to Annex G for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130970	0962	-	Addition to TC 9.2.2.1_D FDD CQI Reporting under AWGN conditions - PUCCH 1-1 for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130971	0963	-	Addition to TC 9.3.2.2.1_D FDD CQI Reporting under fading conditions - PUCCH 1-1 for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130972	0964	-	Additions to TC 9.5.1.1_D FDD RI Reporting for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130973	0965	-	Additions to TC 9.5.1.2_D TDD RI Reporting for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130978	0966	-	Correcting TS 36.521-1 to reflect changes in 36.101	10.4.0	10.5.0
2013-03	RAN#59	R5-130979	0967	-	Correction of RF conformance Test case: 8.2.1.3.3	10.4.0	10.5.0
2013-03	RAN#59	R5-130980	0968	-	Addition new TC 8.2.2.3.3 TDD PDSCH Open Loop Spatial Multiplexing 2x2-Demod subframe overlaps with aggressor cell ABS (eICIC)	10.4.0	10.5.0
2013-03	RAN#59	R5-130994	0969	-	Corrections to 7.8.1A Wideband intermodulation for CA	10.4.0	10.5.0

2013-03	RAN#59	R5-130998	0970	-	TC 9.3.1.2.1_D FDD CQI Reporting under fading conditions - PUSCH 3-1 for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130999	0971	-	TC 9.3.1.2.2_D TDD CQI Reporting under fading conditions - PUSCH 3-1 for eDL-MIMO	10.4.0	10.5.0
2013-03	RAN#59	R5-130093	0852	-	Updates of 5.2A Operating bands for CA_11-18	10.5.0	11.0.0
2013-03	RAN#59	R5-130094	0853	-	Updates of 5.4.2A Channel bandwidth combination for CA_11-18	10.5.0	11.0.0
2013-03	RAN#59	R5-130124	0855	-	Additions to the inter-band relaxation term for CA 3A-8A in Table 6.2.5A.1.3-3	10.5.0	11.0.0
2013-03	RAN#59	R5-130140	0865	-	Update TC 7.3A.3 Reference sensitivity level for CA_3-7 and CA_7-20 (inter-band DL CA without UL CA)	10.5.0	11.0.0
2013-03	RAN#59	R5-130141	0866	-	Update TC 7.6.2A.1 Out-of-band blocking for CA_38 (intra-band contiguous DL CA and UL CA)	10.5.0	11.0.0
2013-03	RAN#59	R5-130142	0867	-	Update TC 6.2.2A.1 UE Maximum Output Power for CA_38 (intra-band contiguous DL CA and UL CA)	10.5.0	11.0.0
2013-03	RAN#59	R5-130144	0868	-	Update TC 6.2.4A.1 Additional Maximum Power Reduction (A-MPR) for CA_38 (intra-band contiguous DL CA and UL CA)	10.5.0	11.0.0
2013-03	RAN#59	R5-130239	0876	-	Updates of 6.2.5A - inter-band relaxation term for CA_1A-18A and CA_11A-18A	10.5.0	11.0.0
2013-03	RAN#59	R5-130257	0878	-	Addition of TDD operating band 44 in receiver characteristic test cases	10.5.0	11.0.0
2013-03	RAN#59	R5-130258	0879	-	Addition of TDD operating band 44 in transmitter characteristic test cases	10.5.0	11.0.0
2013-03	RAN#59	R5-130329	0891	-	Updates for 7.6.1A.1 in-band blocking for CA_7 and CA_41	10.5.0	11.0.0
2013-03	RAN#59	R5-130330	0892	-	Updates for 7.6.2A.1 Out-of-band blocking for CA_7 and CA_41	10.5.0	11.0.0
2013-03	RAN#59	R5-130348	0972	-	Correction to Spurious emission band UE co-existence and Additional spurious emissions for Band 28	10.5.0	11.0.0
2013-03	RAN#59	R5-130349	0893	-	Addition of Band 28 to MPR and A-MPR	10.5.0	11.0.0
2013-03	RAN#59	R5-130769	0907	-	Updates of Refsens for inter-band CA test points for CA_1A-19A and CA_1A-21A	10.5.0	11.0.0
2013-03	RAN#59	R5-130783	0906	-	Update TC 6.2.3A.1 Maximum Power Reduction (MPR) for CA_38 (intra-band contiguous DL CA and UL CA)	10.5.0	11.0.0
2013-03	RAN#59	R5-130805	0910	-	Update TC 7.3A.1 Reference sensitivity level for CA_38, CA_3-7 and CA_7-20 (intra-band contiguous DL CA and UL CA)	10.5.0	11.0.0
2013-03	RAN#59	R5-130810	0914	-	CA_2-17 and CA_4-17 addition to 36.521-1 Rx characteristics	10.5.0	11.0.0
2013-03	RAN#59	R5-130905	0919	-	Addition of TDD operating band 44 in chapter 5	10.5.0	11.0.0
2013-03	RAN#59	R5-130915	0927	-	Addition of band 38 and band 41 in intra-band contiguous CA transmitter test cases	10.5.0	11.0.0
2013-03	RAN#59	R5-130916	0928	-	Update TC 7.6.1A.1 In-band blocking for CA_38 (intra-band contiguous DL CA and UL CA)	10.5.0	11.0.0
2013-03	RAN#59	R5-130917	0929	-	Addition of Inter Band CA combo CA_2A-29A	10.5.0	11.0.0
2013-03	RAN#59	R5-130918	0930	-	Update of 6.2.5A Configured transmitted power for CA	10.5.0	11.0.0
2013-03	RAN#59	R5-130919	0931	-	CA_2-17 and CA_4-17 addition to 36.521-1 Tx characteristics	10.5.0	11.0.0
2013-03	RAN#59	R5-130920	0932	-	Adding transmit power relaxation value for inter-band CA configurations CA_4A-5A and CA_4A-13A	10.5.0	11.0.0

2013-03	RAN#59	R5-130921	0933	-	Adding refsens relaxation value for inter-band CA configurations CA_4A-5A and CA_4A-13A	10.5.0	11.0.0
2013-03	RAN#59	R5-130926	0936	-	Updates for 6.6.2.1A Spectrum emission mask for CA for CA_7 and CA_41	10.5.0	11.0.0
2013-03	RAN#59	R5-130956	0952	-	Updates for 7.3A.1 Reference sensitivity level for CA_7C	10.5.0	11.0.0
2013-03	RAN#59	R5-130957	0953	-	Updates for 6.2.2A UE Maximum Output Power for CA_7 and CA_41	10.5.0	11.0.0
2013-03	RAN#59	R5-130958	0954	-	Updates of 7.3A - Reference sensitivity level for CA_11A-18A	10.5.0	11.0.0
2013-03	RAN#59	R5-130964	0956	-	Adding Band 27 to TS 36.521-1	10.5.0	11.0.0
2013-03	RAN#59	-	-	-	Correction of missing small changes of R5-130806 in Table 6.6.3.2.3-1, 6.6.3.2.5-1, 6.6.3.2_1.3-1 and 6.6.3.2_1.5-1.	11.0.0	11.0.1
2013-06	RAN#60	R5-131085	0973	-	Removal of technical content in 36.521-1 v10.5.0 and substitution with pointer to the next Release	11.0.1	11.1.0
2013-06	RAN#60	R5-131147	0974	-	Updates to Chapter7 for Inter Band CA combo CA_2A-29A	11.0.1	11.1.0
2013-06	RAN#60	R5-131149	0975	-	New chap8 TDD TC 8.2.2.2.3_C for eICIC	11.0.1	11.1.0
2013-06	RAN#60	R5-131150	0976	-	New chap 8 TDD TC 8.4.2.2.3_C for eICIC	11.0.1	11.1.0
2013-06	RAN#60	R5-131153	0977	-	Introduction of new rel-11 Reporting of RI test cases	11.0.1	11.1.0
2013-06	RAN#60	R5-131154	0978	-	Introduction of new rel-11 Reporting of RI test cases into annexes	11.0.1	11.1.0
2013-06	RAN#60	R5-131156	0979	-	Correction to TC 8.4.1.1 test procedure	11.0.1	11.1.0
2013-06	RAN#60	R5-131158	0980	-	Introduction of Maximum Input Level test case for CA (inter-band DL CA without UL CA) into annexes	11.0.1	11.1.0
2013-06	RAN#60	R5-131210	0981	-	Correction of test applicability for TC 8.2.1.1.1_1: TC 8.2.1.2.1_1 and TC 8.3.2.1.1_1 in 36.521-1	11.0.1	11.1.0
2013-06	RAN#60	R5-131222	0982	-	Update of TC6.6.3B.1 for Transmitter Spurious emissions for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131226	0983	-	Clarification to test procedure on applying timing offset between CCs for Chap8 inter-band CA test cases	11.0.1	11.1.0
2013-06	RAN#60	R5-131238	0984	-	Update TC 6.2.4A.1 Additional Maximum Power Reduction (A-MPR) for CA_38C (intra-band contiguous DL CA and UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131241	0985	-	Update TC 7.3A.1 Reference sensitivity level for CA_4A-12A (intra-band contiguous DL CA and UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131242	0986	-	Update TC 7.3A.3 Reference sensitivity level for CA_4A-12A (inter-band DL CA without UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131245	0987	-	Update TT of 6.3.5A.3.1 Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131289	0988	-	Uncertainties and Test Tolerances for CA spectrum emission mask	11.0.1	11.1.0
2013-06	RAN#60	R5-131358	0989	-	RF: Corrections to RMC-s for sustained data rate test	11.0.1	11.1.0
2013-06	RAN#60	R5-131379	0990	-	CA RF - Corrections to 6.2.4A.1 requirements	11.0.1	11.1.0
2013-06	RAN#60	R5-131381	0991	-	LTE RF - Editorial correction to 8.2.2.4.2_1	11.0.1	11.1.0
2013-06	RAN#60	R5-131415	0992	-	Updates for 6.6.1A Occupied bandwidth for CA_41C	11.0.1	11.1.0
2013-06	RAN#60	R5-131450	0993	-	Addition of band44 in MPR for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131473	0994	-	References to wrong section in TS 36.508	11.0.1	11.1.0
2013-06	RAN#60	R5-131518	0995	-	Corrections to Common Test Parameters User-Specific	11.0.1	11.1.0

2013-06	RAN#60	R5-131519	0996	-	Corrections to Beamforming Model Parameters	11.0.1	11.1.0
2013-06	RAN#60	R5-131521	0997	-	Corrections to Reporting of Channel State Requirements	11.0.1	11.1.0
2013-06	RAN#60	R5-131522	0998	-	Corrections to Reporting of Precoding Matrix Indicator Requirements	11.0.1	11.1.0
2013-06	RAN#60	R5-131527	0999	-	Additions to Annex G for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131528	1000	-	Additions of eDL-MIMO test cases to Annex F	11.0.1	11.1.0
2013-06	RAN#60	R5-131539	1001	-	LTE RF: Minor changes to test case 7.5A.3	11.0.1	11.1.0
2013-06	RAN#60	R5-131540	1002	-	LTE-RF: Clarification to 7.6.1A.3 test procedure	11.0.1	11.1.0
2013-06	RAN#60	R5-131541	1003	-	Corrections to TC 6.6.2.3A.1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131545	1004	-	Additions to TC 9.2.3.1_D for FDD CQI reporting under AWGN conditions - PUCCH 1-1 for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131546	1005	-	LTE-RF: Corrections to CA Open Loop Spatial Multiplexing Performance test cases	11.0.1	11.1.0
2013-06	RAN#60	R5-131553	1006	-	Additions to TC 9.2.3.2_D for TDD CQI reporting under AWGN conditions - PUCCH 1-1 for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131555	1007	-	Additions to TC 9.3.1.2.2_D for TDD CQI reporting under fading conditions - PUSCH 3-1 for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131559	1008	-	Additions to TC 9.3.2.2.2_D for TDD CQI reporting under fading conditions - PUCCH 1-1 for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131561	1009	-	Update of 6.2.5A - Delta TIB for CA_11A-18A	11.0.1	11.1.0
2013-06	RAN#60	R5-131562	1010	-	Additions to TC 9.4.1.3.2_D for TDD reporting of PMI-PUSCH 3-1 (Single PMI) for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131563	1011	-	Update of 7.3A - Delta RIB for CA_11A-18A	11.0.1	11.1.0
2013-06	RAN#60	R5-131567	1012	-	Additions to TC 9.4.2.3.2_D for TDD PMI reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131569	1013	-	Additions to TC 9.5.2.2_D for TDD RI reporting - PUCCH 1-1 for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131634	1014	-	Removal of Spurious emission UE co-existence test case 6.6.3.2_1 from annex F	11.0.1	11.1.0
2013-06	RAN#60	R5-131649	1015	-	Adding Band28 in some Receiver test cases in section 7	11.0.1	11.1.0
2013-06	RAN#60	R5-131677	1016	-	Correction to the contents of the chapter 5.	11.0.1	11.1.0
2013-06	RAN#60	R5-131711	1017	-	Corrections to test procedure of TC 7.5B Adjacent Channel Selectivity (ACS) for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131900	1018	-	RF: Correction of Imcs for CQI index 10 (15 RBs)	11.0.1	11.1.0
2013-06	RAN#60	R5-131901	1019	-	Corrections to Frequency non-selective scheduling mode	11.0.1	11.1.0
2013-06	RAN#60	R5-131902	1020	-	Correction to the missing title of Rel-9 close loop tests	11.0.1	11.1.0
2013-06	RAN#60	R5-131903	1021	-	Correction to the references of connection diagrams	11.0.1	11.1.0
2013-06	RAN#60	R5-131904	1022	-	Maintenance of Band 23 additional regulatory requirements	11.0.1	11.1.0
2013-06	RAN#60	R5-131905	1023	-	Realignment of A-MPR Configuration Tables for Band 27 in TS 36.521-1	11.0.1	11.1.0
2013-06	RAN#60	R5-131906	1024	-	Update on General section of Tx and Rx for Cell IDs	11.0.1	11.1.0
2013-06	RAN#60	R5-131907	1025	-	LTE RF: Initial conditions update for test 6.2.5A.2	11.0.1	11.1.0

2013-06	RAN#60	R5-131908	1026	-	CA RF: Alignment for inter-band Rx tests with DL tested only as S-Cell	11.0.1	11.1.0
2013-06	RAN#60	R5-131909	1027	-	36.521-1: Inter-band CA operating bands update	11.0.1	11.1.0
2013-06	RAN#60	R5-131911	1028	-	Updates for 7.7A.1 Spurious response for CA	11.0.1	11.1.0
2013-06	RAN#60	R5-131915	1029	-	Additions to TC 9.3.1.2.1_D for FDD CQI reporting under fading conditions - PUSCH 3-1 for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131916	1030	-	Additions to TC 9.3.2.2.1_D for FDD CQI reporting under fading conditions - PUCCH 1-1 for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131917	1031	-	Additions to TC 9.4.1.3.1_D for FDD reporting of PMI - PUSCH 3-1 (Single PMI) for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131918	1032	-	Additions to TC 9.4.2.3.1_D for FDD PMI reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131919	1033	-	Additions to TC 9.5.2.1_D for FDD RI reporting - PUCCH 1-1 for eDL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131920	1034	-	Adding Band28 in some Transmitter test cases in section 6	11.0.1	11.1.0
2013-06	RAN#60	R5-131921	1035	-	New RF TC for 36.521-1_8.5.1.2.3_C.1_Enhanced ICIC for LTE	11.0.1	11.1.0
2013-06	RAN#60	R5-131929	1036	-	Update TT of 6.2.2B_6.2.3B_6.2.4B and 6.2.5B for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131930	1037	-	Update TT of 6.3.2B_6.3.3B and 6.3.4B for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131931	1038	-	Update TT of 6.3.5B.1_6.3.5B.2 and 6.3.5B.3 for UL- MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131932	1039	-	Update TT of 6.5.1B_6.5.2B.1_6.5.2B.2_6.5.2B.3_6.5.2B.4 for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131933	1040	-	Update TT of 6.6.1B Occupied bandwidth for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131934	1041	-	Update TT of 6.6.2.1B_6.6.2.2B and 6.6.2.3B for UL- MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131935	1042	-	Update TT of 6.7B Transmit intermodulation for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131936	1043	-	Update TT of 6.8B Time alignment error for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131937	1044	-	Update TT of 7.3B Reference sensitivity level for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131952	1045	-	Corrections to TC 6.2.5A.1 Configured UE transmitted Power for CA (intra-band contiguous DL CA and UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131954	1046	-	Maintenance of Band 23 Spurious Emissions Requirements	11.0.1	11.1.0
2013-06	RAN#60	R5-131955	1047	-	Corrections to Demodulation Requirements	11.0.1	11.1.0
2013-06	RAN#60	R5-131956	1048	-	Updates to sustained data rate test case	11.0.1	11.1.0
2013-06	RAN#60	R5-131957	1049	-	New RF TC for 36.521-1_9.2.1.3_C.1_Enhanced ICIC for LTE	11.0.1	11.1.0
2013-06	RAN#60	R5-131958	1050	-	RF: Structure clean-up for chapter 9 (including eICIC and eDL-MIMO tests)	11.0.1	11.1.0
2013-06	RAN#60	R5-131959	1051	-	Update TT of 7.4B_7.5B_7.6.1B_7.6.2B_7.6.3B_7.7B and 7.8.1B for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131960	1052	-	Update of TC6.6.3B.3 for Additional spurious emissions for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131961	1053	-	Update of TC6.6.3B.2 for Spurious emissions band UE co-existence for UL-MIMO	11.0.1	11.1.0
2013-06	RAN#60	R5-131962	1054	-	Updates of 6.2.2.3 - maximum output power for UE that supports both Band 18 and 26	11.0.1	11.1.0
2013-06	RAN#60	R5-131963	1055	-	Update of 6.2.4 Test points for A-MPR when NS_05 is signalled	11.0.1	11.1.0

2013-06	RAN#60	R5-131964	1056	-	Updates of 7.3.3 - Refsens for UE that supports both Band 18 and Band 26	11.0.1	11.1.0
2013-06	RAN#60	R5-131969	1057	-	CA RF: Alignment for tests with PCC and SCC switching	11.0.1	11.1.0
2013-06	RAN#60	R5-131971	1059	-	Introduction of Maximum Input Level test case for CA (inter-band DL CA without UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131972	1060	-	Addition of Maximum input level for inter-band CA and updates to test configuration for some Rx TCs	11.0.1	11.1.0
2013-06	RAN#60	R5-131973	1061	-	Updates to FDD sustained data rate test case for CA	11.0.1	11.1.0
2013-06	RAN#60	R5-131974	1062	-	Clarification on Time offset between cells	11.0.1	11.1.0
2013-06	RAN#60	R5-131975	1063	-	Update TC 6.2.3A.1 Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131976	1064	-	Update of UE co-existence requirement for CA	11.0.1	11.1.0
2013-06	RAN#60	R5-131977	1065	-	Update TC 6.2.5A.1 Configured UE transmitted Output Power for CA_3A-7A, CA_4A-12A and CA_7A-20A (intra-band contiguous DL CA and UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-131978	1066	-	Updates for 6.2.4A A-MPR for CA_41C	11.0.1	11.1.0
2013-06	RAN#60	R5-131979	1067	-	Updates for 7.5A.1 Adjacent Channel Selectivity (ACS) for CA_41C	11.0.1	11.1.0
2013-06	RAN#60	R5-131980	1068	-	Updates for 7.6.1A.1 in-band blocking for CA_41C	11.0.1	11.1.0
2013-06	RAN#60	R5-131981	1069	-	Updates for 7.6.2A.1 Out-of-band blocking for CA_41C	11.0.1	11.1.0
2013-06	RAN#60	R5-131982	1070	-	Updates for 7.6.3A.1 Narrow band blocking for CA_41C	11.0.1	11.1.0
2013-06	RAN#60	R5-131983	1071	-	Updates for 7.8.1A.1 Wideband intermodulation for CA_41C	11.0.1	11.1.0
2013-06	RAN#60	R5-131985	1072	-	Update of CA refsens test 7.3A for inter-band CA configurations CA_4A-5A and CA_4A-13A	11.0.1	11.1.0
2013-06	RAN#60	R5-131987	1073	-	Addition of band 44 in MPR	11.0.1	11.1.0
2013-06	RAN#60	R5-131990	1074	-	CA_1A-18A, CA_2A-17A, CA_3A-8A, CA_4A-5A, CA_4A-13A, CA_4A-17A, CA_11A-18A addition and corrections to Reference Sensitivity TC 7.3A	11.0.1	11.1.0
2013-06	RAN#60	R5-132079	1058	-	Corrections to TC 6.6.3.3A.1 Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA)	11.0.1	11.1.0
2013-06	RAN#60	R5-132080	1075	-	CA RF - Corrections to Blocking Characteristics in 7.6	11.0.1	11.1.0
2013-06	RAN#60	R5-132103	1076	-	Change Spurious emission UE co-existence test cases to align with release independence rule	11.0.1	11.1.0
2013-06	RAN#60	R5-132105	1077	-	CA RF: Corrections to message contents with regard to transmission mode	11.0.1	11.1.0
2013-06	RAN#60	R5-132110	1078	-	Updated test points test case 6.2.3 A-MPR for NS_15 band26	11.0.1	11.1.0
2013-06	RAN#60	R5-132113	1079	-	New test cases for LTE B14 public safety high power UE	11.0.1	11.1.0
2013-09	RAN#61	R5-133070	1080	-	Correction to test points in Additional Spurious Emissions Coexistence test case	11.1.0	11.2.0
2013-09	RAN#61	R5-133073	1081	-	LTE Type A performance requirements - Changes to clause 3	11.1.0	11.2.0
2013-09	RAN#61	R5-133074	1082	-	LTE Type A performance requirements - Changes to clause 8.1.1	11.1.0	11.2.0
2013-09	RAN#61	R5-133075	1083	-	LTE Type A performance requirements - Changes to Annex A	11.1.0	11.2.0
2013-09	RAN#61	R5-133076	1084	-	LTE Type A performance requirements - Introduction of Annex B.5	11.1.0	11.2.0

2013-09	RAN#61	R5-133077	1085	-	LTE Type A performance requirements - Introduction of the new test case 9.3.5.1.1.	11.1.0	11.2.0
2013-09	RAN#61	R5-133232	1086	-	Corrections to CA TC 6.5.2A.3	11.1.0	11.2.0
2013-09	RAN#61	R5-133247	1087	-	Addition of Band 31 to 36.521-1 General s05	11.1.0	11.2.0
2013-09	RAN#61	R5-133248	1088	-	Addition of Band 31 to 36.521-1 RX s07	11.1.0	11.2.0
2013-09	RAN#61	R5-133249	1089	-	Addition of Band 31 to 36.521-1 TX s06	11.1.0	11.2.0
2013-09	RAN#61	R5-133252	1090	-	RF: Minor correction to test points for spurious emissions UE co-existence	11.1.0	11.2.0
2013-09	RAN#61	R5-133258	1091	-	Update TC 7.3A.3 Reference sensitivity level for CA_5A-12A (inter-band DL CA without UL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133261	1092	-	Update the minimum requirements of TCs 7.6.3A.1, 7.7A.1 and 7.8.1A.1 for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133262	1093	-	Update TC 6.6.3B.2 of Spurious emission band UE co-existence for UL-MIMO	11.1.0	11.2.0
2013-09	RAN#61	R5-133263	1094	-	Update TCs 6.2.2B and 6.2.5B for UL-MIMO	11.1.0	11.2.0
2013-09	RAN#61	R5-133265	1095	-	RF: Addition of missing UL-RMC-s for Tx testing	11.1.0	11.2.0
2013-09	RAN#61	R5-133266	1096	-	Correction of TCs 7.3 and 7.3B Reference sensitivity level for Band 27	11.1.0	11.2.0
2013-09	RAN#61	R5-133268	1097	-	CA RF: Addition of new CQI tests for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133298	1098	-	Correction to Spurious emission band UE co-existence	11.1.0	11.2.0
2013-09	RAN#61	R5-133415	1099	-	Correction to the repeat steps in 7.6.1A, 7.6.3A and 7.8.1A	11.1.0	11.2.0
2013-09	RAN#61	R5-133418	1100	-	Correction to CA sustained data rate performance test	11.1.0	11.2.0
2013-09	RAN#61	R5-133423	1101	-	Correction to eICIC Performance test cases	11.1.0	11.2.0
2013-09	RAN#61	R5-133425	1102	-	Correction to UE category in Tx test cases	11.1.0	11.2.0
2013-09	RAN#61	R5-133426	1103	-	Correction to Spurious emission band UE co-existence	11.1.0	11.2.0
2013-09	RAN#61	R5-133431	1104	-	Correction to MBMS Performance test cases	11.1.0	11.2.0
2013-09	RAN#61	R5-133474	1105	-	Update TC of 8.7.2.1_A.1 TDD sustained data rate performance for CA (intra-band contiguous DL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133517	1106	-	Adding the minimum channel spacing for intra-band non-contiguous CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133522	1107	-	Corrections to Annex F for Maintenance of Band 23	11.1.0	11.2.0
2013-09	RAN#61	R5-133523	1108	-	Corrections to description for definition of MIMO Correlation Matrices using cross polarized antennas	11.1.0	11.2.0
2013-09	RAN#61	R5-133524	1109	-	Corrections to UE maximum output power for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133525	1110	-	Corrections to General Maintenance of Operating Bands and Channel Arrangements	11.1.0	11.2.0
2013-09	RAN#61	R5-133532	1111	-	Introduction of eICIC_enh_LTE to Annex C	11.1.0	11.2.0
2013-09	RAN#61	R5-133534	1112	-	Corrections to TC 6.6.2.3A.1 Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133535	1113	-	Corrections to TC 7.5A.1 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA and UL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133800	1114	-	Correction to test frequency in Additional Spurious Emissions test cases for NS_15	11.1.0	11.2.0
2013-09	RAN#61	R5-133801	1115	-	Update applicability of test cases 9.4.2.2.1 and 9.4.2.2.2	11.1.0	11.2.0

2013-09	RAN#61	R5-133802	1116	-	Correction to applicability for TDD-TM8 test cases	11.1.0	11.2.0
2013-09	RAN#61	R5-133803	1117	-	Editorial correction to 6.6.3.3 Additional spurious emissions	11.1.0	11.2.0
2013-09	RAN#61	R5-133804	1118	-	Correction the Minimum conformance requirements for test case 6.2.2B	11.1.0	11.2.0
2013-09	RAN#61	R5-133805	1119	-	CA RF: Adding missing DL-RMC-s	11.1.0	11.2.0
2013-09	RAN#61	R5-133806	1120	-	Update TC of 8.2.1.1 FDD PDSCH Single Antenna Port Performance (Cell-Specific Reference Symbols) for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133807	1121	-	Update TC of 8.2.1.4 FDD PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols) for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133808	1122	-	Addition of new TC 8.2.1.4.2_A.2 for FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (inter band DL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133811	1123	-	Update of CA TC 7.3A.1	11.1.0	11.2.0
2013-09	RAN#61	R5-133812	1124	-	Update of CA TC 7.4A.1	11.1.0	11.2.0
2013-09	RAN#61	R5-133819	1125	-	Correction of applicability for FDD RF TCs 9.3.4.1.1, 9.3.4.2.1 & 9.4.1.2.1and TDD RF TCs 9.3.4.1.2, 9.3.4.2.2 & 9.4.1.2.2	11.1.0	11.2.0
2013-09	RAN#61	R5-133823	1126	-	Introduction of eICIC_enh_LTE to Annex A to reference measurement channels for PDCCH/PCFICH	11.1.0	11.2.0
2013-09	RAN#61	R5-133824	1127	-	Introduction of eICIC_enh_LTE to Annex A DL reference measurement channels	11.1.0	11.2.0
2013-09	RAN#61	R5-133828	1128	-	Corrections to 6.2.4 A-MPR for Maintenance of Band 23	11.1.0	11.2.0
2013-09	RAN#61	R5-133829	1129	-	Corrections to Transmitter Characteristics Maintenance	11.1.0	11.2.0
2013-09	RAN#61	R5-133830	1130	-	Alignment of test configuration tables (test frequencies) in Additional Spurious Emissions tests cases	11.1.0	11.2.0
2013-09	RAN#61	R5-133831	1131	-	Corrections to Receiver Characteristics Maintenance	11.1.0	11.2.0
2013-09	RAN#61	R5-133832	1132	-	Corrections to 6.6.2.2 Additional Spectrum Emission Mask for Maintenance of Band 23	11.1.0	11.2.0
2013-09	RAN#61	R5-133833	1133	-	Updates to Chapter7 for Inter Band CA combo CA_4A-29A	11.1.0	11.2.0
2013-09	RAN#61	R5-133838	1134	-	Update Minimum Requirements of TCs 6.2.4 and 6.2.5	11.1.0	11.2.0
2013-09	RAN#61	R5-133845	1135	-	Correction to Configured UE transmitted output power for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133846	1136	-	Corrections to TC 6.2.5A.2 Configured UE transmitted Power for CA (inter-band DL CA without UL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133847	1137	-	Updates to Wideband intermodulation for CA test cases	11.1.0	11.2.0
2013-09	RAN#61	R5-133850	1138	-	Correction to measurement target of CA Rx test cases	11.1.0	11.2.0
2013-09	RAN#61	R5-133851	1139	-	Corrections to TC 7.5A.2 Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA without UL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133852	1140	-	Update TC of 8.7.1.1_A.1 FDD Sustained data rate performance for CA (intra band contiguous DL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133853	1141	-	Update TC of 8.7.1.1_A.2 FDD Sustained data rate performance for CA (inter band DL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133854	1142	-	Updates of Annex for CA test cases	11.1.0	11.2.0
2013-09	RAN#61	R5-133863	1143	-	Clarification on Bandwidth Combination Set for Carrier Aggregation Transmitter tests	11.1.0	11.2.0
2013-09	RAN#61	R5-133865	1144	-	Update TC 6.2.5A.1 Configured UE transmitted Output Power for CA_5A-12A (intra-band contiguous DL CA and UL CA)	11.1.0	11.2.0

2013-09	RAN#61	R5-133866	1145	-	Update the minimum requirements of TCs 7.5A.1, 7.6.1A.1 and 7.6.2A.1 for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133867	1146	-	Update TC 7.3A.1 Reference sensitivity level for CA (intra-band contiguous DL CA and UL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133869	1147	-	Addition of Refsens for intra-band non-contiguous CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133870	1148	-	Update TC 7.3A.3 reference sensitivity level for CA_3-8 (inter-band DL CA without UL CA)	11.1.0	11.2.0
2013-09	RAN#61	R5-133871	1149	-	Test cases and test system uncertainty for LTE B14 public safety highpower UE	11.1.0	11.2.0
2013-09	RAN#61	R5-133873	1150	-	Addition of new TC 8.3.1.1.3 for FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model	11.1.0	11.2.0
2013-09	RAN#61	R5-133874	1151	-	Addition of new TC 8.3.2.1.4 for TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model	11.1.0	11.2.0
2013-09	RAN#61	R5-133886	1152	-	eICIC RF: Addition of new RI tests and OCNG patterns for eICIC	11.1.0	11.2.0
2013-09	RAN#61	R5-133887	1153	-	Update of CA TC 6.2.3A and TC 6.2.4A	11.1.0	11.2.0
2013-09	RAN#61	R5-133888	1154	-	CA RF: Corrections to reference sensitivity requirements for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133889	1155	-	Correction to Test Requirement in 7.3A.3	11.1.0	11.2.0
2013-09	RAN#61	R5-133890	1156	-	Update TC of 8.2.1.3 FDD PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)for CA	11.1.0	11.2.0
2013-09	RAN#61	R5-133898	1157	-	Clarification on Bandwidth Combination Set for Carrier Aggregation Receiver tests	11.1.0	11.2.0
2013-09	RAN#61	R5-133899	1158	-	Addition of CA TC 6.6.2.2A	11.1.0	11.2.0
2013-12	RAN#62	R5-134130	1159	-	RF: Corrections to the notes in the band UE co-existence requirements table	11.2.0	11.3.0
2013-12	RAN#62	R5-134131	1160	-	RF: Corrections to sustained data rate test case	11.2.0	11.3.0
2013-12	RAN#62	R5-134132	1161	-	RF: Clean-up of uplink reference measurement channels	11.2.0	11.3.0
2013-12	RAN#62	R5-134139	1162	-	eICIC RF: Corrections to PHICH demodulation test	11.2.0	11.3.0
2013-12	RAN#62	R5-134161	1163	-	Corrections to Transmitter Requirements for Intra-band Non-contiguous CA	11.2.0	11.3.0
2013-12	RAN#62	R5-134169	1164	-	Introduction of I.2.6 Tests for feICIC (Further Enhanced Non CA- based ICIC for LTE)	11.2.0	11.3.0
2013-12	RAN#62	R5-134170	1165	-	Introduction of TC 8.2.1.2.3_E.1 FDD PDSCH Transmit diversity 2x2 for feICIC (non-MBFSN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134171	1166	-	Introduction of TC 8.2.2.2.3_E.1 TDD PDSCH Transmit diversity 2x2 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134172	1167	-	Introduction of TC 8.2.1.4.1_E.1 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134173	1168	-	Introduction of TC 8.2.2.4.1_E.1 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134174	1169	-	Introduction of TC 8.4.1.2.3_E.1 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134175	1170	-	Introduction of TC 8.4.1.2.3_E.2 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)	11.2.0	11.3.0

2013-12	RAN#62	R5-134176	1171	-	Introduction of TC 8.4.2.2.3_E.1 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134177	1172	-	Introduction of TC 8.4.2.2.3_E.2 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134178	1173	-	Introduction of Demodulation feICIC Test Cases to Annex F	11.2.0	11.3.0
2013-12	RAN#62	R5-134179	1174	-	Introduction of TC 9.2.1.5_E.1 FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134180	1175	-	Introduction of TC 9.2.1.6_E.1 TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134181	1176	-	Introduction of TC 9.3.1.3.1_E.1 FDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134182	1177	-	Introduction of TC 9.3.1.3.2_E.1 TDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134183	1178	-	Introduction of TC 9.5.4.1_E FDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134184	1179	-	Introduction of TC 9.5.4.2_E TDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	11.2.0	11.3.0
2013-12	RAN#62	R5-134185	1180	-	Introduction of Reporting of Channel State Information feICIC Test Cases to Annex F	11.2.0	11.3.0
2013-12	RAN#62	R5-134196	1181	-	Corrections to 7.5A.3 Adjacent Channel Selectivity (ACS) for CA (inter-band DL CA without UL CA)	11.2.0	11.3.0
2013-12	RAN#62	R5-134199	1182	-	Corrections to MPR for intra-band non-contiguous CA	11.2.0	11.3.0
2013-12	RAN#62	R5-134234	1183	-	CA RF: Corrections to requirements for In-Band blocking for Inter-Band without UL-CA	11.2.0	11.3.0
2013-12	RAN#62	R5-134247	1184	-	RF: Corrections to requirements for NS_11 (Band 23)	11.2.0	11.3.0
2013-12	RAN#62	R5-134250	1185	-	RF: Band edge relaxation for UE-s supporting Band 18 and Band 26	11.2.0	11.3.0
2013-12	RAN#62	R5-134289	1187	-	Correction to Maximum Power Reduction (MPR) for CA Test Procedure	11.2.0	11.3.0
2013-12	RAN#62	R5-134413	1189	-	Update TT of TC 8.2.1.4.2_A.2 FDD PDSCH Closed Loop Multi Layer 4x2 for CA	11.2.0	11.3.0
2013-12	RAN#62	R5-134414	1190	-	Correction of TC 6.2.4A Test Requirements for CA_38C	11.2.0	11.3.0
2013-12	RAN#62	R5-134421	1191	-	The addition of Beamforming model for EPDCCH localized transmission	11.2.0	11.3.0
2013-12	RAN#62	R5-134423	1192	-	The addition of Beamforming model for EPDCCH distributed transmission	11.2.0	11.3.0
2013-12	RAN#62	R5-134424	1193	-	The addition of Downlink physical setup for EPDCCH	11.2.0	11.3.0
2013-12	RAN#62	R5-134431	1194	-	LTE Type A performance requirements - Introduction of the new test case 8.2.1.2.4	11.2.0	11.3.0
2013-12	RAN#62	R5-134432	1195	-	LTE Type A performance requirements - adding TC 8.2.1.2.4 and 9.3.5.1.1 to Annex E and G	11.2.0	11.3.0
2013-12	RAN#62	R5-134445	1196	-	TU and TT for 36.521-1 eICIC FDD PCFICH/PDCCH and PHICH demodulation tests	11.2.0	11.3.0
2013-12	RAN#62	R5-134477	1197	-	Correction to CA Sustained data rate tests	11.2.0	11.3.0
2013-12	RAN#62	R5-134478	1198	-	Correction to CQI-ReportConfig-DEFAULT for CA performance tests	11.2.0	11.3.0
2013-12	RAN#62	R5-134485	1199	-	Clarification of UL resource blocks for CA_4A-17A in 7.3A.3	11.2.0	11.3.0

2013-12	RAN#62	R5-134488	1200	-	Correction to test requirement in 6.2.4	11.2.0	11.3.0
2013-12	RAN#62	R5-134489	1201	-	Correction to test requirement in 6.6.3.2	11.2.0	11.3.0
2013-12	RAN#62	R5-134490	1202	-	Additional exception message for SIB3 in MBMS performance test	11.2.0	11.3.0
2013-12	RAN#62	R5-134800	1204	-	Introduction of UE TM3 Demodulation Performance under High Speed to Annex F	11.2.0	11.3.0
2013-12	RAN#62	R5-134801	1205	-	Introduction of UE TM3 Demodulation Performance under High Speed	11.2.0	11.3.0
2013-12	RAN#62	R5-134802	1206	-	Corrections to eDL-MIMO Channel State Information Test	11.2.0	11.3.0
2013-12	RAN#62	R5-134805	1207	-	Update Minimum Requirements of TCs 6.6.3.2 and 6.6.3.2A Spurious emission band UE co-existence	11.2.0	11.3.0
2013-12	RAN#62	R5-134806	1208	-	Change Spurious emission UE co-existence test case for LTE CA to align with release independence rule	11.2.0	11.3.0
2013-12	RAN#62	R5-134807	1209	-	Clarification of applicability of additional relaxation RIB,c on Reference Sensitivity Test Cases	11.2.0	11.3.0
2013-12	RAN#62	R5-134816	1215	-	Addition of new Test Case PUCCH 1-1 for Interference rejection	11.2.0	11.3.0
2013-12	RAN#62	R5-134817	1216	-	Addition of interference rejection test cases TC 8.2.2.2.4 and TC 8.2.2.4.3	11.2.0	11.3.0
2013-12	RAN#62	R5-134828	1217	-	Clarification of multi-cluster transmission terminology	11.2.0	11.3.0
2013-12	RAN#62	R5-134829	1218	-	Corrections to Pcmax	11.2.0	11.3.0
2013-12	RAN#62	R5-134830	1219	-	Corrections to test descriptions reference tables for Transmitter Characteristics test cases	11.2.0	11.3.0
2013-12	RAN#62	R5-134832	1220	-	Corrections to definition of 5+20 MHz for spectrum emission mask for CA in Annex F	11.2.0	11.3.0
2013-12	RAN#62	R5-134857	1223	-	Update TC 6.2.4 A-MPR for NS_19	11.2.0	11.3.0
2013-12	RAN#62	R5-134858	1224	-	Update TC 6.6.3.3 Additional Spurious Emissions for NS_19	11.2.0	11.3.0
2013-12	RAN#62	R5-134859	1225	-	Simplification of test points in Additional Spurious Emissions Coexistence test case	11.2.0	11.3.0
2013-12	RAN#62	R5-134861	1227	-	Addition of Sustained data rate test(FDD) for category 6 and 7 UEs	11.2.0	11.3.0
2013-12	RAN#62	R5-134865	1228	-	CA RF: Power alignment between uplink component carriers	11.2.0	11.3.0
2013-12	RAN#62	R5-134866	1229	-	Completion of test case 6.7A Transmit intermodulation for CA	11.2.0	11.3.0
2013-12	RAN#62	R5-134867	1230	-	Update Minimum Requirements of TCs 7.3 and 7.3.1A Reference sensitivity power level	11.2.0	11.3.0
2013-12	RAN#62	R5-134868	1231	-	Clean-up of CA Rx test cases	11.2.0	11.3.0
2013-12	RAN#62	R5-134871	1232	-	Update Minimum Requirements and TT of TC 8.2.1.3.1_A	11.2.0	11.3.0
2013-12	RAN#62	R5-134875	1233	-	Addition of Inter Band CA combo CA_3A-5A, CA_3A-20A	11.2.0	11.3.0
2013-12	RAN#62	R5-134876	1234	-	Addition of Inter Band CA combo CA_4A-7A	11.2.0	11.3.0
2013-12	RAN#62	R5-134878	1235	-	Correction and applicability clarification to multi-cluster allocations for UL CA TCs 6.2.3A, 6.2.4A, 6.6.2.1A, 6.6.2.2A, 6.6.2.3A and 6.6.3.3A	11.2.0	11.3.0
2013-12	RAN#62	R5-134879	1236	-	Clarification of CA Reference sensitivity level	11.2.0	11.3.0
2013-12	RAN#62	R5-134880	1237	-	Correction to blocking requirements and use of delta RIB	11.2.0	11.3.0

2013-12	RAN#62	R5-134881	1238	-	Addition of new TC 7.4A.4 Maximum input level for CA (intra band non-contiguous DL CA without UL CA)	11.2.0	11.3.0
2013-12	RAN#62	R5-134882	1239	-	Addition of new TC 7.5A.4 Adjacent Channel Selectivity (ACS) for CA(intra band non-contiguous DL CA without UL CA)	11.2.0	11.3.0
2013-12	RAN#62	R5-134889	1244	-	Uncertainties and Test Tolerances for eICIC PDSCH demodulation tests	11.2.0	11.3.0
2013-12	RAN#62	R5-134893	1247	-	Addition of applicabilities of LTE Type A performance requirements	11.2.0	11.3.0
2013-12	RAN#62	R5-134894	1248	-	Test Procedure, uncerts and TT for Rx Test cases with intra-band contiguous UL CA	11.2.0	11.3.0
2013-12	RAN#62	R5-134976	1251	-	Update TT of TC 8.2.1.4.2_A.1 FDD PDSCH Closed Loop Multi Layer 4x2 for CA	11.2.0	11.3.0
2013-12	RAN#62	R5-134977	1252	-	Update of CA CSI tests	11.2.0	11.3.0
2013-12	RAN#62	R5-134978	1253	-	Update of eICIC Performance test cases	11.2.0	11.3.0
2013-12	RAN#62	R5-134985	1254	-	LTE Type A performance requirements - Changes to TC 9.3.5.1.1	11.2.0	11.3.0
2013-12	RAN#62	R5-134987	1255	-	RF: Corrections to requirements for NS_15 (Band 26)	11.2.0	11.3.0
2013-12	RAN#62	R5-134988	1256	-	Corrections to Band 23 NS_11 and NS_20 Test Points	11.2.0	11.3.0
2013-12	RAN#62	R5-134995	1259	-	Update on MPR and A-MPR test requirements	11.2.0	11.3.0
2013-12	RAN#62	R5-135012	1261	-	Clarification in regard to 36.521-1 tests not included in 36.521-2 Applicability table	11.2.0	11.3.0
2013-12	RAN#62	R5-135031	1222	-	RF TC Update for 36.521-1_9.2.1.3_C1 eICIC	11.2.0	11.3.0
2013-12	RAN#62	R5-135046	1226	-	RF: Updates to the downlink reference measurement channels	11.2.0	11.3.0
2013-12	RAN#62	R5-134277	1186	-	Addition of Rel-12 CA band combinations(CA_3-19 and CA_19-21) to Chap. 5	11.3.0	12.0.0
2013-12	RAN#62	R5-134339	1188	-	Updates to TC 6.2.2A.1 for CA_3C	11.3.0	12.0.0
2013-12	RAN#62	R5-134540	1203	-	Applicability statement of new 5MHz BB tests for Band 31 in TS 36.521-1	11.3.0	12.0.0
2013-12	RAN#62	R5-134808	1210	-	Updates of 5.4.2A Channel bandwidth for CA_1A-18A	11.3.0	12.0.0
2013-12	RAN#62	R5-134809	1211	-	Updates of 5.2A Operating bands for CA_1A-26A	11.3.0	12.0.0
2013-12	RAN#62	R5-134810	1212	-	Updates of 5.4.2A Channel bandwidth for CA_1A-26A	11.3.0	12.0.0
2013-12	RAN#62	R5-134811	1213	-	Updates of 6.2.5A Delta TIB for CA_1A-26A	11.3.0	12.0.0
2013-12	RAN#62	R5-134812	1214	-	Updates of 7.3A Delta RIB for CA_1A-26A	11.3.0	12.0.0
2013-12	RAN#62	R5-134833	1221	-	Correction to Tx TCs for lower tolerance relaxation, removal of 6.2.5A.2 and addition of Rel-12 CA band combinations(CA_3-19 and CA_19-21) to 6.2.5	11.3.0	12.0.0
2013-12	RAN#62	R5-134884	1240	-	Addition of Rel-12 CA band combination(CA_3-19 and CA_19-21) to Refsens	11.3.0	12.0.0
2013-12	RAN#62	R5-134886	1241	-	Updates for 5.2A operating bands and 5.4.2A channel bandwidth for CA_3C	11.3.0	12.0.0
2013-12	RAN#62	R5-134887	1242	-	Updates to TC 6.2.3A.1 for CA_3C	11.3.0	12.0.0
2013-12	RAN#62	R5-134888	1243	-	Updates to TC 6.6.2.1A.1 for CA_3C	11.3.0	12.0.0
2013-12	RAN#62	R5-134891	1245	-	Updates to FDD PDSCH Single Antenna and Transmit Diversity 2x2 performance test cases for 5MHz BW	11.3.0	12.0.0

2013-12	RAN#62	R5-134892	1246	-	Updates to 8.2.1.3.1 for FDD PDSCH Open Loop Spatial Multiplexing 2x2 for 5MHz BW	11.3.0	12.0.0
2013-12	RAN#62	R5-134896	1249	-	Updates to TC 9.2.1.1 FDD CQI reporting under AWGN conditions - PUCCH 1-0 test case for 5MHz BW	11.3.0	12.0.0
2013-12	RAN#62	R5-134897	1250	-	Updates to TC 9.3.2.1.1 and 9.3.2.1.1_1 FDD CQI Reporting under fading conditions - PUCCH 1-0 test case for 5MHz BW	11.3.0	12.0.0
2013-12	RAN#62	R5-134989	1257	-	Corrections to definition of 5+20 MHz for spectrum emission mask for CA	11.3.0	12.0.0
2013-12	RAN#62	R5-134992	1258	-	Updates to 8.5.1.2 FDD PHICH Transmit Diversity Performance tests	11.3.0	12.0.0
2013-12	RAN#62	R5-135068	1262	-	Updates to 8.2.1.4 FDD PDSCH Closed Loop Single/Multiple layer Spatial Multiplexing 2x2 for 5MHz BW	11.3.0	12.0.0
2014-03	RAN#63	R5-140228	1264	-	Uncertainties for eICIC 9.x CSI Test Cases	12.0.0	12.1.0
2014-03	RAN#63	R5-140245	1265	-	eDL-MIMO RF: Corrections to 8x2 MIMO tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140247	1266	-	CA RF: Corrections to sustained data rate tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140248	1267	-	RF: Corrections to OCNG pattern for PMI tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140249	1268	-	RF: Corrections to cross references between tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140250	1269	-	feICIC RF: Corrections to some subclause-titles	12.0.0	12.1.0
2014-03	RAN#63	R5-140261	1270	-	CoMP RF: Introduction of CoMP section in Annex I	12.0.0	12.1.0
2014-03	RAN#63	R5-140388	1272	-	LTE Type A performance requirements - Introduction of the new test case 9.3.5.1.2	12.0.0	12.1.0
2014-03	RAN#63	R5-140444	1273	-	Updates of 6.2.5 Delta TIB for CA_1A-26A	12.0.0	12.1.0
2014-03	RAN#63	R5-140446	1274	-	Updates of 7.3 Delta RIB for CA_1A-26A	12.0.0	12.1.0
2014-03	RAN#63	R5-140448	1275	-	Updates of 6.6.3.2 Spurious emission band UE co-existence for B41	12.0.0	12.1.0
2014-03	RAN#63	R5-140499	1276	-	Update of eICIC Performance tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140505	1277	-	Correction to test configuration parameter in Tx	12.0.0	12.1.0
2014-03	RAN#63	R5-140508	1278	-	Update of CA FDD and TDD performance tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140509	1279	-	Addition of CQI configuration in CA closed loop performance tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140511	1280	-	Addition of SCC activation and CQI configuration in CA CQI Reporting tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140561	1281	-	Removal of [ ]s in Annex G.6	12.0.0	12.1.0
2014-03	RAN#63	R5-140800	1282	-	Corrections to NS signalling for CA refsens	12.0.0	12.1.0
2014-03	RAN#63	R5-140801	1283	-	Correction to statistical testing for Inter-band CA Rx tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140802	1284	-	Additions to combinations of channel model parameters	12.0.0	12.1.0
2014-03	RAN#63	R5-140803	1285	-	Addition of a Fixed Reference Channel two antenna ports	12.0.0	12.1.0
2014-03	RAN#63	R5-140804	1286	-	Corrections to TDD eDL-MIMO test cases	12.0.0	12.1.0
2014-03	RAN#63	R5-140805	1287	-	Correction the category information of Table 8.2.1.1.2.3-2 and Table 8.2.1.1.2.5-1 in test case 8.2.1.1.2	12.0.0	12.1.0
2014-03	RAN#63	R5-140806	1288	-	Correction the category information in Table 8.2.1.2.1.3-2 and Table 8.2.1.2.1.3-2 for Test case 8.2.1.2.1	12.0.0	12.1.0
2014-03	RAN#63	R5-140807	1289	-	Correction the test case applicability of test case 8.2.1.3.2	12.0.0	12.1.0

2014-03	RAN#63	R5-140811	1290	-	Addition of A.3.9.4 TDD SDR Reference Channel for EPDCCH	12.0.0	12.1.0
2014-03	RAN#63	R5-140812	1291	-	Addition of A.3.9.3 FDD SDR Reference Channel for EPDCCH	12.0.0	12.1.0
2014-03	RAN#63	R5-140813	1292	-	Addition of OCNG Pattern for EPDCCH TDD performance requirements	12.0.0	12.1.0
2014-03	RAN#63	R5-140814	1293	-	Addition of OCNG Pattern for EPDCCH FDD performance requirements	12.0.0	12.1.0
2014-03	RAN#63	R5-140815	1294	-	Addition of Reference Measurement Channels for EPDCCH performance requirements	12.0.0	12.1.0
2014-03	RAN#63	R5-140816	1295	-	Introduction of RMCs and power levels for CoMP in annex	12.0.0	12.1.0
2014-03	RAN#63	R5-140818	1296	-	Addition of CA_1A-8A to 36.521-1 Chapter 5	12.0.0	12.1.0
2014-03	RAN#63	R5-140819	1297	-	Addition of CA_1A-8A to 36.521-1 Chapter 6	12.0.0	12.1.0
2014-03	RAN#63	R5-140820	1298	-	Addition of CA_1A-8A to 36.521-1 Chapter 7	12.0.0	12.1.0
2014-03	RAN#63	R5-140823	1300	-	Corrections to definition of 20 MHz and 5MHz for transmit intermodulation for CA in 6.7A	12.0.0	12.1.0
2014-03	RAN#63	R5-140824	1301	-	Updates to TC 7.4A.1 for CA_3C	12.0.0	12.1.0
2014-03	RAN#63	R5-140825	1302	-	Updates to TC 6.6.3.2A for CA_3C	12.0.0	12.1.0
2014-03	RAN#63	R5-140826	1303	-	Corrections to definition of 20 MHz and 5MHz for occupied bandwidth for CA in 6.6.1A	12.0.0	12.1.0
2014-03	RAN#63	R5-140827	1304	-	Updates to TC 7.3A.1 for CA_3C	12.0.0	12.1.0
2014-03	RAN#63	R5-140828	1305	-	Updates to TC 7.3A.2 for CA_3C	12.0.0	12.1.0
2014-03	RAN#63	R5-140831	1306	-	Additions to TC 8.2.2.2.3_E.1 TDD PDSCH Transmit diversity 2x2 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140832	1307	-	Additions to TC 8.2.1.4.1_E.1 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140833	1308	-	Additions to TC 8.2.2.4.1_E.1 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140834	1309	-	Additions to TC 8.4.1.2.3_E.1 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140835	1310	-	Additions to TC 8.4.2.2.3_E.1 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140836	1311	-	Additions to TC 8.4.1.2.3_E.2 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140837	1312	-	Additions to TC 8.4.2.2.3_E.2 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140838	1313	-	Additions to TC 9.2.1.5_E.1 FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140839	1314	-	Additions to TC 9.2.1.6_E.1 TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140840	1315	-	Additions to TC 9.3.1.3.1_E.1 FDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140841	1316	-	Additions to TC 9.3.1.3.2_E.1 TDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140842	1317	-	Additions to TC 9.5.4.1_E FDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0

2014-03	RAN#63	R5-140843	1318	-	Additions to TC 9.5.4.2_E TDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140844	1319	-	Introduction of feICIC to Annex G	12.0.0	12.1.0
2014-03	RAN#63	R5-140845	1361	-	Addition of PHICH demod requirements for fEICIC	12.0.0	12.1.0
2014-03	RAN#63	R5-140846	1320	-	Addition to TC 8.2.2.3.3_E.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140847	1321	-	Corrections to test configuration notes of CA soft buffer	12.0.0	12.1.0
2014-03	RAN#63	R5-140856	1322	-	Additions to TC 8.2.1.2.3_E.1 FDD PDSCH Transmit diversity 2x2 for feICIC (non-MBFSN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140868	1323	-	Uncertainties and Test Tolerances for Interf_Rej Test case 8.2.1.2.4	12.0.0	12.1.0
2014-03	RAN#63	R5-140877	1324	-	Introduction of TC 9.5.5.1_F.1 FDD RI Reporting with Single CSI process	12.0.0	12.1.0
2014-03	RAN#63	R5-140878	1325	-	Introduction of TC 9.5.5.2_F.1 TDD RI Reporting with Single CSI process	12.0.0	12.1.0
2014-03	RAN#63	R5-140881	1326	-	Addition to TC 8.2.1.3.3_E.1 FDD FDD PDSCH Open Loop Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.0.0	12.1.0
2014-03	RAN#63	R5-140887	1327	-	Correction to eICIC CQI Reporting tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140888	1328	-	eICIC RF: Corrections to requirements, procedure and UL-RMCs for CQI tests	12.0.0	12.1.0
2014-03	RAN#63	R5-140889	1329	-	Addition of TC 8.7.3.1 FDD sustained data rate performance for EPDCCH scheduling	12.0.0	12.1.0
2014-03	RAN#63	R5-140890	1330	-	Addition of TC 8.8.1.1.1 FDD distributed EPDCCH performance	12.0.0	12.1.0
2014-03	RAN#63	R5-140891	1331	-	Addition of TC 8.7.4.1 TDD sustained data rate performance for EPDCCH scheduling	12.0.0	12.1.0
2014-03	RAN#63	R5-140892	1332	-	Addition of TC 8.8.1.2.1 TDD distributed EPDCCH performance	12.0.0	12.1.0
2014-03	RAN#63	R5-140893	1333	-	Addition of TC 8.8.2.1.1 FDD localized EPDCCH performance	12.0.0	12.1.0
2014-03	RAN#63	R5-140894	1334	-	Addition of TC 8.8.2.1.2 FDD EPDCCH localized transmission with TM10 quasi co-location Type-B	12.0.0	12.1.0
2014-03	RAN#63	R5-140895	1335	-	Addition of TC 8.8.2.2.1 TDD localized EPDCCH performance	12.0.0	12.1.0
2014-03	RAN#63	R5-140896	1336	-	Addition of TC 8.8.2.2.2 TDD EPDCCH localized transmission with TM10 quasi co-location Type-B	12.0.0	12.1.0
2014-03	RAN#63	R5-140922	1337	-	Modify Applicability for LTE B14 public safety high power UE test cases	12.0.0	12.1.0
2014-03	RAN#63	R5-141003	1338	-	Addition of FDD CQI Reporting under AWGN conditions - Single CSI Process TC 9.2.4.1	12.0.0	12.1.0
2014-03	RAN#63	R5-141004	1339	-	Addition of TDD CQI Reporting under AWGN conditions - Single CSI Process TC 9.2.4.2	12.0.0	12.1.0
2014-03	RAN#63	R5-141006	1340	-	Addition of TC 8.2.1.7 FDD Carrier Aggregation with power imbalance	12.0.0	12.1.0
2014-03	RAN#63	R5-141007	1341	-	Updates to TC 7.4A.2 for CA_3C	12.0.0	12.1.0
2014-03	RAN#63	R5-141008	1342	-	Addition of TC 9.3.6.1_F FDD CQI Reporting under fading conditions multiple CSI processes for CoMP	12.0.0	12.1.0
2014-03	RAN#63	R5-141009	1343	-	Addition of TC 9.3.6.2_F TDD CQI Reporting under fading conditions multiple CSI processes for CoMP	12.0.0	12.1.0

2014-03	RAN#63	R5-141011	1345	-	Corrections to definition of 20 MHz and 5MHz for minimum output power for CA in 6.3.2A	12.0.0	12.1.0
2014-03	RAN#63	R5-141012	1346	-	Addition of Intra NC CA to chap. 5 and related symbol to chap. 3	12.0.0	12.1.0
2014-03	RAN#63	R5-141016	1347	-	Correction and proposed resolution to TBDs UL CA TCs 6.2.4A and 6.6.3.3A	12.0.0	12.1.0
2014-03	RAN#63	R5-141017	1348	-	Update for CA Rx TCs	12.0.0	12.1.0
2014-03	RAN#63	R5-141018	1349	-	PCC/SCC switching in inter-band CA Rx test cases	12.0.0	12.1.0
2014-03	RAN#63	R5-141026	1350	-	Introduction of new TC 8.3.1.3.2_F FDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and multiple NZP CSI-RS resources for CoMP	12.0.0	12.1.0
2014-03	RAN#63	R5-141027	1351	-	Introduction of TC 8.3.1.3.3_F FDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Different Cell ID, Colliding CRS and single NZP CSI-RS for CoMP	12.0.0	12.1.0
2014-03	RAN#63	R5-141028	1352	-	Addition of new demod scenario for DL COMP - Same Cell ID and single NZP CSI-RS resource	12.0.0	12.1.0
2014-03	RAN#63	R5-141029	1353	-	Corrections to TM9 test to verify correct SNR estimation	12.0.0	12.1.0
2014-03	RAN#63	R5-141038	1354	-	Correction to sustained downlink data rate tests	12.0.0	12.1.0
2014-03	RAN#63	R5-141040	1355	-	Changes to test frequencies in Tx test cases for Band 28	12.0.0	12.1.0
2014-03	RAN#63	R5-141041	1356	-	Updates of Reference sensitivity for Intra-band non-contiguous CA	12.0.0	12.1.0
2014-03	RAN#63	R5-141042	1357	-	Update TC of 7.4A.4 Maximum input level for CA (intra band non-contiguous DL CA without UL CA)	12.0.0	12.1.0
2014-03	RAN#63	R5-141043	1358	-	Update TC of 7.5A.4 Adjacent Channel Selectivity (ACS) for CA (intra band non-contiguous DL CA without UL CA)	12.0.0	12.1.0
2014-03	RAN#63	R5-141044	1359	-	Corrections to maximum output power for multiple transmissions in a subframe	12.0.0	12.1.0
2014-03	RAN#63	R5-141045	1360	-	Correction to test configuration of Maximum input for CA	12.0.0	12.1.0
2014-03	RAN#63	R5-141047	1271	-	eICIC RF: Corrections to TDD PHICH test	12.0.0	12.1.0
2014-06	RAN#64	R5-142069	1362	-	LTE Type A performance requirements - adding TC 8.2.1.4.3 into annex F and G	12.1.0	12.2.0
2014-06	RAN#64	R5-142071	1363	-	Addition of connection diagram references to LTE Type A performance tests	12.1.0	12.2.0
2014-06	RAN#64	R5-142072	1364	-	Addition of connection diagram references to LTE Type A CSI tests	12.1.0	12.2.0
2014-06	RAN#64	R5-142111	1365	-	Addition of CA 3A-28A to 36.521-1 Chapter 6	12.1.0	12.2.0
2014-06	RAN#64	R5-142112	1366	-	Addition of CA 3A-28A to 36.521-1 Chapter 7	12.1.0	12.2.0
2014-06	RAN#64	R5-142172	1367	-	Addition of TC 6.2.2A.1 for CA_39C	12.1.0	12.2.0
2014-06	RAN#64	R5-142176	1368	-	Corrections to configured transmitted power for CA	12.1.0	12.2.0
2014-06	RAN#64	R5-142177	1369	-	Corrections to OCNG pattern	12.1.0	12.2.0
2014-06	RAN#64	R5-142295	1370	-	Updates of 6.2.5 Delta TIB for CA_3A-26A and CA_3A-27A	12.1.0	12.2.0
2014-06	RAN#64	R5-142296	1371	-	Updates of 7.3.3 Delta RIB for CA_3A-26A and CA_3A-27A	12.1.0	12.2.0
2014-06	RAN#64	R5-142307	1372	-	RF: Corrections to spurious emission requirements with NS different than NS_01	12.1.0	12.2.0
2014-06	RAN#64	R5-142309	1373	-	RF: Editorial corrections to the annexes	12.1.0	12.2.0

2014-06	RAN#64	R5-142312	1374	-	CA RF: Several corrections to some Tx tests	12.1.0	12.2.0
2014-06	RAN#64	R5-142317	1375	-	eICIC RF: Corrections to RI performance tests	12.1.0	12.2.0
2014-06	RAN#64	R5-142343	1376	-	Addition of LTE CA_39A-41A into Table 6.2.5.3-2	12.1.0	12.2.0
2014-06	RAN#64	R5-142366	1377	-	Update of TC 8.7.4.1 TDD sustained data rate performance for EPDCCH scheduling	12.1.0	12.2.0
2014-06	RAN#64	R5-142372	1378	-	Update of TC 8.8.2.1.2 FDD EPDCCH localized transmission with TM10 quasi co-location Type-B	12.1.0	12.2.0
2014-06	RAN#64	R5-142376	1379	-	Update of TC 8.8.2.2.2 TDD EPDCCH localized transmission with TM10 quasi co-location Type-B	12.1.0	12.2.0
2014-06	RAN#64	R5-142384	1380	-	Update of TC 9.3.6.1_F FDD CQI Reporting under fading conditions multiple CSI processes for CoMP	12.1.0	12.2.0
2014-06	RAN#64	R5-142387	1381	-	Update overview of DL reference measurement channels for EPDCCH	12.1.0	12.2.0
2014-06	RAN#64	R5-142391	1382	-	Uncertainties and Test Tolerances for Enhanced Performance Requirement Type A 9.3.5.1.1 and 9.3.5.1.2 CQI Test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-142393	1383	-	Test Tolerances for eICIC 9.2.x CQI Test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-142394	1384	-	Correction of the test cases 8.2.1.2.2 and 8.2.1.2.2_1	12.1.0	12.2.0
2014-06	RAN#64	R5-142420	1386	-	Corrections to Annex G.5.4	12.1.0	12.2.0
2014-06	RAN#64	R5-142444	1387	-	Introduction of transmission mode 10 in precoder update granularity in FDD and TDD common test parameters	12.1.0	12.2.0
2014-06	RAN#64	R5-142446	1388	-	Introduction of new TC 8.3.2.4.2_F TDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and multiple NZP CSI-RS resources for CoMP	12.1.0	12.2.0
2014-06	RAN#64	R5-142449	1389	-	Introduction of TC 8.3.2.4.3_F TDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Different Cell ID, Colliding CRS and single NZP CSI-RS for CoMP	12.1.0	12.2.0
2014-06	RAN#64	R5-142515	1390	-	Corrections to MBMS performance test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-142576	1391	-	Update UE Transmit OFF power for CA _39C (intra-band contiguous DL CA and UL CA)	12.1.0	12.2.0
2014-06	RAN#64	R5-142588	1392	-	Remove the square bracket in TC 8.3.1.3.2_F and TC 8.3.1.3.3_F	12.1.0	12.2.0
2014-06	RAN#64	R5-142590	1393	-	Uncertainties and Test Tolerances for eICIC PDCCH/PCFICH and PHICH demodulation tests	12.1.0	12.2.0
2014-06	RAN#64	R5-142596	1394	-	Addition of message exception for PHICH duration	12.1.0	12.2.0
2014-06	RAN#64	R5-142597	1515	-	Correction to eICIC CSI tests	12.1.0	12.2.0
2014-06	RAN#64	R5-142601	1395	-	Correction to title in feICIC PDSCH demodulation tests	12.1.0	12.2.0
2014-06	RAN#64	R5-142605	1396	-	Correction to measurement bandwidth in 6.6.2.1A.1	12.1.0	12.2.0
2014-06	RAN#64	R5-142616	1399	-	Correction to MBMS performance	12.1.0	12.2.0
2014-06	RAN#64	R5-142672	1400	-	Correction to in-band blocking requirements	12.1.0	12.2.0
2014-06	RAN#64	R5-142676	1401	-	Correction to 6.6.2.1A test environment	12.1.0	12.2.0
2014-06	RAN#64	R5-142692	1402	-	Correction to 8.2.2.1.1_1 and 8.2.2.2.1_1 applicability	12.1.0	12.2.0
2014-06	RAN#64	R5-142697	1403	-	36.521-1: Corrections to section 7.3A	12.1.0	12.2.0
2014-06	RAN#64	R5-142701	1404	-	Introduction of NC CA TC 7.7A.4	12.1.0	12.2.0
2014-06	RAN#64	R5-142703	1405	-	Uncertainties and Derivation of Test Requirements for TCs 7.6.xA.4 and 7.7A.4	12.1.0	12.2.0

2014-06	RAN#64	R5-142710	1406	-	36-521-1: Clarification on Averaged EVM for PRACH	12.1.0	12.2.0
2014-06	RAN#64	R5-142749	1407	-	Correction to CA band combo CA_3A-5A	12.1.0	12.2.0
2014-06	RAN#64	R5-142750	1408	-	Verification of exceptions of REFSENS requirements for carrier aggregation	12.1.0	12.2.0
2014-06	RAN#64	R5-142771	1409	-	Addition of CA_2A-4A and CA_5A-7A to 36.521-1 Chapter 7	12.1.0	12.2.0
2014-06	RAN#64	R5-143003	1410	-	36.521-1: Editorial correction on 6.6.3.3 Initial conditions for NS_19	12.1.0	12.2.0
2014-06	RAN#64	R5-143004	1411	-	36.521-1: Editorial correction on 6.6.2.2B test requirements for NS_06 or NS_07	12.1.0	12.2.0
2014-06	RAN#64	R5-143005	1412	-	Correction for CA_4A-12A uplink configuration in inter-band CA reference sensitivity	12.1.0	12.2.0
2014-06	RAN#64	R5-143006	1413	-	CA RF: Clarification of test parameters and requirements for Inter-band CA Rx tests	12.1.0	12.2.0
2014-06	RAN#64	R5-143007	1414	-	Corrections to SNR test for TM9 minimum requirements	12.1.0	12.2.0
2014-06	RAN#64	R5-143008	1415	-	Correction to ACK NAK Reporting mode for TDD CA test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143009	1416	-	Addition of TC 8.2.1.1.1_2 and 8.2.2.1.1_2	12.1.0	12.2.0
2014-06	RAN#64	R5-143010	1417	-	Correction of FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA test cases of TCs 8.2.1.3.1_A.2 and 8.2.1.3.1_A.2_1	12.1.0	12.2.0
2014-06	RAN#64	R5-143011	1418	-	Updates to 8.2.1.3 FDD PDSCH Open Loop Spatial Multiplexing 2x2 related test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143012	1419	-	Updates to 8.2.2.3 TDD PDSCH Open Loop Spatial Multiplexing 2x2 related test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143013	1420	-	36.521-1: Editorial correction on 8.2.1.4.2_A.2 message contents	12.1.0	12.2.0
2014-06	RAN#64	R5-143014	1421	-	Clarification the minimum conformance requirement and test parameter for 8.2.1.3.3_C1 and 8.2.1.3.3_C2 test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143015	1422	-	Correction to minimum test time for eICIC tests	12.1.0	12.2.0
2014-06	RAN#64	R5-143025	1423	-	LTE Type A performance requirements - Introduction of the new test case 8.2.1.4.3	12.1.0	12.2.0
2014-06	RAN#64	R5-143026	1424	-	Test Tolerances for eICIC 9.5.x RI Test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143027	1425	-	Uncertainties and Test Tolerances for EPDCCH 8.8.1.x demodulation Test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143031	1426	-	Update to operating bands for CA	12.1.0	12.2.0
2014-06	RAN#64	R5-143032	1427	-	Update to channel bandwidths for CA	12.1.0	12.2.0
2014-06	RAN#64	R5-143033	1428	-	Update to TC 6.3.2A.1 for CA_39C	12.1.0	12.2.0
2014-06	RAN#64	R5-143034	1429	-	Updates of 7.3A.3 Refsens for CA_3A-26A and CA_3A-27A	12.1.0	12.2.0
2014-06	RAN#64	R5-143035	1430	-	Addition of CA band Combo CA_2A-13A	12.1.0	12.2.0
2014-06	RAN#64	R5-143036	1431	-	Addition of CA_39A-41A to Refsens in chap.7	12.1.0	12.2.0
2014-06	RAN#64	R5-143037	1432	-	Updates to Chap.5 for CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143038	1433	-	Addition of CA_2A-4A and CA_5A-7A to 36.521-1 Clause 6	12.1.0	12.2.0
2014-06	RAN#64	R5-143039	1434	-	TC 8.2.1.3.3_E.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143040	1435	-	TC 8.2.2.3.3_E.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0

2014-06	RAN#64	R5-143041	1436	-	Corrections applicability statement including UE category for feICIC	12.1.0	12.2.0
2014-06	RAN#64	R5-143042	1437	-	Additions to TC 8.2.1.2.3_E.1 FDD PDSCH Transmit diversity 2x2 for feICIC (non-MBFSN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143043	1438	-	Additions to TC 8.2.2.2.3_E.1 TDD PDSCH Transmit diversity 2x2 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143044	1439	-	Additions to TC 8.2.1.4.1_E.1 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143045	1440	-	Additions to TC 8.2.2.4.1_E.1 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143046	1441	-	Additions to TC 9.2.1.5_E.1 FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143047	1442	-	Additions to TC 9.2.1.6_E.1 TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143048	1443	-	Additions to TC 9.3.1.3.1_E.1 FDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143049	1444	-	Additions to TC 9.3.1.3.2_E.1 TDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143050	1445	-	Additions to TC 9.5.4.1_E.1 FDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143051	1446	-	Additions to TC 9.5.4.2_E.1 TDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143052	1447	-	Additions to Reporting of Channel State Information feICIC Test Cases to Annex F	12.1.0	12.2.0
2014-06	RAN#64	R5-143076	1448	-	Update of TC 9.3.6.2_F TDD CQI Reporting under fading conditions multiple CSI processes for CoMP	12.1.0	12.2.0
2014-06	RAN#64	R5-143077	1449	-	Correction parameter and reference table number in test case 8.3.2.4.1_F	12.1.0	12.2.0
2014-06	RAN#64	R5-143079	1450	-	Update of TC 8.7.3.1 FDD sustained data rate performance for EPDCCH scheduling	12.1.0	12.2.0
2014-06	RAN#64	R5-143080	1451	-	Addition of TC 8.8.3.1 FDD Localized transmission with TM10 Type B quasi co-location type	12.1.0	12.2.0
2014-06	RAN#64	R5-143081	1452	-	Addition of TC 8.8.3.2 TDD Localized transmission with TM10 Type B quasi co-location type	12.1.0	12.2.0
2014-06	RAN#64	R5-143082	1453	-	Update initial condition and test requirement in test case 8.7.1.1_A.2_1 for two 15MHz CCs	12.1.0	12.2.0
2014-06	RAN#64	R5-143097	1454	-	Addition of message content exception in eICIC performance tests with MBSFN ABS	12.1.0	12.2.0
2014-06	RAN#64	R5-143098	1455	-	Additions to TC 8.4.1.2.3_E.1 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143099	1456	-	Additions to TC 8.4.2.2.3_E.1 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143100	1457	-	Additions to TC 8.4.2.2.3_E.2 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143101	1458	-	Additions to Demodulation feICIC Test Cases to Annex F	12.1.0	12.2.0
2014-06	RAN#64	R5-143104	1459	-	Introduction of TC 8.2.2.4.2_A.3 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4 x 2 for CA	12.1.0	12.2.0
2014-06	RAN#64	R5-143105	1460	-	Updates to Refsens for Intra-band non-contiguous CA	12.1.0	12.2.0

2014-06	RAN#64	R5-143106	1461	-	Correction of interference rejection test cases TC 8.2.2.4.3	12.1.0	12.2.0
2014-06	RAN#64	R5-143107	1462	-	Correction to eICIC PDSCH demodulation tests	12.1.0	12.2.0
2014-06	RAN#64	R5-143113	1463	-	Introduction of TC 8.2.2.1.1_A.3 TDD PDSCH Single Antenna Port Performance for CA	12.1.0	12.2.0
2014-06	RAN#64	R5-143114	1464	-	Additions to TC 8.4.1.2.3_E.2 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)	12.1.0	12.2.0
2014-06	RAN#64	R5-143115	1465	-	Update of TC 8.8.1.1 FDD distributed EPDCCH performance	12.1.0	12.2.0
2014-06	RAN#64	R5-143116	1466	-	Update of TC 8.8.2.1 FDD localized transmission with TM9	12.1.0	12.2.0
2014-06	RAN#64	R5-143117	1467	-	Update of TC 8.8.2.2 TDD localized transmission with TM9	12.1.0	12.2.0
2014-06	RAN#64	R5-143118	1468	-	Update sections of A.3.9 and A.3.10 reference channel for EPDCCH test	12.1.0	12.2.0
2014-06	RAN#64	R5-143129	1469	-	Addition of FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for CA (intra band non-contiguous DL CA) TC 9.6.1.1_A.3	12.1.0	12.2.0
2014-06	RAN#64	R5-143130	1470	-	Addition of TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for CA (intra band non-contiguous DL CA) TC 9.6.1.2_A.3	12.1.0	12.2.0
2014-06	RAN#64	R5-143131	1471	-	Addition of TC 6.2.4A.1 for CA_39C	12.1.0	12.2.0
2014-06	RAN#64	R5-143133	1472	-	Update additional spurious emissions for CA_38C (intra-band contiguous DL CA and UL CA)	12.1.0	12.2.0
2014-06	RAN#64	R5-143134	1473	-	Update In-band blocking for CA_39C (intra-band contiguous DL CA and UL CA)	12.1.0	12.2.0
2014-06	RAN#64	R5-143135	1474	-	Update Out-of-band blocking for CA_39C (intra-band contiguous DL CA and UL CA)	12.1.0	12.2.0
2014-06	RAN#64	R5-143136	1475	-	Update Reference sensitivity level for CA_39C (intra-band contiguous DL CA and UL CA)	12.1.0	12.2.0
2014-06	RAN#64	R5-143137	1476	-	RF: Corrections to CSI RMCs	12.1.0	12.2.0
2014-06	RAN#64	R5-143138	1477	-	CA RF: Corrections to CQI performance tests	12.1.0	12.2.0
2014-06	RAN#64	R5-143140	1478	-	CA RF: Corrections to performance test with power imbalance (Class C)	12.1.0	12.2.0
2014-06	RAN#64	R5-143141	1479	-	Correction of test case 8.2.1.1.1_1	12.1.0	12.2.0
2014-06	RAN#64	R5-143142	1480	-	Correction of the test applicability for test cases 8.2.1.1.1_A.2, 8.2.1.3.1_A.1, 8.2.1.3.1_A.2 and 8.2.1.4.2_A.2	12.1.0	12.2.0
2014-06	RAN#64	R5-143143	1481	-	Correction of the test applicability of the test cases 8.2.1.1.1_A.1, 8.2.1.4.2_A.1, 8.2.2.1.1_A.1 and 8.2.2.4.2_A.1	12.1.0	12.2.0
2014-06	RAN#64	R5-143144	1482	-	Correction of the applicability for the test case 8.7.1.1	12.1.0	12.2.0
2014-06	RAN#64	R5-143146	1483	-	Addition of TC 9.5.5.1_F.2 FDD RI Reporting with Multiple CSI processes for CoMP	12.1.0	12.2.0
2014-06	RAN#64	R5-143147	1484	-	Addition of TC 9.5.5.2_F.2 TDD RI Reporting with Multiple CSI processes for CoMP	12.1.0	12.2.0
2014-06	RAN#64	R5-143148	1485	-	Clarification of test parameters for eICIC PDCCH performance tests	12.1.0	12.2.0
2014-06	RAN#64	R5-143149	1486	-	Correction to Intra-band CA uplink configuration for reference sensitivity	12.1.0	12.2.0
2014-06	RAN#64	R5-143151	1487	-	Correction to CQI reference measurement channels	12.1.0	12.2.0
2014-06	RAN#64	R5-143154	1488	-	Introduction of NC CA TC 7.6.1A.4	12.1.0	12.2.0

2014-06	RAN#64	R5-143155	1489	-	Introduction of NC CA TC 7.6.2A.4	12.1.0	12.2.0
2014-06	RAN#64	R5-143156	1490	-	Introduction of NC CA TC 7.6.3A.4	12.1.0	12.2.0
2014-06	RAN#64	R5-143161	1491	-	Update Spurious emission band UE co-existence for CA_39C (intra-band contiguous DL CA and UL CA)	12.1.0	12.2.0
2014-06	RAN#64	R5-143162	1492	-	Update additional spurious emissions for CA_39C (intra-band contiguous DL CA and UL CA)	12.1.0	12.2.0
2014-06	RAN#64	R5-143163	1493	-	Updates to TC 7.3A.2 Reference sensitivity level for CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143164	1494	-	Updates to TC 7.4A.2 maximum input level for intra-band contiguous CA for CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143165	1495	-	Updates to TC 7.5A.2 ACS for CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143166	1496	-	Updates to 7.6.1A.2 IBB for CA of CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143167	1497	-	Updates to TC 7.6.2A.2 OOB for CA of CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143168	1498	-	Updates to TC 7.6.3A.2 Narrow band blocking for CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143169	1499	-	Updates to TC 7.7A.2 Spurious response for CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143170	1500	-	Updates to TC 7.8.1A.2 Wideband intermodulation for CA_27B	12.1.0	12.2.0
2014-06	RAN#64	R5-143175	1502	-	Updates to 8.7.2.1 TDD sustained data rate performance related test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143178	1504	-	Additions to TC 9.5.5.1_F.1 FDD RI Reporting with Single CSI process	12.1.0	12.2.0
2014-06	RAN#64	R5-143179	1505	-	Additions to TC 9.5.5.2_F.1 TDD RI Reporting with Single CSI process	12.1.0	12.2.0
2014-06	RAN#64	R5-143181	1506	-	Splitting of FDD CA TM3 and soft buffer management tests	12.1.0	12.2.0
2014-06	RAN#64	R5-143182	1507	-	Removal of soft buffer test points from FDD TM3 test cases in 8.2.1.3.1 and move to new soft buffer test cases in section 8.2.1.3.1A	12.1.0	12.2.0
2014-06	RAN#64	R5-143183	1508	-	Splitting of TDD CA TM3 and soft buffer management tests	12.1.0	12.2.0
2014-06	RAN#64	R5-143184	1509	-	Removal of soft buffer test points from TDD TM3 test cases in 8.2.2.3.1 and move to new soft buffer test case in section 8.2.2.3.1A	12.1.0	12.2.0
2014-06	RAN#64	R5-143188	1512	-	Addition of TC 8.2.2.7 TDD Carrier Aggregation with power imbalance	12.1.0	12.2.0
2014-06	RAN#64	R5-143189	1513	-	Corrections to test case 8.2.1.4.2_1, 8.2.2.4.1_1, and 8.2.2.4.2_1	12.1.0	12.2.0
2014-06	RAN#64	R5-143190	1514	-	Uncertainties and Test Tolerances for CoMP Test case 8.3.1.3.2_F	12.1.0	12.2.0
2014-06	RAN#64	R5-143203	1385	-	Throughput calculation for eICIC demodulation requirements	12.1.0	12.2.0
2014-06	RAN#64	R5-143204	1503	-	Correction to eICIC TDD RI requirements	12.1.0	12.2.0
2014-06	RAN#64	R5-143205	1510	-	Updates to 8.7.1.1_A FDD sustained data rate performance for CA related test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143206	1511	-	Updates to 8.7.2.1_A TDD sustained data rate performance for CA related test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143207	1397	-	Correction to CA Rx test cases	12.1.0	12.2.0
2014-06	RAN#64	R5-143208	1398	-	Correction to call setup in 8.7.1 and 8.7.2	12.1.0	12.2.0
2014-06	RAN#64	R5-143216	1501	-	Updates to 8.7.1.1 FDD sustained data rate performance related test cases	12.1.0	12.2.0

2014-09	RAN#65	R5-144068	1516	-	Uncertainties and test tolerances for test case 8.2.2.2.4	12.2.0	12.3.0
2014-09	RAN#65	R5-144072	1517	-	Uncertainties and test tolerances for test case 8.3.1.1.3	12.2.0	12.3.0
2014-09	RAN#65	R5-144074	1518	-	Uncertainties and test tolerances for test case 8.3.2.1.4	12.2.0	12.3.0
2014-09	RAN#65	R5-144086	1519	-	Corrections to TC 8.2.2.1.1_A.3 TDD PDSCH Single Antenna Port Performance for CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144087	1520	-	Corrections to TC 8.2.2.4.2_A.3 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4 x 2 for CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144088	1521	-	Test Tolerances to Annex F for TC 8.2.2.1.1_A.3 and TC 8.2.2.4.2_A.3	12.2.0	12.3.0
2014-09	RAN#65	R5-144093	1522	-	Test Tolerances for TC 9.5.5.1_F.1 FDD RI Reporting with Single CSI process	12.2.0	12.3.0
2014-09	RAN#65	R5-144094	1523	-	Test Tolerances for TC 9.5.5.2_F.1 TDD RI Reporting with Single CSI process	12.2.0	12.3.0
2014-09	RAN#65	R5-144095	1524	-	Addition of OCNG pattern for TM10	12.2.0	12.3.0
2014-09	RAN#65	R5-144096	1525	-	Uncertainties and Test Tolerances for TC 9.5.5.1_F.1+9.5.5.2_F.1 in Annex F	12.2.0	12.3.0
2014-09	RAN#65	R5-144098	1526	-	Test Tolerances for TC 8.2.1.4.1_E.1 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144099	1527	-	Test Tolerances for TC 8.2.2.4.1_E.1 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144101	1528	-	Test Tolerances for TC 8.4.1.2.3_E.1 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144102	1529	-	Test Tolerances for TC 8.4.2.2.3_E.1 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144104	1530	-	Test Tolerances for TC 8.4.1.2.3_E.2 FDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144105	1531	-	Test Tolerances for TC 8.4.2.2.3_E.2 TDD PCFICH/PDCCH Transmit Diversity 2x2 for feICIC (MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144107	1532	-	Uncertainties and Test Tolerances to Annex F for Demodulation feICIC	12.2.0	12.3.0
2014-09	RAN#65	R5-144111	1533	-	Test Tolerances for TC 9.2.1.5_E.1 FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144112	1534	-	Test Tolerances for TC 9.2.1.6_E.1 TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144114	1535	-	Test Tolerances for TC 9.3.1.3.1_E.1 FDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144115	1536	-	Test Tolerances for TC 9.3.1.3.2_E.1 TDD CQI Reporting under fading conditions - PUSCH 3-0 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144117	1537	-	Test Tolerances for TC 9.5.4.1_E.1 FDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144118	1538	-	Test Tolerances for TC 9.5.4.2_E.1 TDD RI Reporting - PUCCH 1-0 for feICIC (non-MBSFN ABS)	12.2.0	12.3.0
2014-09	RAN#65	R5-144120	1539	-	Uncertainties and Test Tolerances to Annex F for Reporting of Channel State Information feICIC	12.2.0	12.3.0
2014-09	RAN#65	R5-144122	1540	-	Message contents updates for CSI feICIC test cases	12.2.0	12.3.0
2014-09	RAN#65	R5-144123	1541	-	Corrections to Annex G for feICIC	12.2.0	12.3.0

2014-09	RAN#65	R5-144173	1542	-	RF: Corrections to spurious emission band co-existence test	12.2.0	12.3.0
2014-09	RAN#65	R5-144174	1543	-	RF: Missing test coverage for Band 31	12.2.0	12.3.0
2014-09	RAN#65	R5-144176	1544	-	IR RF: Correction to TCs 8.3.1.1.3 and 8.3.2.1.4	12.2.0	12.3.0
2014-09	RAN#65	R5-144244	1545	-	Correction of clause 6.2.4.5 in 36.521-1	12.2.0	12.3.0
2014-09	RAN#65	R5-144248	1546	-	Addition of operating band 30 to TS 36.521-1, clause 5	12.2.0	12.3.0
2014-09	RAN#65	R5-144283	1547	-	Add static propagation condition matrix for 1 x 2	12.2.0	12.3.0
2014-09	RAN#65	R5-144299	1548	-	Update of TC 8.3.1.3.2_F CoMP	12.2.0	12.3.0
2014-09	RAN#65	R5-144300	1549	-	Update of TC 8.3.1.3.3_F CoMP	12.2.0	12.3.0
2014-09	RAN#65	R5-144301	1550	-	Update of TC 8.3.2.4.2_F CoMP	12.2.0	12.3.0
2014-09	RAN#65	R5-144302	1551	-	Update of TC 8.3.2.4.3_F CoMP	12.2.0	12.3.0
2014-09	RAN#65	R5-144310	1552	-	Update minimum requirements and test tolerance for TC 8.7.3.1	12.2.0	12.3.0
2014-09	RAN#65	R5-144311	1553	-	Update minimum requirements and test tolerance for TC 8.7.4.1	12.2.0	12.3.0
2014-09	RAN#65	R5-144312	1554	-	Update minimum requirements and test tolerance for TC 8.8.2.1	12.2.0	12.3.0
2014-09	RAN#65	R5-144313	1555	-	Update minimum requirements and test tolerance for TC 8.8.2.2	12.2.0	12.3.0
2014-09	RAN#65	R5-144347	1556	-	Correction to Inter-band CA operating bands	12.2.0	12.3.0
2014-09	RAN#65	R5-144352	1557	-	Correction to eICIC performance test cases	12.2.0	12.3.0
2014-09	RAN#65	R5-144353	1558	-	Correction to UL/DL configuration in CQI requirements	12.2.0	12.3.0
2014-09	RAN#65	R5-144393	1559	-	RF: Corrections to A-MPR test requirements	12.2.0	12.3.0
2014-09	RAN#65	R5-144416	1560	-	Update configurations of CA_39C in A-MPR for CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144420	1561	-	Update configurations of CA_39C in Additional spurious emissions for CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144436	1562	-	Update of test applicabilities for TDD PDSCH Transmit Diversity	12.2.0	12.3.0
2014-09	RAN#65	R5-144439	1563	-	Update of test applicability for TDD PDSCH Transmit Diversity 4x2	12.2.0	12.3.0
2014-09	RAN#65	R5-144441	1564	-	Update test applicabilities for TDD interference rejection test cases	12.2.0	12.3.0
2014-09	RAN#65	R5-144474	1565	-	Updates to TC 8.7.2.1 and 8.7.2.1_1 for TDD SDR	12.2.0	12.3.0
2014-09	RAN#65	R5-144766	1567	-	Correction to CA Rx Blocking TCs	12.2.0	12.3.0
2014-09	RAN#65	R5-144775	1568	-	Correction of the ePDCCH TCs for applying default parameter	12.2.0	12.3.0
2014-09	RAN#65	R5-144787	1566	-	Addition of new TC 8.2.1.3.1_A.3 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for intra-band NC DL CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144801	1569	-	Removal of TBDs in Clause 6.2.4A.1 (A-MPR for UL intra-band cont. CA), CA_NS_02 and 03, correction of Test Requirements	12.2.0	12.3.0
2014-09	RAN#65	R5-144802	1570	-	Correction to in-band blocking for CA requirements	12.2.0	12.3.0
2014-09	RAN#65	R5-144803	1571	-	Corrections to TM9 SNR requirements for eDL-MIMO	12.2.0	12.3.0
2014-09	RAN#65	R5-144804	1572	-	Addition of exception message for TDD MBMS	12.2.0	12.3.0
2014-09	RAN#65	R5-144805	1573	-	RF: Corrections to sustained data rate tests	12.2.0	12.3.0

2014-09	RAN#65	R5-144806	1574	-	Correction of TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for CA (intra band contiguous DL CA) TC 9.6.1.2_A.1	12.2.0	12.3.0
2014-09	RAN#65	R5-144807	1575	-	Correction of TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for CA (intra band non-contiguous DL CA) TC 9.6.1.2_A.3	12.2.0	12.3.0
2014-09	RAN#65	R5-144808	1576	-	Correction to the test cases 8.3.2.1.1, 8.3.2.1.2, 8.3.2.1.3 and 8.3.2.2.1	12.2.0	12.3.0
2014-09	RAN#65	R5-144809	1577	-	Correction to RF General section on CA configurations	12.2.0	12.3.0
2014-09	RAN#65	R5-144814	1578	-	Update TC 9.3.6.1_F FDD CQI Reporting under fading conditions multiple CSI processes for CoMP	12.2.0	12.3.0
2014-09	RAN#65	R5-144815	1579	-	Update TC 9.3.6.2_F TDD CQI Reporting under fading conditions multiple CSI processes for CoMP	12.2.0	12.3.0
2014-09	RAN#65	R5-144817	1580	-	Addition of CoMP AWGN CQI Tests to Test Requirements Derivation in Annex F	12.2.0	12.3.0
2014-09	RAN#65	R5-144818	1581	-	Update minimum requirements and test tolerance for TC 8.8.3.1	12.2.0	12.3.0
2014-09	RAN#65	R5-144819	1582	-	Update minimum requirements and test tolerance for TC 8.8.3.2	12.2.0	12.3.0
2014-09	RAN#65	R5-144820	1583	-	Uncertainties and test tolerances for test cases 8.2.1.3.3_E.1 and 8.2.2.3.3_E.1	12.2.0	12.3.0
2014-09	RAN#65	R5-144821	1584	-	Uncertainties and Test Tolerances for feICIC Test cases 8.2.1.2.3_E.1 and 8.2.2.2.3_E.1.	12.2.0	12.3.0
2014-09	RAN#65	R5-144822	1585	-	Uncertainties and test tolerances for test case 8.2.2.4.3	12.2.0	12.3.0
2014-09	RAN#65	R5-144824	1586	-	Uncertainties and test tolerances for test cases 9.3.5.2.1 and 9.3.5.2.2	12.2.0	12.3.0
2014-09	RAN#65	R5-144826	1587	-	eICIC Test Tolerance references to TS 36.904	12.2.0	12.3.0
2014-09	RAN#65	R5-144827	1588	-	Addition of CA aQI Tests to Test Requirements Derivation in Annex F	12.2.0	12.3.0
2014-09	RAN#65	R5-144828	1589	-	ePDCCH RF: Corrections to sustained data rate tests	12.2.0	12.3.0
2014-09	RAN#65	R5-144836	1590	-	Update to CoMP test case 9.5.5.1_F.2 and 9.5.5.2_F.2	12.2.0	12.3.0
2014-09	RAN#65	R5-144839	1591	-	New CA band combination CA_NC_42 and CA_4-27-Update to 36.521-1 Chapter 6	12.2.0	12.3.0
2014-09	RAN#65	R5-144840	1592	-	New CA band combination CA_NC_42 and CA_4-27-Update to 36.521-1 Chapter 7	12.2.0	12.3.0
2014-09	RAN#65	R5-144841	1593	-	Addition of CA band Combo CA_7A-28A	12.2.0	12.3.0
2014-09	RAN#65	R5-144842	1594	-	Addition of CA_2A-2A to 36.521-1	12.2.0	12.3.0
2014-09	RAN#65	R5-144844	1595	-	Existing CA band combination CA_3A-28A update to 36.521-1 7.3	12.2.0	12.3.0
2014-09	RAN#65	R5-144845	1596	-	Addition of new CA band combo CA_2A-5A to 36.521-1	12.2.0	12.3.0
2014-09	RAN#65	R5-144859	1597	-	New TC: TDD CQI Reporting under AWGN conditions - PUCCH 1-0 for CA (inter band DL CA)	12.2.0	12.3.0
2014-09	RAN#65	R5-144873	1599	-	Correction of clause 6.3.4.1.4 in 36.521-1	12.2.0	12.3.0
2014-09	RAN#65	R5-144874	1600	-	Removal of transition period for Band 28 test frequency definition	12.2.0	12.3.0
2014-09	RAN#65	R5-144875	1601	-	Clarification of tables used in TDD Intra band non-contiguous DL CA TCs	12.2.0	12.3.0

2014-09	RAN#65	R5-144876	1602	-	Introduction of new Wideband Intermodulation test for Intra-band NC CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144879	1603	-	New CA band combination CA_NC_42 and CA_4-27-Update to 36.521-1 Chapter 5	12.2.0	12.3.0
2014-09	RAN#65	R5-144880	1604	-	Update reference sensitivity level for CA (intra-band contiguous DL CA without UL CA)	12.2.0	12.3.0
2014-09	RAN#65	R5-144881	1605	-	Update In-band blocking for CA (intra-band contiguous DL CA without UL CA)	12.2.0	12.3.0
2014-09	RAN#65	R5-144891	1606	-	CA RF: Adopting test frequencies selection to the new structure proposed for TS 36.508	12.2.0	12.3.0
2014-09	RAN#65	R5-144894	1607	-	Corrections to 8.3.1.2.1_D_1 FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO (Release 11 and forward)	12.2.0	12.3.0
2014-09	RAN#65	R5-144895	1608	-	Corrections to 8.3.2.2.1_D_1 TDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO (Release 11 and forward)	12.2.0	12.3.0
2014-09	RAN#65	R5-144896	1609	-	Correct errors in TDD PDSCH Single Antenna Port Performance test case	12.2.0	12.3.0
2014-09	RAN#65	R5-144897	1610	-	Separation of minimum requirements for CA UE PDSCH demodulation from single carrier	12.2.0	12.3.0
2014-09	RAN#65	R5-144898	1611	-	Introduction of FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for CA (intra band contiguous DL CA) TC 9.6.1.1_A.1	12.2.0	12.3.0
2014-09	RAN#65	R5-144899	1612	-	Correction of FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for CA (inter band DL CA) TC 9.6.1.1_A.2	12.2.0	12.3.0
2014-09	RAN#65	R5-144900	1613	-	Correction of FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for CA (intra band non-contiguous DL CA) TC 9.6.1.1_A.3	12.2.0	12.3.0
2014-09	RAN#65	R5-144901	1614	-	Updates to 8.2.1.4.2_A.1/A.2 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA related test cases	12.2.0	12.3.0
2014-09	RAN#65	R5-144902	1615	-	Updates to 8.2.2.3.1_A TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144903	1616	-	Updates to 8.2.2.4.2_A TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144904	1617	-	Updates to 8.2.2.3.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2	12.2.0	12.3.0
2014-09	RAN#65	R5-144905	1618	-	Updates to 8.2.2.3.2 TDD PDSCH Open Loop Spatial Multiplexing 4x2	12.2.0	12.3.0
2014-09	RAN#65	R5-144906	1619	-	Updates to 8.2.2.4 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 and 4x2	12.2.0	12.3.0
2014-09	RAN#65	R5-144907	1620	-	Updates to 9.2.x CQI Reporting under AWGN conditions	12.2.0	12.3.0
2014-09	RAN#65	R5-144916	1621	-	Message contents updates for TC 9.5.5.1_F.1+9.5.5.2_F.1 CoMP	12.2.0	12.3.0
2014-09	RAN#65	R5-144917	1622	-	FDD CQI Reporting under AWGN conditions - Single CSI Process TC 9.2.4.1_F - Editor Notes Resolution	12.2.0	12.3.0
2014-09	RAN#65	R5-144918	1623	-	TDD CQI Reporting under AWGN conditions - Single CSI Process TC 9.2.4.2_F - Editor Notes Resolution	12.2.0	12.3.0
2014-09	RAN#65	R5-144920	1624	-	Addition of SDR test case 8.7.1.1_A.3 for intra-band NC DL CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144922	1625	-	New TC: TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (inter band DL CA)	12.2.0	12.3.0
2014-09	RAN#65	R5-144923	1626	-	New TC: TDD PDSCH Single Antenna Port Performance for CA (inter-band DL CA)	12.2.0	12.3.0

2014-09	RAN#65	R5-144924	1627	-	New TC: TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (inter-band DL CA)	12.2.0	12.3.0
2014-09	RAN#65	R5-144925	1628	-	New TC: TDD sustained data rate performance for CA (inter-band DL CA)	12.2.0	12.3.0
2014-09	RAN#65	R5-144926	1629	-	Update Out-of-band blocking for CA (intra-band contiguous DL CA without UL CA)	12.2.0	12.3.0
2014-09	RAN#65	R5-144928	1630	-	Message contents updates for Demod feICIC test cases	12.2.0	12.3.0
2014-09	RAN#65	R5-144930	1631	-	Addition of new TC 8.2.2.3.1A_A.3 TDD Soft buffer management test for intra-band NC DL CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144931	1632	-	Addition of new TC 8.2.1.4.2_A.3 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (intra band NC DL CA)	12.2.0	12.3.0
2014-09	RAN#65	R5-144932	1633	-	Updates to TCs 8.2.1.3.1_A.1/A.2 for FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144933	1634	-	Updates to 8.7.1.1_A FDD SDR for CA related test cases	12.2.0	12.3.0
2014-09	RAN#65	R5-144934	1635	-	Addition of new TC 8.2.2.3.1A_A.2 TDD Soft buffer management test for inter-band DL CA	12.2.0	12.3.0
2014-09	RAN#65	R5-144936	1636	-	Updates of Annex F.1.4 and F.3.4 for newly added performance test cases	12.2.0	12.3.0
2014-09	RAN#65	R5-144938	1637	-	Updates to TC 8.2.2.1 TDD PDSCH Single Antenna Port Performance (Cell-Specific Reference Symbols) related test cases	12.2.0	12.3.0
2014-09	RAN#65	R5-144939	1638	-	Updates to 8.2.2.2 TDD PDSCH Transmit Diversity Performance (Cell-Specific Reference Symbols)	12.2.0	12.3.0
2014-09	RAN#65	R5-144942	1640	-	Updates to TC 9.6.1.1_A.2 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (inter band DL CA)	12.2.0	12.3.0
2014-12	RAN#66	R5-145014	1641	-	Corrections to CA Blocking TCs minimum requirements	12.3.0	12.4.0
2014-12	RAN#66	R5-145015	1642	-	Correction to CA Spurious Response TC minimum requirements	12.3.0	12.4.0
2014-12	RAN#66	R5-145125	1645	-	RF: Review of definition of CSI measurement channels with dynamic coding rate	12.3.0	12.4.0
2014-12	RAN#66	R5-145128	1646	-	RF: Review of references to CSI measurement channels with dynamic coding rate	12.3.0	12.4.0
2014-12	RAN#66	R5-145175	1647	-	New CA band combination CA_1A-3A - Updates of 5.2A Operating bands	12.3.0	12.4.0
2014-12	RAN#66	R5-145176	1648	-	New CA band combination CA_1A-3A - Updates of 5.4.2A Channel Bandwidth	12.3.0	12.4.0
2014-12	RAN#66	R5-145177	1649	-	New CA band combination CA_1A-3A - Updates of 6.2.5 Delta TIB	12.3.0	12.4.0
2014-12	RAN#66	R5-145178	1650	-	New CA band combination CA_1A-3A - Updates of 7.3.3 Delta RIB	12.3.0	12.4.0
2014-12	RAN#66	R5-145189	1651	-	eICIC-RF: Corrections to PDCCH performance tests	12.3.0	12.4.0
2014-12	RAN#66	R5-145196	1652	-	RF: Corrections to RMC-s tables	12.3.0	12.4.0
2014-12	RAN#66	R5-145210	1653	-	CA-RF: Correction to OBW requirement	12.3.0	12.4.0
2014-12	RAN#66	R5-145222	1654	-	Introduction of UE maximum output power for CA_42C	12.3.0	12.4.0
2014-12	RAN#66	R5-145223	1655	-	Introduction of Spurious emission band UE co-existence for CA_42C	12.3.0	12.4.0

2014-12	RAN#66	R5-145229	1656	-	Update the minimum requirement and test requirements of TC 8.8.3 localized transmission with TM10	12.3.0	12.4.0
2014-12	RAN#66	R5-145232	1657	-	Existing CA band combination CA_4A-27A and new CA band combination CA_41A-42A update to 36.521-1 section 5.4.2A.1	12.3.0	12.4.0
2014-12	RAN#66	R5-145234	1658	-	New CA band combination CA_41A-42A update to 36.521-1 section 5.2A	12.3.0	12.4.0
2014-12	RAN#66	R5-145235	1659	-	New CA band combination CA_41A-42A update to 36.521-1 section 6.2.5	12.3.0	12.4.0
2014-12	RAN#66	R5-145236	1660	-	New CA band combination CA_41A-42A update to 36.521-1 section 7.3.3	12.3.0	12.4.0
2014-12	RAN#66	R5-145291	1661	-	CQI reporting in AWGN and in fading: CQI indices in set	12.3.0	12.4.0
2014-12	RAN#66	R5-145311	1662	-	Clarification for CA ACS and Wideband Intermodulation testcases	12.3.0	12.4.0
2014-12	RAN#66	R5-145374	1663	-	New CA band combination CA_18A-28A - Updates of 5.2A Operating bands	12.3.0	12.4.0
2014-12	RAN#66	R5-145375	1664	-	New CA band combination CA_18A-28A - Updates of 5.4.2A Channel bandwidth	12.3.0	12.4.0
2014-12	RAN#66	R5-145376	1665	-	New CA band combination CA_18A-28A - Updates of 6.2.5.3 Delta TIB	12.3.0	12.4.0
2014-12	RAN#66	R5-145377	1666	-	New CA band combination CA_18A-28A - Updates of 7.3A Delta RIB	12.3.0	12.4.0
2014-12	RAN#66	R5-145407	1667	-	Alignment with 36.521-2 on UE categories for COMP	12.3.0	12.4.0
2014-12	RAN#66	R5-145425	1668	-	Removal of Non-contiguous Allocation within a Component Carrier Testpoints from UL CA MPR, Spectrum Emissions and ACLR Tests	12.3.0	12.4.0
2014-12	RAN#66	R5-145431	1669	-	Correction on parameters for high speed train scenario	12.3.0	12.4.0
2014-12	RAN#66	R5-145436	1670	-	Update TC 9.3.6 CQI Reporting under fading conditions Multiple CSI processes for CoMP	12.3.0	12.4.0
2014-12	RAN#66	R5-145437	1671	-	New CA band combination 1+11 and 8+11 û Introduction of 1+11 and 8+11 to 36.521-1 chapter 5	12.3.0	12.4.0
2014-12	RAN#66	R5-145438	1672	-	New CA band combination 1+11 and 8+11 û Introduction of 1+11 and 8+11 to 36.521-1 chapter 6	12.3.0	12.4.0
2014-12	RAN#66	R5-145439	1673	-	New CA band combination 1+11 and 8+11 û Introduction of 1+11 and 8+11 to 36.521-1 chapter 7	12.3.0	12.4.0
2014-12	RAN#66	R5-145465	1674	-	Correction to TC 8.2.1.1.1_A.1 FDD PDSCH Single Antenna Port Performance for CA	12.3.0	12.4.0
2014-12	RAN#66	R5-145479	1675	-	Corrections to throughput calculation for feICIC demodulation minimum requirements	12.3.0	12.4.0
2014-12	RAN#66	R5-145480	1676	-	Test Tolerances for TC 8.5.1.2.3_E.1 FDD PHICH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	12.3.0	12.4.0
2014-12	RAN#66	R5-145481	1677	-	Test Tolerances for TC 8.5.2.2.3_E.1 TDD PHICH Transmit Diversity 2x2 for feICIC (non-MBSFN ABS)	12.3.0	12.4.0
2014-12	RAN#66	R5-145486	1678	-	Uncertainties and Test Tolerances to Annex F for PHICH feICIC	12.3.0	12.4.0
2014-12	RAN#66	R5-145487	1679	-	Corrections to Annex G for minimum test time for demodulation for feICIC	12.3.0	12.4.0
2014-12	RAN#66	R5-145505	1680	-	Updates to TDD SDR CA test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145532	1681	-	Addition of missing bandwidth combination sets for inter-band CA	12.3.0	12.4.0

2014-12	RAN#66	R5-145536	1682	-	Additions to CoMP Demod test cases 8.3.1.3.1_F and 8.3.2.4.1_F	12.3.0	12.4.0
2014-12	RAN#66	R5-145539	1683	-	Addition of Band 30 in Max output power test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145540	1684	-	Addition of Band 30 in Max power reduction test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145543	1685	-	Addition of Band 30 in Spurious emission UE co-existence test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145559	1686	-	Correction to 6.3.5A.1.1	12.3.0	12.4.0
2014-12	RAN#66	R5-145638	1687	-	Correction to HPUE Applicability statements in TS 36.521-1	12.3.0	12.4.0
2014-12	RAN#66	R5-145800	1688	-	RF: Modification of test description to refer to State 2A-RF	12.3.0	12.4.0
2014-12	RAN#66	R5-145803	1689	-	Removal of Non-contiguous Allocation within a Component Carrier Testpoints from UL CA A-MPR and Additional Spectrum/Spurious Emissions Tests	12.3.0	12.4.0
2014-12	RAN#66	R5-145804	1690	-	Addition of RF requirements in later releases	12.3.0	12.4.0
2014-12	RAN#66	R5-145805	1691	-	eDL-MIMO RF: Correction to TC 8.3.1.1.1_D	12.3.0	12.4.0
2014-12	RAN#66	R5-145808	1692	-	Correction on support of a bandwidth combination set	12.3.0	12.4.0
2014-12	RAN#66	R5-145809	1693	-	Correction to TC 8.7.1.1_A FDD sustained data rate performance for CA	12.3.0	12.4.0
2014-12	RAN#66	R5-145810	1694	-	Correction to TC 8.2.2.1.1_A.1 TDD PDSCH Single Antenna Port Performance for CA	12.3.0	12.4.0
2014-12	RAN#66	R5-145811	1695	-	Corrections to TC 8.2.2.1.1_A.3 TDD PDSCH Single Antenna Port Performance for CA	12.3.0	12.4.0
2014-12	RAN#66	R5-145812	1696	-	Corrections to TC 8.2.2.4.2_A.3 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4 x 2 for CA	12.3.0	12.4.0
2014-12	RAN#66	R5-145813	1697	-	Corrections to Annex G for CA Enhancements	12.3.0	12.4.0
2014-12	RAN#66	R5-145825	1698	-	Uncertainties and TT for CoMP test case 9.5.5.1_F.2 and 9.5.5.2_F.2	12.3.0	12.4.0
2014-12	RAN#66	R5-145835	1699	-	Update Uncertainties for RI Test cases 9.5.x	12.3.0	12.4.0
2014-12	RAN#66	R5-145839	1700	-	Update of Demodulation of PDSCH CoMP TCs	12.3.0	12.4.0
2014-12	RAN#66	R5-145840	1701	-	Uncertainties and Test Tolerances for CoMP Test cases 8.3.1.3.3_F, 8.3.2.4.2_F, 8.3.2.4.3_F	12.3.0	12.4.0
2014-12	RAN#66	R5-145841	1702	-	Correction to CoMP TDD RI test case	12.3.0	12.4.0
2014-12	RAN#66	R5-145846	1703	-	Introduction of CA_42C in section 5 of TS 36.521-1	12.3.0	12.4.0
2014-12	RAN#66	R5-145847	1704	-	New CA band combination CA_4A-27A and CA_41A-42A update to 36.521-1 section 7.3A.3	12.3.0	12.4.0
2014-12	RAN#66	R5-145848	1705	-	Introduction of receiver requirements for CA_42C into TS 36.521-1	12.3.0	12.4.0
2014-12	RAN#66	R5-145851	1706	-	Addition of operating band 30 to TS 36.521-1 Clause 7 for receiver tests	12.3.0	12.4.0
2014-12	RAN#66	R5-145853	1707	-	Sections 3 and 4 update on 3DL CA WI	12.3.0	12.4.0
2014-12	RAN#66	R5-145854	1708	-	Addition of new 2DL(CA_1A-42A and CA_19A-42A) and 3DL CA band combinations(CA_1A-3A-19A, CA_1A-19A-21A, CA_1A-42C and CA_19A-42C)	12.3.0	12.4.0
2014-12	RAN#66	R5-145855	1709	-	New CA band combination CA_18A-28A - Updates of 7.3A Refsens	12.3.0	12.4.0
2014-12	RAN#66	R5-145856	1710	-	Update of CA Maximum input level Test cases	12.3.0	12.4.0

2014-12	RAN#66	R5-145857	1711	-	Update of CA ACS Test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145858	1712	-	Update of CA Blocking and Spurious Response Test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145859	1713	-	Update of CA Rx Intermodulation Test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145872	1714	-	Update to applicability for TM9 test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145874	1715	-	RF: Correction to A-MPR requirements with NS_20	12.3.0	12.4.0
2014-12	RAN#66	R5-145876	1716	-	Applicability of CSI requirements for CA capability	12.3.0	12.4.0
2014-12	RAN#66	R5-145880	1717	-	Addition of Band 30 in Additional Max power reduction test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145881	1718	-	Addition of Band 30 in Additional SEM test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145882	1719	-	Addition of Band 30 in Additional Spurious emission test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145883	1720	-	Update the minimum requirement and test requirements of TC 8.8.2 localized transmission with TM9	12.3.0	12.4.0
2014-12	RAN#66	R5-145884	1721	-	New CA band combination CA_1A-3A - Updates of 7.3A Refsens	12.3.0	12.4.0
2014-12	RAN#66	R5-145885	1722	-	New CA band combination CA_NC_41A and CA_NC_42A update to 36.521-1 section 7.4A.4 and 7.5A.4	12.3.0	12.4.0
2014-12	RAN#66	R5-145886	1723	-	New CA band combination CA_NC_41A and CA_NC_42A update to 36.521-1 section 7.6.1A.4, 7.6.2A.4 and 7.6.3A.4	12.3.0	12.4.0
2014-12	RAN#66	R5-145887	1724	-	New CA band combination CA_NC_41A and CA_NC_42A update to 36.521-1 section 7.8.1A.4	12.3.0	12.4.0
2014-12	RAN#66	R5-145888	1725	-	Existing CA band combination CA_39C: update bandwidth combination to CQI test	12.3.0	12.4.0
2014-12	RAN#66	R5-145889	1726	-	Existing CA band combination CA_39C: update bandwidth combination to PDSCH TM1 test	12.3.0	12.4.0
2014-12	RAN#66	R5-145890	1727	-	Existing CA band combination CA_39C: update bandwidth combination to PDSCH TM3 test	12.3.0	12.4.0
2014-12	RAN#66	R5-145891	1728	-	Existing CA band combination CA_39C: update bandwidth combination to PDSCH TM4 test	12.3.0	12.4.0
2014-12	RAN#66	R5-145893	1729	-	7A-7A NC CA RX RF Tests Testpoint Correction	12.3.0	12.4.0
2014-12	RAN#66	R5-145896	1730	-	CA-RF: Correction to ACLR test points	12.3.0	12.4.0
2014-12	RAN#66	R5-145898	1731	-	Intraband Contiguous CA RF Tests Testpoint Choice Clarification	12.3.0	12.4.0
2014-12	RAN#66	R5-145899	1732	-	Updates to Spurious emission band UE co-existence test cases 6.6.3.2 and 6.6.3.2A.1	12.3.0	12.4.0
2014-12	RAN#66	R5-145900	1733	-	Chapter 7 RX RF Tests Intra-band contiguous Test Configuration Tables Cleanup	12.3.0	12.4.0
2014-12	RAN#66	R5-145901	1734	-	Updates to FDD and TDD PDSCH Soft buffer management test (inter-band DL CA)	12.3.0	12.4.0
2014-12	RAN#66	R5-145902	1735	-	Updates to TM3 CA demodulation tests for release independence	12.3.0	12.4.0
2014-12	RAN#66	R5-145917	1736	-	Addition of CRS assistance data in message contents for feICIC demodulation test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145922	1737	-	Introduction of TC 8.2.1.1.1_A.3 FDD PDSCH Single Antenna Port Performance for CA	12.3.0	12.4.0
2014-12	RAN#66	R5-145926	1739	-	New CA band combination CA_NC_41A and CA_NC_42A update to 36.521-1 section 7.3A.4	12.3.0	12.4.0

2014-12	RAN#66	R5-145933	1740	-	Existing CA band combination CA_39C: update annex tables for 20+15MHz	12.3.0	12.4.0
2014-12	RAN#66	R5-145934	1741	-	Reconstruction of FDD SDR test cases based on Release independent rule	12.3.0	12.4.0
2014-12	RAN#66	R5-145935	1742	-	RF: Cleanup of sustained data rate test cases	12.3.0	12.4.0
2014-12	RAN#66	R5-145936	1743	-	Applicability of Demodulation requirements for CA capability	12.3.0	12.4.0
2014-12	RAN#66	R5-145975	1643	-	CA-RF: Review of test frequencies clause 8	12.3.0	12.4.0
2014-12	RAN#66	R5-145976	1644	-	CA-RF: Review of test frequencies clause 9	12.3.0	12.4.0
2015-03	RAN#67	R5-150112	1744	-	Addition of CA_2-30 to Clause 5.2A of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150135	1745	-	Addition of CA_5-30 to Clause 5.2A of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150136	1746	-	Addition of CA_5A-30A to Clause 5.4.2A of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150169	1747	-	Addition of CA_4A-5A-30A to Clause 5.4.2A of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150181	1748	-	Addition of new TC 9.3.6.1_F.2 FDD CQI Reporting under fading conditions with Three CSI processes for CoMP	12.4.0	12.5.0
2015-03	RAN#67	R5-150184	1749	-	Addition of new TC 9.3.6.2_F.2 TDD CQI Reporting under fading conditions with Three CSI processes for CoMP	12.4.0	12.5.0
2015-03	RAN#67	R5-150186	1840	-	Addition of TT for new TCs 9.3.6.1_F.1, 9.3.6.1_F.2, 9.3.6.1_F.3, 9.3.6.2_F.1, 9.3.6.2_F.2 and 9.3.6.2_F.3	12.4.0	12.5.0
2015-03	RAN#67	R5-150209	1750	-	Corrections to 1 PRB allocation performance in presence of MBSF	12.4.0	12.5.0
2015-03	RAN#67	R5-150210	1751	-	Corrections to the Common Test Parameters for User-specific Reference Symbols	12.4.0	12.5.0
2015-03	RAN#67	R5-150214	1752	-	Test Tolerances for 8.3.1.2.1_D_1 FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO Rel-11	12.4.0	12.5.0
2015-03	RAN#67	R5-150215	1753	-	Test Tolerances for 8.3.2.2.1_D_1 TDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO Rel-11	12.4.0	12.5.0
2015-03	RAN#67	R5-150216	1754	-	Uncertainties and Test Tolerances to Annex F for PDSCH for eDL-MIMO Rel-11	12.4.0	12.5.0
2015-03	RAN#67	R5-150234	1755	-	CA RF: Corrections to power imbalance test	12.4.0	12.5.0
2015-03	RAN#67	R5-150252	1756	-	Update of non-contiguous CA Rx Test Cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150364	1757	-	ePDCCH RF: Corrections to sustained data rate test	12.4.0	12.5.0
2015-03	RAN#67	R5-150373	1758	-	Introduction of new CA band combinations 5+25 and 12+25 for Transmitter Characteristics	12.4.0	12.5.0
2015-03	RAN#67	R5-150409	1759	-	Correction in cl.3 of 36.521-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150415	1760	-	Correction to message exceptions for eICIC performance test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150416	1761	-	Clean up on Performance and CSI test cases for eICIC and feICIC	12.4.0	12.5.0
2015-03	RAN#67	R5-150417	1762	-	Correction to test procedure in CQI Reporting under AWGN for feICIC	12.4.0	12.5.0
2015-03	RAN#67	R5-150420	1763	-	Correction to minimum test time for feICIC performance tests in G.3A.5	12.4.0	12.5.0
2015-03	RAN#67	R5-150437	1764	-	New CA band combination CA_1A-28A - Updates of 5.2A Operating bands	12.4.0	12.5.0
2015-03	RAN#67	R5-150438	1765	-	New CA band combination CA_1A-28A - Updates of 5.4.2A Channel bandwidth	12.4.0	12.5.0

2015-03	RAN#67	R5-150440	1766	-	New CA band combination CA_1A-28A - Updates of 6.2.5.3 Delta TIB	12.4.0	12.5.0
2015-03	RAN#67	R5-150441	1767	-	New CA band combination CA_1A-28A - Updates of 7.3.3 Delta RIB	12.4.0	12.5.0
2015-03	RAN#67	R5-150452	1768	-	New CA band combination CA_1A-18A-28A - Updates of 5.4.2A Channel bandwidth	12.4.0	12.5.0
2015-03	RAN#67	R5-150453	1769	-	New CA band combinations (CA_1A-41A, CA_1A-41C) - Updates of 5.2A Operating bands	12.4.0	12.5.0
2015-03	RAN#67	R5-150455	1770	-	New CA band combinations (CA_26A-41A, CA_26A-41C) - Updates of 5.2A Operating bands	12.4.0	12.5.0
2015-03	RAN#67	R5-150456	1771	-	New CA band combination CA_1A-18A-28A - Updates of 5.2A Operating bands	12.4.0	12.5.0
2015-03	RAN#67	R5-150460	1772	-	Correction to the description of duplex mode related to CA_18A-28A	12.4.0	12.5.0
2015-03	RAN#67	R5-150461	1773	-	Correction to the test frequencies and test CC combinations for CA_18A-28A	12.4.0	12.5.0
2015-03	RAN#67	R5-150472	1774	-	Correction to requirements for test case 7.6.2A.1 and 7.6.2A.2	12.4.0	12.5.0
2015-03	RAN#67	R5-150476	1775	-	Removal of Note 1 in requirements of TC 6.2.2A	12.4.0	12.5.0
2015-03	RAN#67	R5-150478	1776	-	Addition of &#916:RIB,c to requirements of blocking and spurious response test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150479	1777	-	Correction to PUSCH configuration details for 36.521-1 4x2 CA test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150505	1778	-	Added TT in annex for TDD inter band CA performance tests	12.4.0	12.5.0
2015-03	RAN#67	R5-150506	1779	-	Updated TT in TDD inter band CA performance tests	12.4.0	12.5.0
2015-03	RAN#67	R5-150522	1780	-	Addition of CA_1A-20A to TS 36.521-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150543	1781	-	Addition of 2A-12A and 5A-13A 2DL Interband CA to 36.521-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150606	1782	-	Clarification on bandwidth to be tested	12.4.0	12.5.0
2015-03	RAN#67	R5-150800	1783	-	Correction to 6.6.3.2 of Tx Spurious	12.4.0	12.5.0
2015-03	RAN#67	R5-150801	1784	-	Correction in 6.2.5A and 6.5.1A of 36.521-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150802	1785	-	Fixing numbering in Table 6.6.2.3A.1.4.1-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150803	1786	-	Change of test points for A-MPR in band 26	12.4.0	12.5.0
2015-03	RAN#67	R5-150809	1787	-	Addition of BCS1 to 25A-25A CA	12.4.0	12.5.0
2015-03	RAN#67	R5-150810	1788	-	Introduction of CA_1A-7A to TS 36.521-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150811	1789	-	Correction to test points for intra-band contiguous receiver test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150816	1790	-	Addition of CA_2A-30A to Clause 7.3.3 of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150817	1791	-	Addition of CA_2A-30A to Clause 6.2.5 of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150818	1792	-	Addition of CA_2A-30A to Clause 5.4.2A of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150819	1793	-	Addition of CA_4A-30A to Clause 7.3.3 of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150820	1794	-	Addition of CA_4A-30A to Clause 6.2.5 of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150821	1795	-	Addition of CA_4-30 to Clause 5.2A of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150822	1796	-	Addition of CA_4A-30A to Clause 5.4.2A of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150823	1797	-	Addition of CA_5A-30A to Clause 7.3.3 of TS 36.521-1.	12.4.0	12.5.0

2015-03	RAN#67	R5-150824	1798	-	Addition of CA_5A-30A to Clause 6.2.5 of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150825	1799	-	Addition of CA_4-5-30 to Clause 5.2A of TS 36.521-1.	12.4.0	12.5.0
2015-03	RAN#67	R5-150826	1800	-	Addition of new TC FDD PDSCH Single Antenna Port Performance for CA (3DL CA)	12.4.0	12.5.0
2015-03	RAN#67	R5-150827	1801	-	Addition of CA_2A-2A-13A to TS 36.521-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150828	1802	-	Addition of 40D,41D,41C-41A and 25A-25A BCS1 to Channel BW for CA tables	12.4.0	12.5.0
2015-03	RAN#67	R5-150829	1803	-	Addition of multiple interband 3DL CA Combinations to Channel BW for CA tables	12.4.0	12.5.0
2015-03	RAN#67	R5-150848	1804	-	Addition of new TC 9.3.6.1_F.1 FDD CQI Reporting under fading conditions with Single CSI process for CoMP	12.4.0	12.5.0
2015-03	RAN#67	R5-150849	1805	-	Addition of new TC 9.3.6.1_F.3 FDD CQI Reporting under fading conditions with Four CSI processes for CoMP	12.4.0	12.5.0
2015-03	RAN#67	R5-150850	1806	-	Addition of new TC 9.3.6.2_F.1 TDD CQI Reporting under fading conditions with Single CSI process for CoMP	12.4.0	12.5.0
2015-03	RAN#67	R5-150851	1807	-	Addition of new TC 9.3.6.2_F.3 TDD CQI Reporting under fading conditions with Four CSI processes for CoMP	12.4.0	12.5.0
2015-03	RAN#67	R5-150860	1808	-	Introduction of new CA band combinations 5+25 and 12+25 for Receiver Characteristics	12.4.0	12.5.0
2015-03	RAN#67	R5-150861	1809	-	Addition of CA_1A-7A-20A to TS 36.521-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150862	1810	-	Update of minimum requirements for TC 6.2.5 Configured UE transmitted Output Power	12.4.0	12.5.0
2015-03	RAN#67	R5-150863	1811	-	Updates of minimum requirement to reference sensitivity for CA	12.4.0	12.5.0
2015-03	RAN#67	R5-150865	1812	-	Addition of new TC TDD PDSCH Single Antenna Port Performance for CA (3DL CA)	12.4.0	12.5.0
2015-03	RAN#67	R5-150866	1813	-	Addition of new TC FDD Sustained data rate performance for CA (3DL CA)	12.4.0	12.5.0
2015-03	RAN#67	R5-150867	1814	-	Addition of new TC TDD Sustained data rate performance for CA (3DL CA)	12.4.0	12.5.0
2015-03	RAN#67	R5-150869	1839	-	Addition of Cell IDs for 3DL CA Rx tests	12.4.0	12.5.0
2015-03	RAN#67	R5-150870	1815	-	New CA band combinations (CA_1A-41A, CA_1A-41C) - Updates of 5.4.2A Channel bandwidth	12.4.0	12.5.0
2015-03	RAN#67	R5-150871	1816	-	New CA band combinations (CA_26A-41A, CA_26A-41C) - Updates of 5.4.2A Channel bandwidth	12.4.0	12.5.0
2015-03	RAN#67	R5-150935	1817	-	Change in UE co-existence 6.6.3.2 harmonic emissions exceptions	12.4.0	12.5.0
2015-03	RAN#67	R5-150874	1818	-	CA RF: Updates to in-band emissions requirements	12.4.0	12.5.0
2015-03	RAN#67	R5-150875	1819	-	Correction to test procedure of TC 7.6.1A.4	12.4.0	12.5.0
2015-03	RAN#67	R5-150880	1820	-	Update of CA sustained data rate tests	12.4.0	12.5.0
2015-03	RAN#67	R5-150881	1821	-	Aligning Bandwidth Combination Sets with latest core specification	12.4.0	12.5.0
2015-03	RAN#67	R5-150892	1822	-	Update to TC 7.5A.4 Adjacent Channel Selectivity (ACS) for CA (intra-band non-contiguous DL CA without UL CA)	12.4.0	12.5.0
2015-03	RAN#67	R5-150897	1823	-	New CA band combination CA_1A-28A - Updates of 7.3A Refsens	12.4.0	12.5.0

2015-03	RAN#67	R5-150928	1824	-	Updates to Spurious emission band UE co-existence test case 6.6.3.2	12.4.0	12.5.0
2015-03	RAN#67	R5-150906	1825	-	Updates to FDD and TDD RI Reporting test cases for CoMP	12.4.0	12.5.0
2015-03	RAN#67	R5-150929	1827	-	Addition of CA capability in Rx tests	12.4.0	12.5.0
2015-03	RAN#67	R5-150913	1828	-	Addition of Multi-Cluster PUSCH with One Uplink Carrier test cases to 36.521-1	12.4.0	12.5.0
2015-03	RAN#67	R5-150915	1829	-	Addition of CA capability and applicability changes to Section 8 36.521-1 FDD TM3 CA test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150916	1830	-	Changes to Annex F of 36.521-1 related to CA capability and applicability changes to FDD CA test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150917	1831	-	Correction to CA applicability and test rules	12.4.0	12.5.0
2015-03	RAN#67	R5-150918	1832	-	Addition of CA capability and applicability changes to 36.521-1 FDD TM1 CA test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150919	1833	-	Update to LTE CA Sustained Data rate test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150920	1834	-	CA demod Soft Buffer test case variants merge	12.4.0	12.5.0
2015-03	RAN#67	R5-150921	1835	-	Addition of CA capability and applicability changes to Section 8 36.521-1 FDD TM4 CA test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150922	1836	-	Addition of CA capability and applicability changes to FDD chap9 CA test cases	12.4.0	12.5.0
2015-03	RAN#67	R5-150925	1837	-	Introduction of Test Case for Maximum input level for 3DL CA	12.4.0	12.5.0
2015-03	RAN#67	R5-150926	1838	-	Addition of new TC of reference sensitivity for 3DL CA	12.4.0	12.5.0
2015-06	RAN#68	R5-151067	1841	-	Removal of Extreme Conditions from TC 6.6.2.1A test environment	12.5.0	12.6.0
2015-06	RAN#68	R5-151114	1843	-	RF: Missing power class information	12.5.0	12.6.0
2015-06	RAN#68	R5-151116	1845	-	CA RF: Clarification of PHICH configuration	12.5.0	12.6.0
2015-06	RAN#68	R5-151117	1846	-	RF: Corrections to CSI RMCs references	12.5.0	12.6.0
2015-06	RAN#68	R5-151121	1850	-	ePDCCH RF: Corrections to sustained data rate test	12.5.0	12.6.0
2015-06	RAN#68	R5-151122	1851	-	feICIC RF: Updates to TC 9.2.1.6_E.1	12.5.0	12.6.0
2015-06	RAN#68	R5-151123	1852	-	feICIC RF: Corrections to CSI TCs	12.5.0	12.6.0
2015-06	RAN#68	R5-151151	1853	-	Correction to the requirements of test case 6.6.2.1A	12.5.0	12.6.0
2015-06	RAN#68	R5-151152	1854	-	Addition of Rx parameter for test case 7.6.2A.1 and 7.6.2A.2	12.5.0	12.6.0
2015-06	RAN#68	R5-151181	1855	-	CA RF: Corrections to the applicability clause	12.5.0	12.6.0
2015-06	RAN#68	R5-151195	1857	-	Corrections to CSI Reference Measurement Channel	12.5.0	12.6.0
2015-06	RAN#68	R5-151213	1871	-	Updating Annex A relevant for the introduced of eDL MIMO enhancement Tests	12.5.0	12.6.0
2015-06	RAN#68	R5-151214	1872	-	Updating Annex B Beam steering approach for eDL MIMO enhancement Tests	12.5.0	12.6.0
2015-06	RAN#68	R5-151215	1873	-	Updating Annex I relevant for the introduced of eDL MIMO enhancement Tests	12.5.0	12.6.0
2015-06	RAN#68	R5-151231	1874	-	CoMP TCs applicability update section 8	12.5.0	12.6.0
2015-06	RAN#68	R5-151237	1876	-	Update of CoMP TCs 9.2.4.1_F and 9.2.4.2_F	12.5.0	12.6.0
2015-06	RAN#68	R5-151238	1877	-	Update of CoMP TCs in sections 9.3.6.1_F and 9.3.6.2_F	12.5.0	12.6.0
2015-06	RAN#68	R5-151256	1884	-	Update of CoMP TCs in section 8	12.5.0	12.6.0

2015-06	RAN#68	R5-151257	1885	-	Update of CoMP TCs 9.5.5.1_F.1 and 9.5.5.2_F.1	12.5.0	12.6.0
2015-06	RAN#68	R5-151329	1902	-	Addition of band 32 to clause 6 in 36.521-1	12.5.0	12.6.0
2015-06	RAN#68	R5-151366	1912	-	Removal of double table 7.6.1B.5-2	12.5.0	12.6.0
2015-06	RAN#68	R5-151367	1913	-	Corrections to UL CA Test Cases	12.5.0	12.6.0
2015-06	RAN#68	R5-151369	1915	-	Editorial corrections to TC 6.6.1	12.5.0	12.6.0
2015-06	RAN#68	R5-151425	1940	-	Addition of Band 32 in Receiver test cases	12.5.0	12.6.0
2015-06	RAN#68	R5-151487	1955	-	Introduction of new test case 8.9.1.1.1 MTC	12.5.0	12.6.0
2015-06	RAN#68	R5-151515	1962	-	Correction to test case 6.3.3A.1: UE Transmit OFF power for CA (intra-band contiguous DL CA and UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151561	1963	-	Update to TX test case 6.6.3.3 Additional spurious emissions	12.5.0	12.6.0
2015-06	RAN#68	R5-151591	1976	-	36.521-1: CA Soft buffering corrections	12.5.0	12.6.0
2015-06	RAN#68	R5-151616	1978	-	Introduction of new test case 9.7.1.1 MTC	12.5.0	12.6.0
2015-06	RAN#68	R5-151639	1980	-	Test points correction in test case 7.3A.2 for CA_23B in 36.521-1	12.5.0	12.6.0
2015-06	RAN#68	R5-151802	1875	1	CoMP TCs applicability update section 9	12.5.0	12.6.0
2015-06	RAN#68	R5-151805	1904	1	Clarification to spurious emission requirement for the edge of spurious domain	12.5.0	12.6.0
2015-06	RAN#68	R5-151806	1842	1	Missing NS Value for Band 30 Reference Sensitivity Testing and Missing Message Content Exceptions	12.5.0	12.6.0
2015-06	RAN#68	R5-151807	1891	1	Correction of UL RB Allocation in Interband DL CA Testcases	12.5.0	12.6.0
2015-06	RAN#68	R5-151808	1898	1	Correction of CA_25A-25A wrong allocation in Chapter 7 Table 7.3A.4.4.1-1	12.5.0	12.6.0
2015-06	RAN#68	R5-151809	1914	1	Updates for interferer placement in non-contiguous CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151811	1903	1	Correction of UEs category for TDD sustained data rate performance	12.5.0	12.6.0
2015-06	RAN#68	R5-151812	1952	1	Updates to 36.521-1 Annex F and G	12.5.0	12.6.0
2015-06	RAN#68	R5-151813	1916	1	Clean up of PDSCH performance test cases	12.5.0	12.6.0
2015-06	RAN#68	R5-151814	1924	1	Clean up of eDL-MIMO test cases	12.5.0	12.6.0
2015-06	RAN#68	R5-151815	1925	1	Clean up of TM9 interference model test cases	12.5.0	12.6.0
2015-06	RAN#68	R5-151816	1926	1	Correction to eICIC performance test cases	12.5.0	12.6.0
2015-06	RAN#68	R5-151817	1927	1	Correction to CQI and RI reporting test in feICIC	12.5.0	12.6.0
2015-06	RAN#68	R5-151818	1928	1	Correction to PDSCH demodulation test in feICIC	12.5.0	12.6.0
2015-06	RAN#68	R5-151819	1929	1	Clean up on PCFICH/PDCCH demodulation test in feICIC	12.5.0	12.6.0
2015-06	RAN#68	R5-151820	1930	1	Clean up on PHICH demodulation test in feICIC	12.5.0	12.6.0
2015-06	RAN#68	R5-151821	1932	1	Correction of PMI test cases in the section 9.4.1 and 9.4.2	12.5.0	12.6.0
2015-06	RAN#68	R5-151822	1966	1	Removal of the correlation matrix of HST propagation conditions	12.5.0	12.6.0
2015-06	RAN#68	R5-151825	1979	1	Updates to CoMP test cases 9.5.5.x	12.5.0	12.6.0
2015-06	RAN#68	R5-151854	1909	1	Addition of new TC FDD PDSCH 2x2 Open Loop Performance for 3DL CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151855	1910	1	Addition of new TC FDD PDSCH 4x2 Closed Loop Performance for 3DL CA	12.5.0	12.6.0

2015-06	RAN#68	R5-151856	1967	1	Introduction of TC TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4X2 for CA (3DL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151857	1968	1	Introduction of TC TDD PDSCH Open Loop Spatial Multiplexing 2X2 for CA (3DL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151858	1969	1	New CA band combination CA_1A-41A and CA_26A-41A - Updates of 6.2.5.3 Delta TIB	12.5.0	12.6.0
2015-06	RAN#68	R5-151859	1970	1	New CA band combination CA_1A-41A and CA_26A-41A - Updates of 7.3.3 Delta RIB	12.5.0	12.6.0
2015-06	RAN#68	R5-151884	1878	1	New TCs: FDD PMI Reporting with 4Tx enhanced codebook - PUSCH 1-2 (Multiple PMI) for eDL-MIMO Enhancement	12.5.0	12.6.0
2015-06	RAN#68	R5-151885	1879	1	New TCs: TDD PMI Reporting with 4Tx enhanced codebook - PUSCH 1-2 (Multiple PMI) for eDL-MIMO Enhancement	12.5.0	12.6.0
2015-06	RAN#68	R5-151891	1901	1	Addition of band 32 to clause 5 in 36.521-1	12.5.0	12.6.0
2015-06	RAN#68	R5-151894	1941	1	Addition of test case 6.2.2E - UE Maximum Output Power for UE category 0	12.5.0	12.6.0
2015-06	RAN#68	R5-151895	1943	1	Introduction of UE category 0 in section 4 of 36.521-1	12.5.0	12.6.0
2015-06	RAN#68	R5-151896	1954	1	Update of SNR definition in clause 8.1.1	12.5.0	12.6.0
2015-06	RAN#68	R5-151897	1859	1	Introduction of TC 6.3.5A.1.2 Power Control Absolute Power Tolerance for CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151899	1860	1	Introduction of TC 6.3.5A.1.3 Power Control Absolute Power Tolerance for CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151900	1883	1	New CA 2UL Tx test case 6.2.2A.3	12.5.0	12.6.0
2015-06	RAN#68	R5-151901	1861	1	Introduction of TC 6.3.5A.2.3 Power Control Relative Power Tolerance for CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151902	1862	1	Introduction of TC 6.3.5A.2.2 Power Control Relative Power Tolerance for CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151903	1863	1	Introduction of TC 6.7A.2 Transmit intermodulation for CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151921	1886	1	Updates of minimum requirement for reference sensitivity for CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151922	1887	1	Addition of test points and test requirements for 3DL inter-band CA	12.5.0	12.6.0
2015-06	RAN#68	R5-151926	1977	1	Update of 7.6.1A.1	12.5.0	12.6.0
2015-06	RAN#68	R5-151928	1918	1	Correction to CQI reference measurement channels	12.5.0	12.6.0
2015-06	RAN#68	R5-151929	1849	1	CA RF: Corrections to sustained data rate test	12.5.0	12.6.0
2015-06	RAN#68	R5-151930	1946	1	Update two band and three band information in test case 7.3	12.5.0	12.6.0
2015-06	RAN#68	R5-151931	1888	1	Update of Maximum input level for CA (3DL CA without UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151932	1950	1	Introduction of TDD FDD CA with TDD as Pcell for PDSCH Single Antenna Port Performance	12.5.0	12.6.0
2015-06	RAN#68	R5-151933	1951	1	Introduction of TDD FDD CA with FDD as Pcell for PDSCH Single Antenna Port Performance	12.5.0	12.6.0
2015-06	RAN#68	R5-151934	1956	1	Introduction to test case 9.6.1.1_A.2: FDD CQI Reporting under AWGN conditions – PUCCH 1-0 (3DL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151935	1957	1	Introduction to test case 9.6.1.2_A.2: TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (3DL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151936	1965	1	Addition of CA capability and applicability for 3 DL CCs in Chapter 8	12.5.0	12.6.0

2015-06	RAN#68	R5-151937	1971	1	New CA band combination CA_1A-41A and CA_26A-41A - Updates of 7.3A Refsens	12.5.0	12.6.0
2015-06	RAN#68	R5-151938	1972	1	New CA band combination CA_1A-18A-28A - Updates of 7.3.3 Delta RIB and 7.3A Refsens	12.5.0	12.6.0
2015-06	RAN#68	R5-151940	1958	1	Introduction to test case 6.3.3A.3: UE Transmit OFF power for CA (intra-band non-contiguous DL CA and UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151941	1959	1	Introduction to test case 6.3.4A.1.3: General ON/OFF time mask for CA (intra-band non-contiguous DL CA and UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151942	1960	1	Introduction to test case 6.6.1A.3: UE Occupied bandwidth for CA (intra-band non-contiguous DL CA and UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151943	1961	1	Introduction to test case 6.6.2.1A.3: Spectrum Emission Mask for CA (intra-band non-contiguous DL CA and UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151944	1893	1	Merge of TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA cases	12.5.0	12.6.0
2015-06	RAN#68	R5-151945	1936	1	Introduction of TC 7.6.2A.5 Out-of-band blocking for CA (3DL CA without UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151946	1983	1	Introduction of TC 7.6.3A.5 Narrow-band blocking for CA (3DL CA without UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151947	1937	1	Introduction of TC 7.7A.5 Spurious response for CA (3DL CA without UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151948	1935	1	Introduction of TC 7.6.1A.5 In-band blocking for CA (3DL CA without UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-151950	1844	1	CA RF: PCC/SCC mapping onto physical CC-s definition cleanup	12.5.0	12.6.0
2015-06	RAN#68	R5-152000	1848	1	CA RF: Corrections to power imbalance test	12.5.0	12.6.0
2015-06	RAN#68	R5-152001	1953	1	Correction to 9.3.1.3.1_E.1 FDD CQI Reporting test	12.5.0	12.6.0
2015-06	RAN#68	R5-152002	1858	1	Corrections to Reference Measurement Channel	12.5.0	12.6.0
2015-06	RAN#68	R5-152003	1911	1	Update of DL RMCs for PDSCH performance requirements	12.5.0	12.6.0
2015-06	RAN#68	R5-152004	1947	1	Addition of CA capability, applicability changes and core spec updates to Section 8 36.521-1 TDD TM1 CA test cases	12.5.0	12.6.0
2015-06	RAN#68	R5-152005	1948	1	Addition of CA capability, applicability changes and core spec updates to Section 8 36.521-1 TDD TM3 CA test cases	12.5.0	12.6.0
2015-06	RAN#68	R5-152006	1949	1	Addition of CA capability, applicability changes and core spec updates to Section 8 36.521-1 TDD TM4 CA test cases	12.5.0	12.6.0
2015-06	RAN#68	R5-152007	1974	1	Editorial correction to 8.2.1.1.1_A.1 and 8.2.1.3.1_A.1	12.5.0	12.6.0
2015-06	RAN#68	R5-152013	1856	1	Addition of Chapter 7 3DL CA Test Configuration Tables	12.5.0	12.6.0
2015-06	RAN#68	R5-152017	1938	1	Introduction of test case 7.8.1A.5 Wideband intermodulation for CA (3DL CA without UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-152018	1942	1	Addition of test case 7.3E - Reference sensitivity level for UE category 0	12.5.0	12.6.0
2015-06	RAN#68	R5-152020	1882	1	New CA 2UL Tx test case 6.2.2A.2	12.5.0	12.6.0
2015-06	RAN#68	R5-152021	1944	1	Introduction of test case Maximum Power Reduction (MPR) for CA (inter-band DL CA and UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-152022	1945	1	Introduction of test case Maximum Power Reduction (MPR) for CA (intra-band non-contiguous DL CA and UL CA)	12.5.0	12.6.0
2015-06	RAN#68	R5-152025	1922	1	Corrections to spurious emission band co-existence limit tables in clause 6	12.5.0	12.6.0

2015-06	RAN#68	R5-152027	1896	1	Update Reference Channel and Minimum test time for TDD CA power imbalance demodulation test	12.5.0	12.6.0
2015-06	RAN#68	R5-152028	1897	1	Update TDD CA BW combination to power imbalance test	12.5.0	12.6.0
2015-06	RAN#68	R5-152031	1908	1	Update of TC8.2.1.1.1_A.2:FDD PDSCH Single Antenna Performance for 3DL CA	12.5.0	12.6.0
2015-06	RAN#68	R5-152032	1900	1	Addition of Multiple 3DL CA Combinations to Chapter 7 Delta RIB and REFSENS Exceptions Tables	12.5.0	12.6.0
2015-06	RAN#68	R5-152033	1906	1	Clarification of the power of interferer with deltaRIBc	12.5.0	12.6.0
2015-06	RAN#68	R5-152038	1889	1	Introduction of ACS Test Case for 3DL CA without UL CA	12.5.0	12.6.0
2015-06	RAN#68	R5-152043	1923	2	Addition and alignment of all Rel-12 CA configurations in Section 5	12.5.0	12.6.0
2015-06	RAN#68	R5-152133	1939	2	NS value for intra-band contiguous CA configurations not allowed A-MPR	12.5.0	12.6.0
2015-06	RAN#68	R5-152136	1981	2	36.521-1: DL Sustained Data Rate clarifications	12.5.0	12.6.0
2015-06	RAN#68	-	-	-	section 8.2.1.4.3 which was deleted by mistake due to a wrong implementation of R5-150921 was restored	12.5.0	12.6.0
2015-09	RAN#69	R5-153100	1991	-	Corrections to EVM and Carrier leakage CA test cases	12.6.0	12.7.0
2015-09	RAN#69	R5-153101	1992	-	Update of EVM minimum requirements	12.6.0	12.7.0
2015-09	RAN#69	R5-153243	2017	-	CA RF: Minor corrections	12.6.0	12.7.0
2015-09	RAN#69	R5-153244	2018	-	eDL-MIMO RF: Minor corrections	12.6.0	12.7.0
2015-09	RAN#69	R5-153245	2019	-	CA RF: Correction to applicability of SDR test	12.6.0	12.7.0
2015-09	RAN#69	R5-153247	2021	-	eICIC and feICIC RF: Corrections to PDSCH RMCs used for PDCCH performance	12.6.0	12.7.0
2015-09	RAN#69	R5-153300	2029	-	Addition of new TC of Frequency error for inter-band CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153305	2033	-	Addition of new TC of Reference sensitivity level for 2UL inter-band CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153317	2037	-	CA RF: Addition of missing requirements for CA_4A-12A	12.6.0	12.7.0
2015-09	RAN#69	R5-153318	2038	-	RF: Clarifications for TC 6.6.3.2	12.6.0	12.7.0
2015-09	RAN#69	R5-153322	2042	-	RF: Correction to TC 6.6.3.3A	12.6.0	12.7.0
2015-09	RAN#69	R5-153362	2053	-	Clean up for Tx test cases	12.6.0	12.7.0
2015-09	RAN#69	R5-153364	2055	-	Correction to DL parameters in CA Rx tests	12.6.0	12.7.0
2015-09	RAN#69	R5-153365	2056	-	Correction to 7.6.1A.4 In-band blocking for non-contiguous CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153367	2058	-	Removable of PCFICH_RA in 8.4 and 8.5	12.6.0	12.7.0
2015-09	RAN#69	R5-153371	2062	-	Correction to CQI reporting under AWGN for eDL-MIMO	12.6.0	12.7.0
2015-09	RAN#69	R5-153372	2063	-	Correction to CQI reporting under fading(PUSCH3-1) for eDL-MIMO	12.6.0	12.7.0
2015-09	RAN#69	R5-153373	2064	-	Correction to CQI reporting under fading(PUCCH1-1) for eDL-MIMO	12.6.0	12.7.0
2015-09	RAN#69	R5-153375	2066	-	Correction to RI reporting test for eDL-MIMO	12.6.0	12.7.0
2015-09	RAN#69	R5-153377	2068	-	Correction to CQI reporting test for TM9	12.6.0	12.7.0
2015-09	RAN#69	R5-153378	2069	-	Correction to feICIC CQI reporting test procedure in 9.2.1.5_E.1	12.6.0	12.7.0
2015-09	RAN#69	R5-153423	2075	-	Updates of ?TIB,c values to TC 6.2.5	12.6.0	12.7.0

2015-09	RAN#69	R5-153460	2091	-	Correction of 1A-3A-5A CA REFSENS DL Allocation	12.6.0	12.7.0
2015-09	RAN#69	R5-153462	2092	-	Addition of several definitions to chapter 3	12.6.0	12.7.0
2015-09	RAN#69	R5-153474	2095	-	Applicability Update of Intra-Band DL-only CA testcases in Chapter 7	12.6.0	12.7.0
2015-09	RAN#69	R5-153613	2122	-	Introduction of Receiver Spurious emissions test case for Carrier Aggregation in DL-only bands	12.6.0	12.7.0
2015-09	RAN#69	R5-153624	2126	-	New CA 2UL Tx test case 6.6.2.3A.2 Adjacent Channel Leakage power Ratio for CA (inter-band DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153629	2127	-	Test Tolerances for test case 6.3.4A.1.3 General ON/OFF time mask for CA (intra-band contiguous DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153630	2128	-	Test Tolerances for test case 6.3.4A.1.1 General ON/OFF time mask for CA (intra-band contiguous DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153633	2130	-	Test Tolerances for test case 6.6.1A.3 Occupied bandwidth for CA (intra-band non-contiguous DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153634	2131	-	Test Tolerances for test case 6.6.2.1A.3 Spectrum emission mask for CA (intra-band non-contiguous DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153646	2135	-	36.521-1_Reference corrections in test 6.6.3.2	12.6.0	12.7.0
2015-09	RAN#69	R5-153671	2145	-	Resubmission: CA RF: Clarification of PHICH configuration	12.6.0	12.7.0
2015-09	RAN#69	R5-153800	2070	1	Correction to applicability of feICIC demod test cases	12.6.0	12.7.0
2015-09	RAN#69	R5-153801	2057	1	Correction to test procedure in 7.8.1A.4 Wideband intermodulation for non-contiguous CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153802	2090	1	Correction to Testpoint Selection in Chapter 7 NC CA Testcases	12.6.0	12.7.0
2015-09	RAN#69	R5-153803	2048	1	Correction to title of table A 3.2-3 and A 3.2-4 in annex A.3.2	12.6.0	12.7.0
2015-09	RAN#69	R5-153804	2061	1	Correction to message exceptions in performance test(User-Specific RS) for eDL-MIMO	12.6.0	12.7.0
2015-09	RAN#69	R5-153805	2065	1	Correction to PMI reporting test for eDL-MIMO	12.6.0	12.7.0
2015-09	RAN#69	R5-153806	2067	1	Correction to TM9 interference model test cases	12.6.0	12.7.0
2015-09	RAN#69	R5-153807	2078	1	Updates to 8.7.2.1.A_1 TDD Sustained data rate performance for CA (2DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153810	2087	1	Correction to test point selection table for all chap8/9 FDD and TDD 2DLCA cases	12.6.0	12.7.0
2015-09	RAN#69	R5-153821	2012	1	Update to FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153822	2024	1	Addition of annex F for Reference sensitivity for 3DL CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153823	2039	1	CA RF: Update of test points for CA_12B	12.6.0	12.7.0
2015-09	RAN#69	R5-153827	2094	1	Addition of 3DL CA default XB-YA configuration to REFSENS test configuration table	12.6.0	12.7.0
2015-09	RAN#69	R5-153836	1999	1	Introduction of SUMIMO for LTE Type C performance TC 8.2.2.3.1B	12.6.0	12.7.0
2015-09	RAN#69	R5-153837	2111	1	Addition of Reference measurement channel and overview reference for multi-cell test in Annex	12.6.0	12.7.0
2015-09	RAN#69	R5-153838	2112	1	Introduction of FDD TM3 test case for LTE Type C performance requirements (8.2.1.3.1B)	12.6.0	12.7.0
2015-09	RAN#69	R5-153839	2113	1	Introduction of FDD TM3 multi-cell test case with TM1 interference for LTE Type C performance requirements (8.2.1.3.1C)	12.6.0	12.7.0

2015-09	RAN#69	R5-153840	2114	1	Introduction of TDD TM3 multi-cell test case with TM1 interference for LTE Type C performance requirements (8.2.2.3.1C)	12.6.0	12.7.0
2015-09	RAN#69	R5-153841	2115	1	Introduction of FDD TM4 test case for LTE Type C performance requirements (8.2.1.4.2A)	12.6.0	12.7.0
2015-09	RAN#69	R5-153842	2116	1	Introduction of TDD TM4 test case for LTE Type C performance requirements (8.2.2.4.2A)	12.6.0	12.7.0
2015-09	RAN#69	R5-153843	2117	1	Introduction of TDD TM8 test case for LTE Type C performance requirements (8.3.2.2.2)	12.6.0	12.7.0
2015-09	RAN#69	R5-153844	2118	1	Introduction of FDD TM9 test case for LTE Type C performance requirements (8.3.1.2.2)	12.6.0	12.7.0
2015-09	RAN#69	R5-153845	2119	1	Addition of Enhanced performance requirements Type C definition	12.6.0	12.7.0
2015-09	RAN#69	R5-153848	1997	1	Update of eDL MIMO enhancement TC 9.4.2.3.3_G	12.6.0	12.7.0
2015-09	RAN#69	R5-153849	1998	1	Update of eDL MIMO enhancement TC 9.4.2.3.4_G	12.6.0	12.7.0
2015-09	RAN#69	R5-153851	2000	1	New TC: 9.7.1.2 TDD CQI reporting definition under AWGN conditions for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-153852	2125	1	RMC definitions for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-153853	2123	1	Additions to test case 6.2.2E - UE Maximum Output Power for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-153854	2124	1	Changes to test case 7.3E - Reference sensitivity level for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-153855	2026	1	Addition of new TC of Transmit off power for inter-band CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153856	2034	1	Addition of annex F for 2UL CA test cases	12.6.0	12.7.0
2015-09	RAN#69	R5-153858	2045	1	Introduction to test case 6.2.4A.3: Additional Maximum Power Reduction (A-MPR) for CA (intra-band non-contiguous DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153859	2088	1	EVM for Intra-band contiguous UL CA for non-equal Channel BWs	12.6.0	12.7.0
2015-09	RAN#69	R5-153867	2150	-	Adding missing subclauses in Annex A.2	12.6.0	12.7.0
2015-09	RAN#69	R5-153868	2008	1	Align Test Procedure and Test requirements for 7.5A.5 ACS 3DL CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153869	2010	1	Align Test requirements for 7.4A.5 Max Input 3DL CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153870	2132	1	Completion to Test cases 9.6.1.1_A.2 and 9.6.1.2_A.2: FDD/TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153873	2035	1	Updates of minimum requirements of Spurious emission band UE co-existence	12.6.0	12.7.0
2015-09	RAN#69	R5-153874	2001	1	New CA band combination CA_1A-5A-7A - Updates of 7.3.3 Delta RIB and 7.3A Refsens Test Configuration	12.6.0	12.7.0
2015-09	RAN#69	R5-153879	2036	1	CA RF: Update of intraband contiguous blocking requirements	12.6.0	12.7.0
2015-09	RAN#69	R5-153880	2096	1	Update of Reference sensitivity for CA_39A-41C and CA_39C-41A	12.6.0	12.7.0
2015-09	RAN#69	R5-153881	2121	1	Updates to test case 7.8.1A.5 Wideband intermodulation for CA (3DL CA without UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153882	2148	-	New CA band combinations (CA_1A-41C, CA_26A_41C) - Updates of 7.3.3 Delta RIB	12.6.0	12.7.0
2015-09	RAN#69	R5-153884	2147	-	Addition of Multiple Inter-band CA Configurations to 7.3A.4	12.6.0	12.7.0

2015-09	RAN#69	R5-153885	2011	1	Update to FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153886	2013	1	Update to TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153887	2014	1	Update to TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153888	2076	1	Updates to 8.2.2.1.1_A.2 TDD PDSCH Single Antenna Port Performance for CA (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153889	2077	1	Updates to 8.7.1.1.A_2 FDD Sustained data rate performance for CA (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153890	2079	1	Updates to 8.7.2.1.A_2 TDD Sustained data rate performance for CA (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153891	2086	1	Updates to TDD FDD CA test cases for PDSCH Single Antenna Port Performance	12.6.0	12.7.0
2015-09	RAN#69	R5-153892	2105	1	Update of FDD PDSCH Single Antenna Port Performance for CA (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153893	2106	1	TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (2DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153894	2107	1	TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153895	2149	1	New CA band combinations (CA_1A-41C, CA_26A-41C) - Updates of 7.3A Refsens	12.6.0	12.7.0
2015-09	RAN#69	R5-153902	1993	1	Introduction of eDL MIMO enhancement TC 9.3.7.1_G	12.6.0	12.7.0
2015-09	RAN#69	R5-153903	1994	1	Introduction of eDL MIMO enhancement TC 9.3.7.2_G	12.6.0	12.7.0
2015-09	RAN#69	R5-153904	1995	1	Introduction of eDL MIMO enhancement TC 9.4.1.4.1_G	12.6.0	12.7.0
2015-09	RAN#69	R5-153905	1996	1	Introduction of eDL MIMO enhancement TC 9.4.1.4.2_G	12.6.0	12.7.0
2015-09	RAN#69	R5-153906	2016	1	UE Cat 0 RF: Addition to Annex I	12.6.0	12.7.0
2015-09	RAN#69	R5-153907	2097	1	Addition of test case 7.4E - Maximum input level for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-153908	2120	1	Additions to test case 6.2.3E - Maximum Power Reduction (MPR) for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-153909	2144	1	Additions to test case 6.2.4E – Additional Maximum Power Reduction (A-MPR) for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-153912	2027	1	Addition of new TC of ON/OFF time mask for inter-band CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153913	2028	1	Addition of new TC of Occupied bandwidth for inter-band CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153914	2030	1	Addition of new TC of Spectrum emission mask for inter-band CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153915	2031	1	Addition of new TC of Transmitter Spurious emissions for inter-band CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153916	2032	1	Addition of new TC of Spurious emission band UE co-existence for inter-band CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153917	2046	1	Introduction to test case 6.2.5A.2: Configured UE transmitted Output Power for CA (inter-band DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153918	2047	1	Introduction to test case 6.2.5A.3: Configured UE transmitted Output Power for CA (intra-band non-contiguous DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153920	2007	1	Update of 6.2.3_2 MPR for Multi-Cluster PUSCH	12.6.0	12.7.0

2015-09	RAN#69	R5-153921	2054	1	Correction to lower tolerances for CA_NS_05 in A-MPR	12.6.0	12.7.0
2015-09	RAN#69	R5-153922	2129	1	Corrections to test case 6.6.1A.1 Occupied bandwidth for CA (intra-band contiguous DL CA and UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-153923	2043	1	CA RF: Clean Up of UL resource allocation for interband 2DL CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153924	2002	1	Correction of minimum requirements and test procedures for 8.2.2.1.1_A.1	12.6.0	12.7.0
2015-09	RAN#69	R5-153925	2003	1	Corrections to 8.2.2.3.1_A.1	12.6.0	12.7.0
2015-09	RAN#69	R5-153926	2059	1	Correction to the title in 2DL CA performance test cases	12.6.0	12.7.0
2015-09	RAN#69	R5-153927	2060	1	Correction to FDD soft buffer test for CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153928	2134	1	36.521-1_CA power imbalance test updates	12.6.0	12.7.0
2015-09	RAN#69	R5-153944	2022	2	Updates of minimum requirements of reference sensitivity for 3DL CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153945	2023	2	Updates of Reference sensitivity for 3DL CA	12.6.0	12.7.0
2015-09	RAN#69	R5-153947	2146	1	UE Category Corrections to test case 8.2.1.4.2_A.1 from 36.521-1	12.6.0	12.7.0
2015-09	RAN#69	R5-153949	1985	1	Correction to RC.2 TDD Nr. HARQ Proc.	12.6.0	12.7.0
2015-09	RAN#69	R5-154002	1986	1	Introduction of TC 9.6.1.3.1 TDD FDD CA CQI Reporting – PUCCH 1-0 for FDD PCell (2DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154003	1987	1	Introduction of TC 9.6.1.3.2 TDD FDD CA CQI Reporting – PUCCH 1-0 for FDD PCell (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154004	1988	1	Introduction of TC 9.6.1.4.1 TDD FDD CA CQI Reporting – PUCCH 1-0 for TDD PCell (2DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154005	1989	1	Introduction of TC 9.6.1.4.2 TDD FDD CA CQI Reporting – PUCCH 1-0 for TDD PCell (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154006	2098	1	Addition of test case 7.5E - Adjacent Channel Selectivity (ACS) for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-154007	2099	1	Addition of test case 7.6.1E - In-band blocking for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-154008	2100	1	Addition of test case 7.6.2E - Out-of-band blocking for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-154009	2101	1	Addition of test case 7.6.3E - Narrow band blocking for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-154010	2102	1	Addition of test case 7.7E - Spurious response for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-154011	2103	1	Addition of test case 7.8.1E - Wide band Intermodulation for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-154012	2104	1	Addition of test case 7.9E - Spurious emissions for UE category 0	12.6.0	12.7.0
2015-09	RAN#69	R5-154014	2136	1	36.521-1_Test requirements correction in test 6.3.5.2	12.6.0	12.7.0
2015-09	RAN#69	R5-154015	2080	1	Addition of 8.7.5.1.1 TDD FDD CA Sustained data rate performance for FDD PCell (2DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154016	2081	1	Addition of 8.7.5.1.2 TDD FDD CA Sustained data rate performance for FDD PCell (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154017	2082	1	Addition of 8.7.5.2.1 TDD FDD CA Sustained data rate performance for TDD PCell (2DL CA)	12.6.0	12.7.0

2015-09	RAN#69	R5-154018	2083	1	Addition of 8.7.5.2.2 TDD FDD CA Sustained data rate performance for TDD PCell (3DL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154019	2049	1	Update to TC 7.6.1A.5 In-band blocking for CA (3DL CA without UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154022	2050	1	Update to TC 7.6.2A.5 Out-of-band blocking for CA (3DL CA without UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154023	2051	1	Update to TC 7.6.3A.5 Narrow band blocking for CA (3DL CA without UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154024	2052	1	Update to TC 7.7A.5 Spurious response for CA (3DL CA without UL CA)	12.6.0	12.7.0
2015-09	RAN#69	R5-154026	2084	2	Addition of SCE-L1 clause numbering principle in Annex I	12.6.0	12.7.0
2015-09	RAN#69	R5-154030	2009	1	Revise Power Control Relative power tolerance for 2 UL CA test case 6.3.5A.2.1	12.6.0	12.7.0
2015-09	RAN#69	R5-154031	2020	1	RF: Applicability of CSI requirements to UE Category 1 (for 36.521-1)	12.6.0	12.7.0
2015-09	RAN#69	-	-	-	update of the "non-specific references" in section 2 according to the approved R5-153582 and an action point on ETSI MCC	12.6.0	12.7.0
2015-12	RAN#70	R5-155112	2156	-	Addition of simplified CA testing method (Annex C.3.5) into 36.521-1	12.7.0	12.8.0
2015-12	RAN#70	R5-155113	2157	-	Uncertainty and Test Tolerance for FDD TM3 test case for LTE Type C performance requirements (8.2.1.3.1B)	12.7.0	12.8.0
2015-12	RAN#70	R5-155116	2160	-	Uncertainty and Test Tolerance for TDD TM8 test case for LTE Type C performance requirements (8.3.2.2.2)	12.7.0	12.8.0
2015-12	RAN#70	R5-155117	2161	-	Uncertainty and Test Tolerance for FDD TM9 test case for LTE Type C performance requirements (8.3.1.2.2)	12.7.0	12.8.0
2015-12	RAN#70	R5-155118	2162	-	Uncertainty and Test Tolerance for FDD TM3 multi-cell test case with TM1 interference for LTE Type C performance requirements (8.2.1.3.1C)	12.7.0	12.8.0
2015-12	RAN#70	R5-155119	2163	-	Uncertainty and Test Tolerance for TDD TM3 multi-cell test case with TM1 interference for LTE Type C performance requirements (8.2.2.3.1C)	12.7.0	12.8.0
2015-12	RAN#70	R5-155205	2169	-	Addition of test time for testing throughput ratios for eDL MIMO Enhancement	12.7.0	12.8.0
2015-12	RAN#70	R5-155300	2206	-	Update of editor's note for TC 6.6.2.2A.1	12.7.0	12.8.0
2015-12	RAN#70	R5-155309	2208	-	ProSe: Update of general chapters in 36.521-1	12.7.0	12.8.0
2015-12	RAN#70	R5-155312	2211	-	ProSe: Update of annexes in 36.521-1	12.7.0	12.8.0
2015-12	RAN#70	R5-155313	2212	-	Update of UE categories for R8 in 36.521-1	12.7.0	12.8.0
2015-12	RAN#70	R5-155316	2214	-	Update of UE categories for R11 in 36.521-1	12.7.0	12.8.0
2015-12	RAN#70	R5-155360	2215	-	Test description for test case 6.3.3A.3: UE Transmit OFF power for CA (intra-band non-contiguous DL CA and UL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-155361	2216	-	Correction to Test cases 9.6.1.1_A.1 and 9.6.1.2_A.1: FDD/TDD CQI Reporting under AWGN conditions – PUCCH 1-0 (2DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-155394	2226	-	Updates of the test configuration about occupied bandwidth for CA (inter-band DL CA and UL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-155401	2228	-	Updates of message contents for ON/OFF time mask for 2UL inter-band CA	12.7.0	12.8.0
2015-12	RAN#70	R5-155405	2232	-	Updates of Refsens for 2UL inter-band CA	12.7.0	12.8.0

2015-12	RAN#70	R5-155406	2233	-	Addition of CA_3A-42A to 7.3A.3 and applicability updates for all inter-band 2DL CA receiver test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155409	2235	-	Updatest of CA demodulation applicabilities in general section	12.7.0	12.8.0
2015-12	RAN#70	R5-155420	2241	-	Changes to general clauses for Dual Connectivity	12.7.0	12.8.0
2015-12	RAN#70	R5-155425	2246	-	Introduction of the reference and abbreviations for Dual Connectivity	12.7.0	12.8.0
2015-12	RAN#70	R5-155426	2247	-	Removal of the duplicate clause 8.2.1.4.2_A.2.5	12.7.0	12.8.0
2015-12	RAN#70	R5-155444	2253	-	Clean up of Tx test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155446	2255	-	Correction to Rx UL CA test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155447	2256	-	Correction to reference channel for CQI requirements	12.7.0	12.8.0
2015-12	RAN#70	R5-155448	2257	-	Correction to UL RMC for single carrier SDR	12.7.0	12.8.0
2015-12	RAN#70	R5-155450	2259	-	Correction to CoMP demodulation requirements	12.7.0	12.8.0
2015-12	RAN#70	R5-155452	2261	-	Correction to Enhanced Performance Type A CQI reporting test	12.7.0	12.8.0
2015-12	RAN#70	R5-155453	2262	-	Correction to CQI and RI Reporting test cases for feICIC	12.7.0	12.8.0
2015-12	RAN#70	R5-155460	2265	-	CA RF: Update 3DL Refsense test requirements	12.7.0	12.8.0
2015-12	RAN#70	R5-155462	2267	-	Corrections to Refsense minimum requirements	12.7.0	12.8.0
2015-12	RAN#70	R5-155464	2269	-	CA RF: Update of test points for Rx inter-band test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155471	2274	-	Corrections to message contents for CSI 3DL CA TCs 9.6.1.3.2+9.6.1.4.2	12.7.0	12.8.0
2015-12	RAN#70	R5-155474	2275	-	Corrections to CA demodulation tests	12.7.0	12.8.0
2015-12	RAN#70	R5-155476	2276	-	Corrections to message exceptions for CSI-RS setting	12.7.0	12.8.0
2015-12	RAN#70	R5-155478	2278	-	Updates to Annexes A.2 and A.3	12.7.0	12.8.0
2015-12	RAN#70	R5-155530	2282	-	Addition of measurement uncertainty and test tolerances for TC 9.7.1.2 TDD CQI reporting definition under AWGN conditions for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155543	2283	-	Correction to Test Parameters for the test cases 10.1 and 10.2	12.7.0	12.8.0
2015-12	RAN#70	R5-155554	2289	-	Correction to 6.6.3.3A.1	12.7.0	12.8.0
2015-12	RAN#70	R5-155668	2325	-	Addition of CA configuration CA_2A-4A-5A in Reference sensitivity level for 3DL CA	12.7.0	12.8.0
2015-12	RAN#70	R5-155670	2326	-	Correction to DL RMCs for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155709	2331	-	Editorial corrections to TC 8.2.2.1.1_A.1	12.7.0	12.8.0
2015-12	RAN#70	R5-155745	2346	-	Correction to CQI test cases for LTE CA	12.7.0	12.8.0
2015-12	RAN#70	R5-155801	2288	1	Correction to 6.2.4A.1	12.7.0	12.8.0
2015-12	RAN#70	R5-155802	2254	1	Correction to 2DL CA Rx test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155803	2266	1	CA RF: Correction to message contents for 2DL Max Input Power TCs	12.7.0	12.8.0
2015-12	RAN#70	R5-155804	2213	1	Update of UE categories for R10 in 36.521-1	12.7.0	12.8.0
2015-12	RAN#70	R5-155807	2176	1	Add new LC MTC test case 9.7.2.1 FDD CQI Reporting under fading conditions for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155808	2177	1	Add new LC MTC test case 9.7.2.2 TDD CQI Reporting under fading conditions for UE category 0	12.7.0	12.8.0

2015-12	RAN#70	R5-155809	2318	1	Test case 6.2.4E – Additional Maximum Power Reduction (A-MPR) for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155810	2321	1	Additions to test case 6.3.3E – UE Transmit OFF Power for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155811	2322	1	Additions to test case 6.3.4E.1 – General ON/OFF time mask for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155812	2329	1	Additions to test case 6.3.5E.1 – Power Control Absolute power tolerance for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155813	2330	1	Additions to test case 6.3.5E.2 – Power Control Relative power tolerance for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155814	2333	1	Additions to test case 6.5.1E – Frequency Error for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155815	2334	1	Additions to test case 6.5.2.1E.1 – Error Vector Magnitude for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155816	2336	1	Additions to test case 6.5.2.2E – Carrier Leakage for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155817	2338	1	Additions to test case 6.5.2.3E – In-band emissions for non allocated RB for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155818	2339	1	Additions to test case 6.5.2.4E – EVM equalizer spectrum flatness for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155819	2342	1	Additions to test case 6.2.5E – Configured Transmitted Power for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-155840	2158	1	Uncertainty and Test Tolerance for FDD TM4 test case for LTE Type C performance requirements (8.2.1.4.2A)	12.7.0	12.8.0
2015-12	RAN#70	R5-155841	2159	1	Uncertainty and Test Tolerance for TDD TM4 test case for LTE Type C performance requirements (8.2.2.4.2A)	12.7.0	12.8.0
2015-12	RAN#70	R5-155842	2165	1	Update of SUMIMO for LTE Type C performance TC 8.2.2.3.1B	12.7.0	12.8.0
2015-12	RAN#70	R5-155844	2151	1	New CA band combination CA_1A-3A-8A - Updates of 7.3A.5 RefSens	12.7.0	12.8.0
2015-12	RAN#70	R5-155845	2152	1	New CA band combination CA_1A-3A-8A - Updates of 7.3.3 Delta RIB	12.7.0	12.8.0
2015-12	RAN#70	R5-155846	2183	1	LTE Type B performance requirements - Addition of fixed reference channels into Annex A	12.7.0	12.8.0
2015-12	RAN#70	R5-155847	2184	1	LTE Type B performance requirements - Introduction of new interference models into Annex B.6	12.7.0	12.8.0
2015-12	RAN#70	R5-155848	2182	1	LTE Type B performance requirements - Changes to clause 3	12.7.0	12.8.0
2015-12	RAN#70	R5-155850	2236	1	Addition of new test cases for TDD FDD CA PDSCH Open Loop for FDD PCell(2DL and 3DL)	12.7.0	12.8.0
2015-12	RAN#70	R5-155851	2224	1	Update of 2DL TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (8.2.3.3.2.1)	12.7.0	12.8.0
2015-12	RAN#70	R5-155852	2225	1	Update of 3DL TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (8.2.3.3.2.2)	12.7.0	12.8.0
2015-12	RAN#70	R5-155853	2248	1	Update for Annex for TDD/FDD Perf test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155855	2250	1	Clean up of 3DL CA Rx test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155857	2280	1	Completion of Testcase 7.3A.5	12.7.0	12.8.0
2015-12	RAN#70	R5-155859	2272	1	CA RF: Correction to message contents for 3DL Max Input Power	12.7.0	12.8.0

2015-12	RAN#70	R5-155860	2327	1	Correction of BW to be tested and CA Capability to be tested for TM3 Test Cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155861	2328	1	36.521-1 – CA_2A-12B updates	12.7.0	12.8.0
2015-12	RAN#70	R5-155892	2168	1	Correction of test cases title for eDL MIMO Enhancement test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-155893	2263	1	Corrections to eDL MIMO enhancement TC 9.3.7.1_G+9.3.7.2_G	12.7.0	12.8.0
2015-12	RAN#70	R5-155894	2264	1	Corrections to eDL MIMO enhancement TC 9.4.1.4.1_G+9.4.1.4.2_G	12.7.0	12.8.0
2015-12	RAN#70	R5-156006	2229	1	Addition of initial conditions for frequency error for 2UL inter-band CA	12.7.0	12.8.0
2015-12	RAN#70	R5-156007	2230	1	Updates of SEM for 2UL inter-band CA	12.7.0	12.8.0
2015-12	RAN#70	R5-156008	2231	1	Updates of test requirements for general spurious for 2UL inter-band CA	12.7.0	12.8.0
2015-12	RAN#70	R5-156013	2210	1	ProSe: Additions to Annexes for RF testing	12.7.0	12.8.0
2015-12	RAN#70	R5-156014	2209	1	ProSe: Reference sensitivity test	12.7.0	12.8.0
2015-12	RAN#70	R5-156016	2242	1	Introduction of FDD PDSCH Closed Loop Multi-Layer Spatial Multiplexing 4x2 for Dual Connectivity	12.7.0	12.8.0
2015-12	RAN#70	R5-156017	2243	1	Introduction of TDD PDSCH Closed Loop Multi-Layer Spatial Multiplexing 4x2 for Dual Connectivity	12.7.0	12.8.0
2015-12	RAN#70	R5-156018	2244	1	Introduction of FDD sustained data rate performance for Dual Connectivity	12.7.0	12.8.0
2015-12	RAN#70	R5-156019	2245	1	Introduction of TDD sustained data rate performance for Dual Connectivity	12.7.0	12.8.0
2015-12	RAN#70	R5-156020	2207	1	Update of RB configurations for TC 7.3A.5	12.7.0	12.8.0
2015-12	RAN#70	R5-156021	2222	1	Addition of soft-buffer test cases for FDD-TDD 2DL CA (8.2.3.2.1A, 8.2.3.2.2A)	12.7.0	12.8.0
2015-12	RAN#70	R5-156022	2234	1	Delta RIB,c updates for 3DL CA supporting UE	12.7.0	12.8.0
2015-12	RAN#70	R5-156023	2237	1	Addition of new test cases for TDD FDD CA PDSCH Closed Loop 4x2 for FDD PCell (2DL and 3DL)	12.7.0	12.8.0
2015-12	RAN#70	R5-156024	2239	1	Correction to test point selection table for TDD-FDD CA cases	12.7.0	12.8.0
2015-12	RAN#70	R5-156025	2251	1	Correction to 7.3A.5	12.7.0	12.8.0
2015-12	RAN#70	R5-156026	2252	1	Update CA perf test cases in clause 8	12.7.0	12.8.0
2015-12	RAN#70	R5-156027	2271	1	CA RF: Update to 3DL Refsense test configurations	12.7.0	12.8.0
2015-12	RAN#70	R5-156028	2281	1	Improvements to 3DL OOB Testcase (7.6.2A.5)	12.7.0	12.8.0
2015-12	RAN#70	R5-156029	2295	1	Updates to 8.7.5 about TDD-FDD CA SDR performance test	12.7.0	12.8.0
2015-12	RAN#70	R5-156030	2337	1	36.521-1: CA_1A-3A-20A & CA_1A-7A-20A updates	12.7.0	12.8.0
2015-12	RAN#70	R5-156031	2346	1	Addition of 2x2 FDD-TDD CA test cases with TDD PCELL	12.7.0	12.8.0
2015-12	RAN#70	R5-156035	2170	1	New TC: 8.9.1.1.2 FDD Closed-loop spatial multiplexing performance (Cell-Specific Reference Symbols) for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156036	2171	1	New TC: 8.9.1.2.2 TDD Closed-loop spatial multiplexing performance (Cell-Specific Reference Symbols) for UE category 0	12.7.0	12.8.0

2015-12	RAN#70	R5-156037	2173	1	Add new LC MTC test case 8.9.1.1.3 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156038	2174	1	Add new LC MTC test case 8.9.1.2.1 TDD PDSCH Transmit Diversity for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156039	2175	1	Add new LC MTC test case 8.9.1.2.3 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156040	2189	1	Addition of Minimum test time for Demodulation performance for UE category 0 in Annex G	12.7.0	12.8.0
2015-12	RAN#70	R5-156041	2191	1	Introduction of new test case 8.9.2.2.1 MTC	12.7.0	12.8.0
2015-12	RAN#70	R5-156042	2240	1	Update of TC 9.7.1.2 TDD CQI reporting definition under AWGN conditions for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156043	2315	1	Update test requirement for MTC test cases: 7.6.1E, 7.6.2E and 7.6.3E	12.7.0	12.8.0
2015-12	RAN#70	R5-156044	2316	1	Addition of Maximum Test System Uncertainty and Derivation of Test Requirements in Annex F for MTC test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-156045	2317	1	Additions to test case 6.2.3E - Maximum Power Reduction (MPR) for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156046	2320	1	Additions to test case 6.3.2E – Minimum Output Power for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156047	2332	1	Additions to test case 6.3.5E.3 – Aggregate power control tolerance for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156048	2340	1	Additions to test case 6.6.1E – Occupied bandwidth for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156049	2341	1	Additions to test case 6.6.2.1E – Spectrum Emission Mask for UE category 0	12.7.0	12.8.0
2015-12	RAN#70	R5-156057	2193	1	New CA 2UL Tx test case 6.5.1A.3 Frequency Error for CA (intra-band non-contiguous DL CA and UL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156058	2291	1	New TC of A-MPR for 2UL inter-band CA (6.2.4A.2)	12.7.0	12.8.0
2015-12	RAN#70	R5-156059	2293	1	New TC of Additional spurious emissions for intra-band non-contiguous CA 6.6.3.3A.3	12.7.0	12.8.0
2015-12	RAN#70	R5-156062	2166	1	Addition of Minimum test time for LTE Type C performance in Annex G	12.7.0	12.8.0
2015-12	RAN#70	R5-156063	2297	1	Addition of new TC 7.4_H Maximum input level for SCE-L1	12.7.0	12.8.0
2015-12	RAN#70	R5-156064	2298	1	Addition of new TC 7.4A.1_H Maximum input level for SCE-L1 for CA (intra-band contiguous DL CA and UL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156065	2299	1	Addition of new TC 7.4A.2_H Maximum input level for SCE-L1for CA (intra-band contiguous DL CA without UL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156066	2300	1	Addition of new TC 7.4A.5_H Maximum input level for SCE-L1 for CA (3DL CA without UL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156089	2185	1	LTE Type B performance requirements - Introduction of new test cases 8.2.1.2.5 and 8.2.1.2.6	12.7.0	12.8.0
2015-12	RAN#70	R5-156090	2186	1	LTE Type B performance requirements - Introduction of new test cases 8.2.2.2.6 and 8.2.2.2.7	12.7.0	12.8.0
2015-12	RAN#70	R5-156091	2187	1	LTE Type B performance requirements - Introduction of new test cases 9.3.8.1.1 and 9.3.8.1.2	12.7.0	12.8.0
2015-12	RAN#70	R5-156092	2188	1	LTE Type B performance requirements - Adding six NAICS test cases into Annex F and G	12.7.0	12.8.0
2015-12	RAN#70	R5-156095	2155	1	Update Minimum requirements for test case 6.2.3A.1	12.7.0	12.8.0

2015-12	RAN#70	R5-156096	2227	1	Updates of test configuration for OBW for intra-band contiguous UL CA	12.7.0	12.8.0
2015-12	RAN#70	R5-156097	2268	1	CA RF: Minor corrections to section 6.6.3.3A	12.7.0	12.8.0
2015-12	RAN#70	R5-156098	2292	1	Revise Configured UE transmitted Output Power for 2UL intra-band contiguous CA test case 6.2.5A.1	12.7.0	12.8.0
2015-12	RAN#70	R5-156100	2167	1	Deleting redundant and outdated Demod scenario in Minimum test time	12.7.0	12.8.0
2015-12	RAN#70	R5-156101	2258	1	Clarification of DL configuration for wideband	12.7.0	12.8.0
2015-12	RAN#70	R5-156102	2260	1	Correction to Enhanced Performance Type A performance test cases	12.7.0	12.8.0
2015-12	RAN#70	R5-156103	2277	1	Correction and addition of minimum test time for several tests	12.7.0	12.8.0
2015-12	RAN#70	R5-156104	2284	1	Correction to test cases of the section of 9.5.1	12.7.0	12.8.0
2015-12	RAN#70	R5-156110	2190	1	Introduction of new test case 8.9.2.1.1 MTC	12.7.0	12.8.0
2015-12	RAN#70	R5-156113	2301	1	Addition of new TC 8.2.1.4.1_H FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 for SCE-L1	12.7.0	12.8.0
2015-12	RAN#70	R5-156114	2302	1	Addition of new TC 8.2.2.4.1_H TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 2x2 for SCE-L1	12.7.0	12.8.0
2015-12	RAN#70	R5-156115	2303	1	Addition of new TC 8.3.1.1.1_H FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for SCE-L1 for eDL-MIMO	12.7.0	12.8.0
2015-12	RAN#70	R5-156116	2304	1	Addition of new TC 8.3.2.1.2_H TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO for SCE-L1	12.7.0	12.8.0
2015-12	RAN#70	R5-156117	2305	1	Addition of new TC 8.7.1.1_H FDD sustained data rate performance for SCE-L1	12.7.0	12.8.0
2015-12	RAN#70	R5-156118	2306	1	Addition of new TC 8.7.1.1_H.2 FDD Sustained data rate performance for CA for SCE-L1 (2DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156119	2307	1	Addition of new TC 8.7.1.1_H.3 FDD Sustained data rate performance for CA for SCE-L1 (3DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156120	2308	1	Addition of new TC 8.7.2.1_H.1 TDD sustained data rate performance for SCE-L1 (Single Carrier)	12.7.0	12.8.0
2015-12	RAN#70	R5-156121	2309	1	Addition of new TC 8.7.2.1_H.2 TDD sustained data rate performance for CA for SCE-L1 (2DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156122	2310	1	Addition of new TC 8.7.2.1_H.3 TDD Sustained data rate performance for CA for SCE-L1 (3DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156124	2312	1	Addition of new TC 8.7.5.1_H.2 TDD FDD CA Sustained data rate performance for FDD PCell for SCE-L1 (3DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156125	2313	1	Addition of new TC 8.7.5.2_H.1 TDD FDD CA Sustained data rate performance for TDD PCell for SCE-L1 (2DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156126	2314	1	Addition of new TC 8.7.5.2_H.2 TDD FDD CA Sustained data rate performance for TDD PCell for SCE-L1 (3DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156130	2192	2	New CA 2UL Tx test case 6.3.5A.3.3 of Aggregate Power Control Tolerance for CA (intra-band non-contiguous DL CA and UL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156131	2290	2	New TC of Aggregate Power Control Tolerance for 2UL inter-band CA(6.3.5A.3.2)	12.7.0	12.8.0
2015-12	RAN#70	R5-156133	2294	1	Correction to the applicable test release of 1.4MHz Bandwidth MBMS test	12.7.0	12.8.0
2015-12	RAN#70	R5-156134	2164	1	Update to in-band Emissions Limits for less than 1GHz Carrier Frequencies	12.7.0	12.8.0

2015-12	RAN#70	R5-156183	2311	1	Addition of new TC 8.7.5.1_H.1 TDD FDD CA Sustained data rate performance for FDD PCell for SCE-L1 (2DL CA)	12.7.0	12.8.0
2015-12	RAN#70	R5-156071	2153	1	New TC: Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156073	2194	1	New TC: 6.2.3_3 MPR for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156074	2195	1	New TC: 6.2.3_4 MPR for Multi-Cluster PUSCH with UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156075	2196	1	New TC: 6.2.4_2 AMPR for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156076	2197	1	New TC: 6.5.2.1_1 EVM for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156077	2198	1	New TC: 6.5.2A.1.1_1 EVM for CA with UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156078	2199	1	New TC: 6.6.2.2_1 Additional Spectrum Emission Mask for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156079	2200	1	New TC: 6.6.2.3_3 ACLR for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156080	2201	1	New TC: 6.6.2.3_4 ACLR for Multi-Cluster PUSCH with UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156081	2202	1	New TC: 6.6.3.3_1 Additional spurious emissions for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156082	2203	1	Addition of RMCs for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156083	2204	1	Introduction of uncertainties and TTs in Annex F for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156084	2285	1	New TC: A-MPR for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156085	2286	1	New TC: A-SEM for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156086	2287	1	New TC: Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	12.8.0	13.0.0
2015-12	RAN#70	R5-156188	2154	2	New TC: Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA) for UL 64QAM	12.8.0	13.0.0
2016-01	RAN#70	R5-156099	2324	1	introduction of R5-156099 "Introduction of new A-MPR test with PUSCH frequency hopping" with the test case renumbered to 6.2.4_3 after working group agreement to avoid duplication	13.0.0	13.0.1
2016-03	RAN#71	R5-160025	2347	-	Update to NAICS test cases to release NAICS configuration	13.0.1	13.1.0
2016-03	RAN#71	R5-160026	2348	-	Test Tolerances for FDD PDSCH Transmit Diversity 2x2 with TM2 Interference Model– Enhanced Performance Requirement Type B (8.2.1.2.5)	13.0.1	13.1.0
2016-03	RAN#71	R5-160027	2349	-	Test Tolerances for FDD PDSCH Transmit Diversity 2x2 with TM9 Interference Model– Enhanced Performance Requirement Type B (8.2.1.2.6)	13.0.1	13.1.0
2016-03	RAN#71	R5-160028	2350	-	Test Tolerances for TDD PDSCH Transmit Diversity 2x2 with TM2 Interference Model– Enhanced Performance Requirement Type B (8.2.2.2.6)	13.0.1	13.1.0
2016-03	RAN#71	R5-160029	2351	-	Test Tolerances for TDD PDSCH Transmit Diversity 2x2 with TM9 Interference Model– Enhanced Performance Requirement Type B (8.2.2.2.7)	13.0.1	13.1.0
2016-03	RAN#71	R5-160030	2352	-	Test Tolerances FDD and TDD CQI reporting under fading conditions (PUCCH) TM4 - Enhanced Receiver Type B (9.3.8.1.1 and 9.3.8.1.2)	13.0.1	13.1.0
2016-03	RAN#71	R5-160067	2362	-	Correction to UE output power of Tx test cases 6.5.2.3	13.0.1	13.1.0

2016-03	RAN#71	R5-160068	2363	-	Correction to some incorrect sentences of Tx test case 6.5.2A.3.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160106	2368	-	Update of Test Tolerance for eDL MIMO enhancement test cases	13.0.1	13.1.0
2016-03	RAN#71	R5-160107	2369	-	Removal of technical content in 36.521-1 v12.8.0 and substitution with pointer to the next Release	13.0.1	13.1.0
2016-03	RAN#71	R5-160124	2371	-	Correction to test case 8.7.1.1_A.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160125	2372	-	Correction to test case 9.3.2.1.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160139	2375	-	Test Tolerances for 9.6.1.3.1+9.6.1.3.2+9.6.1.4.1+9.6.1.4.2 2DL-3DL CA	13.0.1	13.1.0
2016-03	RAN#71	R5-160141	2376	-	TTs to Annex F for 2DL and 3DL CA	13.0.1	13.1.0
2016-03	RAN#71	R5-160155	2382	-	Test Tolerances for 9.3.7.1+9.3.7.2 eDL MIMO enhancement	13.0.1	13.1.0
2016-03	RAN#71	R5-160159	2383	-	Test Tolerances for 9.4.1.4.1+9.4.1.4.2+9.4.2.3.3+9.4.2.3.4 eDL MIMO enhancement	13.0.1	13.1.0
2016-03	RAN#71	R5-160162	2385	-	Corrections to eDL MIMO enhancements Annex B to include High XP 4x2	13.0.1	13.1.0
2016-03	RAN#71	R5-160164	2386	-	Corrections to EVM test case 6.5.2A.1.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160165	2387	-	Update of uncertainty and TT references for TC 6.2.4E and 6.2.5E	13.0.1	13.1.0
2016-03	RAN#71	R5-160169	2390	-	Addition of 4 Rx part to Diversity characteristics	13.0.1	13.1.0
2016-03	RAN#71	R5-160203	2391	-	Revise Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA) test case 6.3.5A.2.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160281	2419	-	Addition of delta TIB for the new CA configuration CA_3A-41A in sub-clause 6.2.5	13.0.1	13.1.0
2016-03	RAN#71	R5-160334	2423	-	Updates of Spurious emission band UE co-existence for CA (inter-band DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-160337	2425	-	Annex F update for frequency error for inter-band 2UL CA	13.0.1	13.1.0
2016-03	RAN#71	R5-160338	2426	-	Correction and updates to test requirements of Reference sensitivity for inter-band 2DL CA	13.0.1	13.1.0
2016-03	RAN#71	R5-160344	2428	-	Updates of some Rel-13 defined CA combinations to minimum requirements of Reference sensitivity for CA	13.0.1	13.1.0
2016-03	RAN#71	R5-160345	2429	-	Updates of delta TIB,c values and table references for delta TIB,c	13.0.1	13.1.0
2016-03	RAN#71	R5-160377	2437	-	R10 Remove editor's note for CA_39C spurious emission test	13.0.1	13.1.0
2016-03	RAN#71	R5-160441	2439	-	Update to MTC test case 8.9.2.1.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160442	2440	-	Update to MTC RF test applicability for Editor’s Note	13.0.1	13.1.0
2016-03	RAN#71	R5-160459	2443	-	Rel-13 Test point reduction for UL 64QAM multi-cluster MPR and ACLR tests	13.0.1	13.1.0
2016-03	RAN#71	R5-160461	2445	-	Rel-13 Test point reduction for UL 64QAM AMPR and ASEM tests	13.0.1	13.1.0
2016-03	RAN#71	R5-160462	2446	-	Rel-13 Test point reduction for UL 64QAM CA MPR and ACLR tests	13.0.1	13.1.0
2016-03	RAN#71	R5-160464	2448	-	Rel-13 Test point reduction for UL 64QAM CA AMPR, ASEM and ASE tests	13.0.1	13.1.0
2016-03	RAN#71	R5-160482	2451	-	Correction to the minimum test time reference in TDD/FDD CA performance	13.0.1	13.1.0

2016-03	RAN#71	R5-160483	2452	-	Correction to UL CA Tx tests	13.0.1	13.1.0
2016-03	RAN#71	R5-160484	2453	-	Clean up on performance test cases	13.0.1	13.1.0
2016-03	RAN#71	R5-160485	2454	-	Correction to 9.5.5.1_F.1 and 9.5.5.1_F.2 for RI Reporting test with CoMP	13.0.1	13.1.0
2016-03	RAN#71	R5-160486	2455	-	Correction to 8.2.2.2.4 and 8.2.2.4.3 for Enhanced Performance Type A	13.0.1	13.1.0
2016-03	RAN#71	R5-160487	2456	-	Correction to CQI reporting tests for Enhanced Performance Type A	13.0.1	13.1.0
2016-03	RAN#71	R5-160488	2457	-	Correction to CQI and RI reporting tests for feICIC	13.0.1	13.1.0
2016-03	RAN#71	R5-160490	2459	-	Correction to PCFICH/PDCCH and PHICH Tx Diversity for feICIC	13.0.1	13.1.0
2016-03	RAN#71	R5-160491	2460	-	Correction to G.5.4 for minimum test time	13.0.1	13.1.0
2016-03	RAN#71	R5-160504	2462	-	New CA band combination CA_41A_42C - Updates of 6.2.5.3 Delta TIB	13.0.1	13.1.0
2016-03	RAN#71	R5-160506	2463	-	New CA band combination CA_41A_42C - Updates of 7.3.3 Delta RIB	13.0.1	13.1.0
2016-03	RAN#71	R5-160527	2468	-	Addition of operating band and channel assignments for the new Intel assigned CA configuration	13.0.1	13.1.0
2016-03	RAN#71	R5-160569	2477	-	Correction to PMI Reporting for eDL-MIMO	13.0.1	13.1.0
2016-03	RAN#71	R5-160578	2480	-	Minor corrections to applicabilities of TCs 8.2.2.2.3_E.1 & 8.2.2.3.3_E.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160580	2482	-	Correction to PDCP SDU size in TC 8.7.2.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160582	2484	-	CA RF: Corrections to Notes in TC 7.3A.3	13.0.1	13.1.0
2016-03	RAN#71	R5-160583	2485	-	CA RF: Corrections to Notes in TC 7.3A.5	13.0.1	13.1.0
2016-03	RAN#71	R5-160584	2486	-	CA RF: Minor correction to Note in TC 7.3A.6	13.0.1	13.1.0
2016-03	RAN#71	R5-160586	2488	-	Corrections to DL 256QAM SDR Test Cases	13.0.1	13.1.0
2016-03	RAN#71	R5-160587	2489	-	Corrections to TDD FDD CA SDR Test Cases	13.0.1	13.1.0
2016-03	RAN#71	R5-160588	2490	-	Addition of Maximum Wgap definition	13.0.1	13.1.0
2016-03	RAN#71	R5-160590	2492	-	Corrections to TDD FDD CA Closed Loop Spatial Multiplexing TCs	13.0.1	13.1.0
2016-03	RAN#71	R5-160592	2494	-	Corrections to TDD FDD CA Test Applicability tables in section 8.1.2.3B	13.0.1	13.1.0
2016-03	RAN#71	R5-160622	2497	-	Addition of delta RIB for CA_3A-41A in TC 7.3.3	13.0.1	13.1.0
2016-03	RAN#71	R5-160681	2516	-	Introduction of test case 6.6.2.3A.3 - Adjacent Channel Leakage power Ratio for CA (intra-band non-contiguous DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-160686	2519	-	Add reference to TR 36.905 in 36.521-1	13.0.1	13.1.0
2016-03	RAN#71	R5-160801	2479	1	Annex F: Corrections for intra-band contiguous UL CA Test Cases	13.0.1	13.1.0
2016-03	RAN#71	R5-160802	2483	1	Minor correction to TC 6.6.3.2	13.0.1	13.1.0
2016-03	RAN#71	R5-160803	2487	1	Removal of editor's notes in TC 6.5.2A.2.1 & 6.5.2A.3.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160804	2466	1	Correction to UE category information in test case 8.2.1.1.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160805	2467	1	Correction to test case applicability for test case 9.2.1.3_C.1 and 9.2.1.4_C.1	13.0.1	13.1.0

2016-03	RAN#71	R5-160811	2430	1	Updates of delta RIB,c values and table references for delta RIB,c	13.0.1	13.1.0
2016-03	RAN#71	R5-160812	2431	1	Addition of CA_19A-28A and CA_21A-42A to refsens for inter-band 2DL CA	13.0.1	13.1.0
2016-03	RAN#71	R5-160813	2432	1	Updates of test points and test requirements of some Rel-13 defined CA combinations for Reference sensitivity for 3DL CA	13.0.1	13.1.0
2016-03	RAN#71	R5-160814	2469	1	Addition of CA configurations and bandwidth combination sets for the new CA configuration	13.0.1	13.1.0
2016-03	RAN#71	R5-160815	2496	1	Add delta TIB for the new CA_20A-67A configuration in sub-clause 6.2.5.	13.0.1	13.1.0
2016-03	RAN#71	R5-160819	2400	1	Addition of new TC 7.4A.3_H Maximum input level for CA (inter-band DL CA without UL CA) for 256QAM in DL	13.0.1	13.1.0
2016-03	RAN#71	R5-160820	2401	1	Addition of new TC 7.4A.4_H Maximum input level for CA (intra band non-contiguous DL CA without UL CA) for 256QAM in DL	13.0.1	13.1.0
2016-03	RAN#71	R5-160825	2436	1	Rel-10 Test point reduction for UL 64QAM multi-cluster MPR and ACLR tests	13.0.1	13.1.0
2016-03	RAN#71	R5-160828	2422	1	Updates to TM3 TDD-FDD Soft buffer 2DLCA test cases	13.0.1	13.1.0
2016-03	RAN#71	R5-160829	2493	1	Corrections to TDD FDD CA TCs 9.6.1.3.1 and 9.6.1.4.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160831	2520	1	Test points for CA_4A-4A-13A in Reference sensitivity test case	13.0.1	13.1.0
2016-03	RAN#71	R5-160835	2379	1	Addition of UL CA capability for CA_4A-4A in Table 5.4.2A.1-3	13.0.1	13.1.0
2016-03	RAN#71	R5-160836	2380	1	Correction for table references in TC 6.6.3.2A.1	13.0.1	13.1.0
2016-03	RAN#71	R5-160837	2381	1	Renaming of Table 6.6.3.2A-3a	13.0.1	13.1.0
2016-03	RAN#71	R5-160838	2409	1	Update to Annex F for TC 6.3.5A.1.2, 6.3.5A.1.3	13.0.1	13.1.0
2016-03	RAN#71	R5-160839	2411	1	Update to TC 6.3.5A.1.2 Power Control Absolute Power Tolerance for CA (inter-band DL CA and UL CA).	13.0.1	13.1.0
2016-03	RAN#71	R5-160840	2412	1	Update to TC 6.3.5A.1.3 Power Control Absolute power tolerance for CA (intra-band non-contiguous DL CA and UL CA).	13.0.1	13.1.0
2016-03	RAN#71	R5-160841	2416	1	Correction to test case 6.2.5A.3	13.0.1	13.1.0
2016-03	RAN#71	R5-160845	2424	1	Addition of new test case for additional spurious for inter-band 2UL CA and updates for A-MPR for inter-band 2UL CA	13.0.1	13.1.0
2016-03	RAN#71	R5-160846	2518	1	Introduction of test case 7.3A.7 - Reference sensitivity level for CA (intra-band non-contiguous DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-160849	2470	1	New TC: FDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM9 - Enhanced Receiver Type B	13.0.1	13.1.0
2016-03	RAN#71	R5-160850	2471	1	New TC: TDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM9 - Enhanced Receiver Type B	13.0.1	13.1.0
2016-03	RAN#71	R5-160852	2393	1	Update to TC 8.9.1.1.3 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160853	2394	1	Update to TC 8.9.1.2.1 TDD PDSCH Transmit Diversity for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160854	2395	1	Update to TC 8.9.1.2.3 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160855	2408	1	Update to TC 9.7.2.2 TDD CQI reporting definition under fading conditions for UE category 0	13.0.1	13.1.0

2016-03	RAN#71	R5-160856	2420	1	Update to TC 9.7.2.1 FDD and Half duplex FDD CQI reporting definition under fading conditions for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160858	2498	1	Additions to test case 6.6.2.2E – Additional Spectrum Emission Mask for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160859	2500	1	Additions to test case 6.6.3E.3 – Additional spurious emissions for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160860	2501	1	Additions to test case 6.6.2.3E – Adjacent Channel Leakage power Ratio for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160861	2504	1	Additions to test case 6.3.4E.2 – PRACH and SRS ON/OFF time mask for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160862	2506	1	Additions to test case 6.7E – Transmit intermodulation for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160863	2508	1	Additions to test case 6.5.2.1E.2 – PUSCH-EVM with exclusion period for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160864	2510	1	Additions of overlying section 6.6.3E-Spurious emission for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160865	2511	1	Additions of overlying sections 6.3.5C, 6.3.5D and 6.3.5E Power Control for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160866	2513	1	Additions to test case 6.2.3E - Maximum Power Reduction (MPR) for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160867	2515	1	Additions of overlying section 6.3.4E-ON/OFF time mask for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160868	2507	1	Additions to test case 6.6.3E.2 –Spurious emission band UE co-existence for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160869	2505	1	Additions to test case 6.6.3E.1 – Transmitter Spurious emissions for UE category 0	13.0.1	13.1.0
2016-03	RAN#71	R5-160870	2370	1	Updates and test tolerance to single antenna FDD-TDD CA test cases	13.0.1	13.1.0
2016-03	RAN#71	R5-160877	2384	1	TTs to Annex F for eDL MIMO enhancement	13.0.1	13.1.0
2016-03	RAN#71	R5-160878	2392	1	Update to Annex F for TC 8.9.1.1.3, 8.9.1.2.1, 8.9.1.2.3, 9.7.2.1, 9.7.2.2	13.0.1	13.1.0
2016-03	RAN#71	R5-161001	2495	1	Addition of B66 in Frequency bands and channel arrangement.	13.0.1	13.1.0
2016-03	RAN#71	R5-161004	2427	1	Updates of some Rel-13 defined CA combinations to chapter 5 of TS 36.521-1	13.0.1	13.1.0
2016-03	RAN#71	R5-161005	2449	1	New ProSe test case: Demodulation of PSDCH for ProSe direct discovery	13.0.1	13.1.0
2016-03	RAN#71	R5-161006	2450	1	New ProSe test case: Maximum input level test	13.0.1	13.1.0
2016-03	RAN#71	R5-161008	2398	1	Updates to TC 8.7.1.1_A.2 FDD Sustained data rate performance for CA (3DL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-161009	2421	1	Updates to TM3 TDD-FDD with TDD Pcell 2DLCA and 3DLCA test cases	13.0.1	13.1.0
2016-03	RAN#71	R5-161010	2491	1	Corrections to TDD FDD CA Open Loop Spatial Multiplexing TCs	13.0.1	13.1.0
2016-03	RAN#71	R5-161012	2502	1	36.521-1 Sensitivity test points revision for 3DL 1A-3A-7A	13.0.1	13.1.0
2016-03	RAN#71	R5-161014	2503	1	36.521-1 Sensitivity test points revision for 3DL 1A-3A-20A	13.0.1	13.1.0
2016-03	RAN#71	R5-161017	2417	1	Update to TC 6.2.4A.2 A-MPR for 2UL inter-band CA	13.0.1	13.1.0
2016-03	RAN#71	R5-161019	2356	1	New CA 2UL Tx test case 6.5.2A.1.3 Error Vector Magnitude (EVM) for CA (intra-band non-contiguous DL CA and UL CA)	13.0.1	13.1.0

2016-03	RAN#71	R5-161022	2359	1	New CA 2UL Tx test case 6.5.2A.3.2 In-band emissions for non allocated RB for CA (inter-band DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-161023	2360	1	New CA 2UL Tx test case 6.5.2A.3.3 In-band emissions for non allocated RB for CA (intra-band non-contiguous DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-161024	2361	1	New CA 2UL Tx test case 6.6.3.1A.3 Transmitter Spurious emissions for CA (intra-band non-contiguous DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-161025	2377	1	Addition of new LTE_CA_Rel12_2UL test case 6.6.3.2A.3	13.0.1	13.1.0
2016-03	RAN#71	R5-161026	2378	1	Completion of new LTE_CA_Rel12_2UL Test Case 6.7A.2	13.0.1	13.1.0
2016-03	RAN#71	R5-161028	2517	1	Introduction of test case 6.6.2.2A.2 - Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-161029	2407	1	Updates to Annex A for 256QAM test	13.0.1	13.1.0
2016-03	RAN#71	R5-161030	2403	1	Addition of new TC 9.2.1.7 FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 256QAM in DL	13.0.1	13.1.0
2016-03	RAN#71	R5-161031	2404	1	Addition of new TC 9.2.1.8 TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for 256QAM in DL	13.0.1	13.1.0
2016-03	RAN#71	R5-161032	2405	1	Addition of new TC 9.3.1.2.3 FDD CQI Reporting under fading conditions – PUSCH 3-1 for 256QAM in DL	13.0.1	13.1.0
2016-03	RAN#71	R5-161033	2406	1	Addition of new TC 9.3.1.2.4 TDD CQI Reporting under fading conditions – PUSCH 3-1 for 256QAM in DL	13.0.1	13.1.0
2016-03	RAN#71	R5-161034	2399	1	Updates to 7.4A.1_H and 7.4A.2_H Maximum input level for intra-band contiguous CA for 256QAM in DL	13.0.1	13.1.0
2016-03	RAN#71	R5-161035	2402	1	Updates to TC 7.4A.5_H Maximum input level for CA (3DL CA without UL CA) for 256QAM in DL	13.0.1	13.1.0
2016-03	RAN#71	R5-161039	2353	1	LTE Type B performance requirements - Introduction of new test cases 8.2.1.4.4 and 8.2.2.4.5	13.0.1	13.1.0
2016-03	RAN#71	R5-161040	2354	1	LTE Type B performance requirements - Adding test cases 8.2.1.4.4 and 8.2.2.4.5 into Annex F and G	13.0.1	13.1.0
2016-03	RAN#71	R5-161041	2433	1	Test configuration correction for AMPR tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161042	2434	1	Test configuration correction for ASE tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161043	2435	1	Test configuration correction for ASEM tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161044	2438	1	Test configuration correction for UL 64QAM AMPR tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161045	2441	1	Test configuration correction for UL 64QAM ASE tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161046	2442	1	Test configuration correction for UL 64QAM ASEM tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161047	2444	1	Rel-8 Test point reduction for UL 64QAM AMPR, ASEM and ASE tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161056	2410	1	Adding new clause 6.3.5A.1.0 and 6.3.5A.2.0 to define the minimum conformance requirements.	13.0.1	13.1.0
2016-03	RAN#71	R5-161059	2465	1	New CA band combination CA_41A-42C - Updates of 7.3A Refsens	13.0.1	13.1.0
2016-03	RAN#71	R5-161061	2447	1	Rel-10 Test point reduction for UL 64QAM CA AMPR, ASEM and ASE tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161062	2472	1	Correction to the UL CA Frequency Error Testcase	13.0.1	13.1.0
2016-03	RAN#71	R5-161064	2522	1	Correction to A-MPR test with frequency hopping	13.0.1	13.1.0
2016-03	RAN#71	R5-161065	2415	1	Correction of Table number of DeltaRib reference in CA receiver RF tests	13.0.1	13.1.0

2016-03	RAN#71	R5-161073	2367	1	Update of test applicability for eDL MIMO enhancement TCs	13.0.1	13.1.0
2016-03	RAN#71	R5-161085	2514	1	36.521-1 Editorial corrections	13.0.1	13.1.0
2016-03	RAN#71	R5-161086	2524	1	Addition frequency bands and channel arrangement for B67 and CA_20-67	13.0.1	13.1.0
2016-03	RAN#71	R5-161103	2355	2	New CA 2UL Tx test case 6.5.2A.1.2 Error Vector Magnitude (EVM) for CA (inter-band DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-161104	2357	2	New CA 2UL Tx test case 6.5.2A.2.2 Carrier leakage for CA (inter-band DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-161105	2358	2	New CA 2UL Tx test case 6.5.2A.2.3 Carrier leakage for CA (intra-band non-contiguous DL CA and UL CA)	13.0.1	13.1.0
2016-03	RAN#71	R5-161107	2389	2	Reference sensitivity level with 4 Rx antenna ports	13.0.1	13.1.0
2016-03	RAN#71	R5-161109	2509	2	36.521-1 Transmitter tests for Band 66	13.0.1	13.1.0
2016-03	RAN#71	R5-161110	2512	1	36.521-1 Receiver tests for Band 66	13.0.1	13.1.0
2016-03	RAN#71	R5-161111	2373	1	Correction to power level for dual layer TM9 demodulation tests	13.0.1	13.1.0
2016-03	RAN#71	R5-161112	2458	2	Correction to TDD CQI Reporting for feICIC	13.0.1	13.1.0
2016-03	RAN#71	R5-161113	2461	2	Correction to UL 64 QAM RMC	13.0.1	13.1.0
2016-03	RAN#71	R5-161114	2475	2	Correction to CQI reports in CoMP fading test	13.0.1	13.1.0
2016-03	RAN#71	R5-161115	2476	2	Correction to test system uncertainties for Rx 7.6.3	13.0.1	13.1.0
2016-06	RAN#72	R5-162088	2527	-	Test Tolerances for FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 with TM4 Interference Model– Enhanced Performance	13.1.0	13.2.0
2016-06	RAN#72	R5-162090	2528	-	Test Tolerances for TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x2 with TM4 Interference Model– Enhanced Performance	13.1.0	13.2.0
2016-06	RAN#72	R5-162169	2533	-	Corrections to Annex F.1.2 and F.3.2 for Pcmax test case	13.1.0	13.2.0
2016-06	RAN#72	R5-162189	2536	-	Additions to test case 6.3.5E.3 – Aggregate power control tolerance for UE category 0	13.1.0	13.2.0
2016-06	RAN#72	R5-162191	2537	-	Additions to test case 6.3.5E.2 – Power Control Relative power tolerance for UE category 0	13.1.0	13.2.0
2016-06	RAN#72	R5-162192	2538	-	Editorial correction in Reference sensitivity QPSK PREFSENS four antenna ports Table number	13.1.0	13.2.0
2016-06	RAN#72	R5-162195	2539	-	Addition In-band blocking with 4 Rx antenna ports test case	13.1.0	13.2.0
2016-06	RAN#72	R5-162210	2542	-	Addition of UL CA capability for CA_4A-5A in Table 5.4.2A.1-2	13.1.0	13.2.0
2016-06	RAN#72	R5-162211	2543	-	New test points for CA_4A-5A (2DL-2UL) in sec. 6.2 and sec. 6.3	13.1.0	13.2.0
2016-06	RAN#72	R5-162212	2544	-	New test points for CA_4A-5A (2DL-2UL) in sec. 6.5 and sec. 6.6	13.1.0	13.2.0
2016-06	RAN#72	R5-162215	2545	-	Update of requirements in TC 6.2.2A.2 for CA_4A-5A (2DL-2UL)	13.1.0	13.2.0
2016-06	RAN#72	R5-162235	2557	-	Introduction of ACLR for intra-band non-contiguous UL CA for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162241	2563	-	New test case: Maximum sidelink processes for ProSe Direct discovery	13.1.0	13.2.0
2016-06	RAN#72	R5-162247	2569	-	Update of TC 7.3A.6 for CA_4A-5A (2DL-2UL)	13.1.0	13.2.0

2016-06	RAN#72	R5-162248	2570	-	New D2D Tx test case 6.5.1D.2 Frequency error for ProSe Direct Communication	13.1.0	13.2.0
2016-06	RAN#72	R5-162249	2571	-	Update of Inter-band E-UTRA ProSe / E-UTRA operating bands to chapter 5 of TS 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162251	2572	-	Update to CA 2UL Tx test case 6.5.1A.3 Frequency Error for CA (intra-band non-contiguous DL CA and UL CA)	13.1.0	13.2.0
2016-06	RAN#72	R5-162296	2590	-	New TC: FDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type B	13.1.0	13.2.0
2016-06	RAN#72	R5-162303	2593	-	RF: Wrong Number of PDCCH symbols in TC 8.2.1.4.1_H	13.1.0	13.2.0
2016-06	RAN#72	R5-162304	2594	-	RF: Corrections to RMCs in Annex A	13.1.0	13.2.0
2016-06	RAN#72	R5-162306	2595	-	RF: Correction to RMC for UE Category 1 in CSI tests	13.1.0	13.2.0
2016-06	RAN#72	R5-162308	2597	-	RF: Pb setting in power imbalance TCs	13.1.0	13.2.0
2016-06	RAN#72	R5-162309	2598	-	RF: UE Categories in FDD-TDD 2DL joint operation CSI test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162324	2605	-	Introduction of TDD PCFICH/PDCCH Single-antenna Port Performance 1x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162340	2608	-	Added Channel BW clause for Dual Connectivity	13.1.0	13.2.0
2016-06	RAN#72	R5-162343	2609	-	Introduction of Spurious Response for ProSe	13.1.0	13.2.0
2016-06	RAN#72	R5-162344	2610	-	Introduction of In-band blocking for ProSe	13.1.0	13.2.0
2016-06	RAN#72	R5-162345	2611	-	Introduction of Out-of-band blocking for ProSe	13.1.0	13.2.0
2016-06	RAN#72	R5-162346	2612	-	Annex F: Addition of chapter 7 ProSe TCs	13.1.0	13.2.0
2016-06	RAN#72	R5-162350	2615	-	UL CA: Corrections to 6.5.2A.x inter-band and non-contiguous TCs	13.1.0	13.2.0
2016-06	RAN#72	R5-162354	2618	-	Correction to UL64QAM A-MPR and ASE tests	13.1.0	13.2.0
2016-06	RAN#72	R5-162355	2619	-	Correction to TC 8.2.1.3.1A_A.1	13.1.0	13.2.0
2016-06	RAN#72	R5-162358	2622	-	Annex G: Corrections to test times for joint operation TCs	13.1.0	13.2.0
2016-06	RAN#72	R5-162393	2625	-	Addition CA_66A-66A in test case 7.4A.4_H	13.1.0	13.2.0
2016-06	RAN#72	R5-162420	2628	-	Addition of CA_1A-3A-7A in 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162421	2629	-	Addition of CA_3A-7A-8A in 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162463	2633	-	Addition of Band 45 to Section 5 of 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162464	2634	-	Addition of Band 45 in maximum output power test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162465	2635	-	Addition of Band 45 in MPR test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162467	2637	-	Addition of Band 45 in Refsens test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162468	2638	-	Addition of Band 45 in in-band blocking test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162469	2639	-	Addition of Band 45 in out-of-band blocking test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162475	2640	-	Addition of output power configuration for CA_3C-5A to Section 6.2.5	13.1.0	13.2.0
2016-06	RAN#72	R5-162486	2644	-	Updates of test configuration for Additional spurious emissions for 2UL inter-band CA	13.1.0	13.2.0
2016-06	RAN#72	R5-162490	2645	-	New CA band combinations CA_28A-41A and CA_28A-41C - Updates of 5.4.2A Channel bandwidth	13.1.0	13.2.0

2016-06	RAN#72	R5-162491	2646	-	New CA band combinations CA_28A-41A and CA_28A-41C - Updates of 6.2.5.3 Delta TIB	13.1.0	13.2.0
2016-06	RAN#72	R5-162492	2647	-	New CA band combinations CA_28A-41A and CA_28A-41C - Updates of 7.3.3 Delta RIB	13.1.0	13.2.0
2016-06	RAN#72	R5-162495	2649	-	New CA band combinations CA_28A-42A and CA_28A-42C - Updates of 5.4.2A Channel bandwidth	13.1.0	13.2.0
2016-06	RAN#72	R5-162496	2650	-	New CA band combinations CA_28A-42A and CA_28A-42C - Updates of 6.2.5.3 Delta TIB	13.1.0	13.2.0
2016-06	RAN#72	R5-162497	2651	-	New CA band combinations CA_28A-42A and CA_28A-42C - Updates of 7.3.3 Delta RIB	13.1.0	13.2.0
2016-06	RAN#72	R5-162499	2653	-	New CA band combinations CA_41C-42A and CA_41C-42C - Updates of 5.4.2A Channel bandwidth	13.1.0	13.2.0
2016-06	RAN#72	R5-162500	2654	-	New CA band combinations CA_41C-42A and CA_41C-42C - Updates of 6.2.5.3 Delta TIB	13.1.0	13.2.0
2016-06	RAN#72	R5-162501	2655	-	New CA band combinations CA_41C-42A and CA_41C-42C - Updates of 7.3.3 Delta RIB	13.1.0	13.2.0
2016-06	RAN#72	R5-162502	2656	-	New CA band combinations CA_41C-42A - Updates of 7.3A Refsens	13.1.0	13.2.0
2016-06	RAN#72	R5-162527	2661	-	Correction of editor's note for CA_41A-42C	13.1.0	13.2.0
2016-06	RAN#72	R5-162528	2662	-	Minor correction to TC 8.2.1.4.2_A.1	13.1.0	13.2.0
2016-06	RAN#72	R5-162542	2666	-	Updates of delta TIB,c values for some CA configurations	13.1.0	13.2.0
2016-06	RAN#72	R5-162549	2668	-	Correction to test case 9.3.2.2.2_D	13.1.0	13.2.0
2016-06	RAN#72	R5-162550	2669	-	Correction to test applicability in test case 8.7.5.1.1	13.1.0	13.2.0
2016-06	RAN#72	R5-162553	2671	-	Correction to test case 9.3.3.1.1.	13.1.0	13.2.0
2016-06	RAN#72	R5-162563	2676	-	Introduction of new Rx test case Maximum input level with 4 Rx antenna ports	13.1.0	13.2.0
2016-06	RAN#72	R5-162567	2678	-	Addition of 2x1 antenna correlation matrices for UE category 0	13.1.0	13.2.0
2016-06	RAN#72	R5-162568	2679	-	Updates to test case 8.9.1.1.1 - FDD PDSCH Transmit Diversity 2x1 for UE category 0	13.1.0	13.2.0
2016-06	RAN#72	R5-162569	2680	-	Updates to test case 9.7.1.1 - FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category 0	13.1.0	13.2.0
2016-06	RAN#72	R5-162593	2688	-	Correction to CQI tests for Enhanced Performance Type A	13.1.0	13.2.0
2016-06	RAN#72	R5-162594	2689	-	Correction to TDD FDD CA CQI Reporting tests	13.1.0	13.2.0
2016-06	RAN#72	R5-162596	2691	-	Correction to demodulation test cases for CoMP in 8.3.1.3.2_F and 8.3.2.4.2_F	13.1.0	13.2.0
2016-06	RAN#72	R5-162597	2692	-	Correction to PDCCH Aggregation Level for SDR test	13.1.0	13.2.0
2016-06	RAN#72	R5-162605	2695	-	Update of refsens test case 7.3A.3 for CA_20A-67A	13.1.0	13.2.0
2016-06	RAN#72	R5-162647	2700	-	Re-Addition of new LTE_CA_Rel12_2UL test case 6.6.3.2A.3	13.1.0	13.2.0
2016-06	RAN#72	R5-162661	2704	-	Band 65 introduction to Chapter 7 in 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162802	2546	1	Introduction of MPR for inter-band DL CA and UL CA for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162803	2547	1	Introduction of MPR for intra-band non-contiguous CA and UL CA for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162804	2553	1	Rel-11 Test point reduction for intra-band non-contiguous UL CA MPR and ACLR tests	13.1.0	13.2.0

2016-06	RAN#72	R5-162805	2554	1	Rel-11 Test point reduction for inter-band UL CA AMPR, ASEM and ASE tests	13.1.0	13.2.0
2016-06	RAN#72	R5-162806	2555	1	R8 - Modification of test bandwidths in AMPR, ASEM and ASE test	13.1.0	13.2.0
2016-06	RAN#72	R5-162807	2556	1	R13 - Modification of test bandwidths in AMPR and ASE for UL 64QAM test	13.1.0	13.2.0
2016-06	RAN#72	R5-162808	2616	1	UL CA: Corrections to TC 6.5.2A.1.1	13.1.0	13.2.0
2016-06	RAN#72	R5-162810	2685	1	Correction to 6.2.4 A-MPR test for Band 12	13.1.0	13.2.0
2016-06	RAN#72	R5-162811	2535	1	Corrections to CA_41A-41C and CA_41C-41A tables in clauses 7.3A.5, 7.4A.5, 7.5A.5, 7.6.1A.5, 7.6.2A.5, 7.6.3A.5 and 7.8.1A.5	13.1.0	13.2.0
2016-06	RAN#72	R5-162812	2665	1	Correction of refsens test case 7.3A.3 for CA_20A-32A	13.1.0	13.2.0
2016-06	RAN#72	R5-162813	2674	1	New CA band combination CA_8A-40A – Updates of 7.3.3 Delta RIB	13.1.0	13.2.0
2016-06	RAN#72	R5-162814	2684	1	New CA band combination CA_8A-40A – Updates of 7.3A Refsens	13.1.0	13.2.0
2016-06	RAN#72	R5-162815	2686	1	Correction to reference sensitivity test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162816	2687	1	Clarification of interferer frequencies in ACS	13.1.0	13.2.0
2016-06	RAN#72	R5-162817	2621	1	Corrections to chapter 8 joint operation TCs	13.1.0	13.2.0
2016-06	RAN#72	R5-162818	2670	1	Correction to test case 8.2.3.2.2A	13.1.0	13.2.0
2016-06	RAN#72	R5-162819	2690	1	Additional test point for 3DL CA Performance and CQI test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162820	2693	1	Correction to TDD FDD CA performance test cases for FDD PCell(2DL and 3DL)	13.1.0	13.2.0
2016-06	RAN#72	R5-162821	2694	1	Correction to TDD FDD CA performance test cases for TDD PCell TCs(2DL)	13.1.0	13.2.0
2016-06	RAN#72	R5-162832	2623	1	Corrections to 256QAM SDR joint operation TCs	13.1.0	13.2.0
2016-06	RAN#72	R5-162837	2559	1	New test case: 2x4 PDSCH TM9 single layer TypeA	13.1.0	13.2.0
2016-06	RAN#72	R5-162838	2530	1	Addition of CA_4A-12A Bandwidth combination set5 information	13.1.0	13.2.0
2016-06	RAN#72	R5-162839	2567	1	Update of TC 6.6.3.1A.2 for CA_4A-5A (2DL-2UL)	13.1.0	13.2.0
2016-06	RAN#72	R5-162840	2584	1	Updates TC7.3 for new Rel-13 defined CA combinations to minimum requirements of Reference sensitivity	13.1.0	13.2.0
2016-06	RAN#72	R5-162841	2585	1	Updates TC7.3A for new Rel-13 defined CA combinations to minimum requirements of Reference sensitivity for CA	13.1.0	13.2.0
2016-06	RAN#72	R5-162842	2586	1	Updates of some Rel-13 defined CA combinations to operating bands of TS 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162843	2587	1	Updates TC6.2.5 for delta TIB,c values with new Rel-13 CA band combination	13.1.0	13.2.0
2016-06	RAN#72	R5-162844	2627	1	Addition of CA_4A-4A BW set 1	13.1.0	13.2.0
2016-06	RAN#72	R5-162846	2531	1	Addition of Rel-13 CA combination CA_3A-41A to refsens for inter-band 2DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-162847	2710	1	Introduction of new TC8.2.1.4.2_A.3 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-162848	2719	1	Addition of definition of CA capability with 4DL & 5DL CCs	13.1.0	13.2.0
2016-06	RAN#72	R5-162849	2720	1	Addition of Operating bands for CA in clause 5.2A	13.1.0	13.2.0

2016-06	RAN#72	R5-162851	2560	1	New test case: 4layer PDSCH CLSM	13.1.0	13.2.0
2016-06	RAN#72	R5-162852	2561	1	New test case: 4layer PDSCH TM9 SM	13.1.0	13.2.0
2016-06	RAN#72	R5-162853	2562	1	New test case: 3layer PDSCH OLSM	13.1.0	13.2.0
2016-06	RAN#72	R5-162854	2573	1	New Performance test case 8.10.4.1.1 FDD distributed EPDCCH performance 2x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162855	2574	1	New Performance test case 8.10.4.1.2 TDD distributed EPDCCH performance 2x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162856	2575	1	New Performance test case 8.10.4.2.1 FDD localized EPDCCH performance with TM9 2x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162857	2576	1	New Performance test case 8.10.4.2.2 TDD localized EPDCCH performance with TM9 2x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162858	2602	1	Introduction of FDD PCFICH/PDCCH Single-antenna Port Performance 1x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162859	2603	1	Introduction of FDD PCFICH/PDCCH Transmit Diversity 2x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162860	2606	1	Introduction of TDD PCFICH/PDCCH Transmit Diversity 2x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162861	2607	1	Introduction of TDD PCFICH/PDCCH Transmit Diversity 4x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162862	2675	1	Addition of 4Rx antenna port feature into Annex I	13.1.0	13.2.0
2016-06	RAN#72	R5-162863	2677	1	Introduction of new Rx test case Adjacent Channel Selectivity (ACS) with 4 Rx antenna ports	13.1.0	13.2.0
2016-06	RAN#72	R5-162865	2577	1	Rearrangement of TC 6.6.2.3A.1_1 and TC 6.6.2.3A.2 and corrections to TC 6.6.2.3A.2	13.1.0	13.2.0
2016-06	RAN#72	R5-162866	2614	1	UL CA: Corrections to intra-band non-contiguous test configuration tables	13.1.0	13.2.0
2016-06	RAN#72	R5-162867	2725	1	Updates of test configuration for EVM and Carrier leakage test cases of 2UL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-162868	2643	1	Addition of minimum requirement tables to clause 6.3.5A.1.0 and 6.3.5A.2.0	13.1.0	13.2.0
2016-06	RAN#72	R5-162869	2681	1	Updates to test case 6.6.2.2A.2 - Additional Spectrum Emission Mask for CA (inter-band DL CA and UL CA)	13.1.0	13.2.0
2016-06	RAN#72	R5-162870	2699	1	Re-submission of New CA 2UL Tx test case 6.5.2A.1.3 Error Vector Magnitude (EVM) for CA (intra-band non-contiguous DL CA and UL CA)	13.1.0	13.2.0
2016-06	RAN#72	R5-162872	2724	1	Additions to test case 6.6.3.1A.2 – Transmitter Spurious emissions for CA (inter-band DL CA and UL CA)	13.1.0	13.2.0
2016-06	RAN#72	R5-162875	2696	1	Adding operating band definitions for MTC and eMTC	13.1.0	13.2.0
2016-06	RAN#72	R5-162877	2564	1	New test case: PSSCH performance for ProSe Direct communication	13.1.0	13.2.0
2016-06	RAN#72	R5-162878	2565	1	New test case: Maximum sidelink processes for ProSe Direct communication	13.1.0	13.2.0
2016-06	RAN#72	R5-162879	2722	1	New test Case: ProSe-UE Maximum Output Power	13.1.0	13.2.0
2016-06	RAN#72	R5-162880	2723	1	New test Case: ProSe-UE Maximum Power Reduction test case	13.1.0	13.2.0
2016-06	RAN#72	R5-162884	2599	1	Update to FDD PDSCH Closed Loop Multi-Layer Spatial Multiplexing 4x2 for Dual Connectivity	13.1.0	13.2.0
2016-06	RAN#72	R5-162885	2600	1	Update to TDD PDSCH Closed Loop Multi-Layer Spatial Multiplexing 4x2 for Dual Connectivity	13.1.0	13.2.0

2016-06	RAN#72	R5-162886	2601	1	Update to sustained data rate performance for Dual Connectivity 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162887	2641	1	Addition of test case for FDD sustained data rate performance for Dual Connectivity 256QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162888	2642	1	Addition of test case for TDD sustained data rate performance for Dual Connectivity 256QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162890	2728	-	Adding Low Wgap definition to section 3	13.1.0	13.2.0
2016-06	RAN#72	R5-162952	2632	1	Update to TC 6.3.5A.2.3 Power Control Relative power tolerance for CA (intra-band non-contiguous DL CA and UL CA)	13.1.0	13.2.0
2016-06	RAN#72	R5-162953	2525	1	CR for Clause 9.3.8.2 in 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162954	2591	1	New TC: TDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type B	13.1.0	13.2.0
2016-06	RAN#72	R5-162967	2624	2	Addition CA combinations in intra-band contiguous DL CA and UL CA transmitter test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162969	2660	1	Update BW definition for band 66 in clause 5	13.1.0	13.2.0
2016-06	RAN#72	R5-162973	2701	1	Band 65 introduction to Chapter 5 in 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162974	2703	1	Band 65 introduction to Chapter 6.6.3 in 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-162975	2636	1	Addition of Band 45 in Spurious emission test cases	13.1.0	13.2.0
2016-06	RAN#72	R5-162976	2540	2	6.3.4E.1 – General ON/OFF time mask for UE category 0	13.1.0	13.2.0
2016-06	RAN#72	R5-162977	2548	1	Introduction of AMPR for inter-band DL CA and UL CA for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162978	2541	1	6.3.4.1 – General ON/OFF time mask.	13.1.0	13.2.0
2016-06	RAN#72	R5-162979	2549	1	Introduction of EVM for inter-band UL CA for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162980	2550	1	Introduction of ASEM for inter-band DL CA and UL CA for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162981	2551	1	Introduction of ACLR for inter-band DL CA and UL CA for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162982	2552	1	Introduction of ASE for inter-band DL CA and UL CA for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162983	2657	1	Updates of test point for A-Spur for UL 64QAM	13.1.0	13.2.0
2016-06	RAN#72	R5-162985	2673	1	New CA band combination CA_8A-40A – Updates of 5.4.2A Channel Bandwidth	13.1.0	13.2.0
2016-06	RAN#72	R5-162987	2664	1	Change of test case applicability for A-MPR for NS_05	13.1.0	13.2.0
2016-06	RAN#72	R5-162989	2566	1	Update of TC 6.6.2.2A.2 for CA_4A-5A (2DL-2UL)	13.1.0	13.2.0
2016-06	RAN#72	R5-162990	2648	1	New CA band combinations CA_28A-41A and CA_28A-41C - Updates of 7.3A Refsens	13.1.0	13.2.0
2016-06	RAN#72	R5-162991	2716	1	Introduction of new TC7.7A.7 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-162992	2604	1	Introduction of FDD PCFICH/PDCCH Transmit Diversity 4x4	13.1.0	13.2.0
2016-06	RAN#72	R5-162993	2532	1	Update test case 6.2.4A.2:AMPR for 2UL inter-band CA	13.1.0	13.2.0
2016-06	RAN#72	R5-162995	2658	1	Addition of a new TC for Minimum Output Power for CA (inter-band DL CA and UL CA)	13.1.0	13.2.0
2016-06	RAN#72	R5-162996	2659	1	Addition of a new TC for Minimum Output Power for CA (intra-band non-contiguous DL CA and UL CA)	13.1.0	13.2.0

2016-06	RAN#72	R5-162997	2682	1	Introduction of test case 6.6.2.2A.3 - Additional Spectrum Emission Mask for CA (intra-band non-contiguous DL CA and UL CA)	13.1.0	13.2.0
2016-06	RAN#72	R5-163100	2588	1	Introduction of new eMTC RF test case 6.3.5EA.1 for category M1	13.1.0	13.2.0
2016-06	RAN#72	R5-163101	2589	1	Introduction of new eMTC RF test case 6.3.5EA.2 for category M1	13.1.0	13.2.0
2016-06	RAN#72	R5-163102	2705	1	Addition of new test case for aggregate power control tolerance for UE category M1	13.1.0	13.2.0
2016-06	RAN#72	R5-163103	2706	1	Addition of New test case for Maximum input level for UE category M1	13.1.0	13.2.0
2016-06	RAN#72	R5-163104	2707	1	Addition of New test case for Adjacent Channel Selectivity (ACS) for category M1	13.1.0	13.2.0
2016-06	RAN#72	R5-163107	2568	1	New D2D Tx test case 6.5.1D.1 Frequency error for ProSe Direct Discovery	13.1.0	13.2.0
2016-06	RAN#72	R5-163110	2558	1	New 2x4 test case: PDSCH CLSM TypeA	13.1.0	13.2.0
2016-06	RAN#72	R5-163119	2708	1	Introduction of new TC7.3A.9 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-163120	2709	1	Introduction of new TC7.4A.7 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-163121	2711	1	Introduction of new TC7.5A.7 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-163122	2712	1	Introduction of new TC7.6.1A.7 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-163123	2713	1	Introduction of new TC7.6.2A.7 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-163124	2715	1	Introduction of new TC7.6.3A.7 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-163125	2717	1	Introduction of new TC7.8.1A.7 4DL CA	13.1.0	13.2.0
2016-06	RAN#72	R5-163126	2718	1	Updates of delta TIB,c values and table references for delta TIB,c for TC 6.2.5	13.1.0	13.2.0
2016-06	RAN#72	R5-163127	2727	1	Introduction of CA 1A-8A-11A in chapters 5, 6 and 7	13.1.0	13.2.0
2016-06	RAN#72	R5-163129	2529	1	Addition of new test case 7.9_1 Spurious emissions with 4 Rx antenna ports	13.1.0	13.2.0
2016-06	RAN#72	R5-163130	2534	1	Revise Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA) test case 6.3.5A.2.1	13.1.0	13.2.0
2016-06	RAN#72	R5-163132	2652	1	New CA band combinations CA_28A-42A and CA_28A-42C - Updates of 7.3A Refsens	13.1.0	13.2.0
2016-06	RAN#72	R5-163192	2631	2	Update to TC 6.3.5A.2.2 Power Control Relative power tolerance for CA (inter-band DL CA and UL CA)	13.1.0	13.2.0
2016-06	RAN#72	R5-163194	2702	2	Band 65 introduction to Chapter 6.2 in 36.521-1	13.1.0	13.2.0
2016-06	RAN#72	R5-163195	2663	2	Change of test points and requirements for A-MPR for NS_05	13.1.0	13.2.0
2016-06	RAN#72	R5-163196	2726	1	Correction to the UL CA Frequency Error Testcase	13.1.0	13.2.0
2016-09	RAN#73	R5-165046	2742	2	Introduction of new definitions for NB-IoT in Chapter 3	13.2.0	13.3.0
2016-09	RAN#73	R5-165047	2744	2	Introduction of general information for NB-IoT in Chapter 4	13.2.0	13.3.0
2016-09	RAN#73	R5-165048	2745	2	Introduction of operating bands for NB-IoT in Chapter 5	13.2.0	13.3.0
2016-09	RAN#73	R5-165049	2730	2	Introduce Downlink Fixed Reference Channels for UE category NB1 Receiver tests	13.2.0	13.3.0
2016-09	RAN#73	R5-165050	2731	2	Introduce GSM Interferer for UE category NB1 Adjacent channel selectivity tests	13.2.0	13.3.0

2016-09	RAN#73	R5-165051	2736	2	New test case: 6.2.2EA UE Maximum Output Power for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165057	2759	2	Addition of FDD MPDCCH demod test case for eMTC	13.2.0	13.3.0
2016-09	RAN#73	R5-165058	2760	2	Addition of TDD MPDCCH demod test case for eMTC	13.2.0	13.3.0
2016-09	RAN#73	R5-165062	2757	2	UE Maximum Output Power for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165063	2741	2	Addition of test case 6.6.2.3F for ACLR for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165067	2749	2	Addition of test case 6.7F for Transmit Intermodulation for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165068	2750	2	Addition of Occupied Bandwidth test case 6.6.1F for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165069	2751	2	Addition of Spectrum Emission Mask test case 6.6.2.1F for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165070	2756	2	Introduction of 6.5.1F Frequency Error for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165071	2763	2	Introduction of new NB-IoT RF test case 6.3.4F.1 for category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165072	2765	2	Introduction of test case 6.2.3F - Maximum Power Reduction (MPR) for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165073	2766	2	Introduction of test case 6.6.3F.1 - Transmitter Spurious emission for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165074	2758	2	Maximum input level for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165075	2729	2	Introduce Adjacent Channel Selectivity (ACS) for UE category NB1 test case 7.5F	13.2.0	13.3.0
2016-09	RAN#73	R5-165076	2733	2	Introduce Downlink Physical Channels for UE category NB1 Receiver tests	13.2.0	13.3.0
2016-09	RAN#73	R5-165077	2764	2	Addition of the TC 6.6.2.3EA ACLR for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165094	2776	-	New test case: 6.5.1EA Frequency Error for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165095	2777	-	New test case: 6.5.2.1EA.1 Error Vector Magnitude for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165096	2778	-	New test case: 6.5.2.1EA.2 PUSCH-EVM with exclusion period for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165097	2779	-	New test case: 6.5.2.2EA Carrier leakage for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165098	2780	-	New test case: 6.5.2.3EA In-band emissions for non allocated RB for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165099	2781	-	New test case: 6.5.2.4EA EVM equalizer spectrum flatness for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165100	2782	-	New test case: 6.6.2.1EA Spectrum Emission Mask for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165101	2783	-	New test case: 6.6.2.2EA Additional Spectrum Emission Mask for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165117	2797	-	Changes to general clauses for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165158	2800	-	Introduction of ProSe RF TC 7.5D	13.2.0	13.3.0
2016-09	RAN#73	R5-165159	2801	-	Introduction of ProSe RF TC 7.6.3D	13.2.0	13.3.0
2016-09	RAN#73	R5-165160	2802	-	Introduction of ProSe RF TC 7.8.1D	13.2.0	13.3.0
2016-09	RAN#73	R5-165210	2808	-	New CA band combination CA_1A-40A and CA_3A-40A - Updates of 7.3A Refsens	13.2.0	13.3.0

2016-09	RAN#73	R5-165225	2809	-	Update minimum test time into Annex G for TC 8.9.1.1.3,8.9.1.2.3	13.2.0	13.3.0
2016-09	RAN#73	R5-165228	2810	-	Update to TC 9.7.2.1,9.7.2.2	13.2.0	13.3.0
2016-09	RAN#73	R5-165243	2812	-	Addition of new 4Rx Test Cases - CQI reporting / AWGN / rank 1	13.2.0	13.3.0
2016-09	RAN#73	R5-165244	2813	-	Addition of new 4Rx Test Cases - CQI reporting / AWGN / rank 2	13.2.0	13.3.0
2016-09	RAN#73	R5-165245	2814	-	Addition of new 4Rx Test Cases - CQI reporting / AWGN / rank 4	13.2.0	13.3.0
2016-09	RAN#73	R5-165247	2815	-	Addition of new 4Rx Test Cases - CQI reporting / AWGN / rank 3	13.2.0	13.3.0
2016-09	RAN#73	R5-165248	2816	-	Uncertainties and Test Tolerances for new 4Rx Test Cases - CQI reporting / AWGN	13.2.0	13.3.0
2016-09	RAN#73	R5-165250	2817	-	Addition of channel matrices for 4Rx in Annex B.1	13.2.0	13.3.0
2016-09	RAN#73	R5-165310	2822	-	Update to FDD PCFICH/PDCCH transmit diversity 2x4	13.2.0	13.3.0
2016-09	RAN#73	R5-165311	2823	-	Update to FDD PCFICH/PDCCH transmit diversity 4x4	13.2.0	13.3.0
2016-09	RAN#73	R5-165322	2833	-	Update minimum requirement of Reference sensitivity level for all Rel-13 CA configurations	13.2.0	13.3.0
2016-09	RAN#73	R5-165334	2834	-	Correction of test requirements of In-band emissions for non allocated RB	13.2.0	13.3.0
2016-09	RAN#73	R5-165366	2837	-	Update to test case 8.10.4.1.1 FDD distributed EPDCCH performance 2x4	13.2.0	13.3.0
2016-09	RAN#73	R5-165368	2839	-	Update to test case 8.10.4.1.2 TDD distributed EPDCCH performance 2x4	13.2.0	13.3.0
2016-09	RAN#73	R5-165369	2840	-	Update to test case 8.10.4.2.1 FDD localized EPDCCH performance 2x4	13.2.0	13.3.0
2016-09	RAN#73	R5-165370	2841	-	Introduction of a clause for Demodulation of PBCH (enhanced coverage)	13.2.0	13.3.0
2016-09	RAN#73	R5-165371	2842	-	Update to test case 8.10.4.2.2 TDD localized EPDCCH performance 2x4	13.2.0	13.3.0
2016-09	RAN#73	R5-165395	2851	-	Correction to the test requirement for General ON/OFF time mask for UE category 0	13.2.0	13.3.0
2016-09	RAN#73	R5-165413	2854	-	Correction for UL 64QAM test cases to TS36.521-1	13.2.0	13.3.0
2016-09	RAN#73	R5-165415	2856	-	Update to eMTC RF test case 6.3.5EA.2 for category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-165424	2861	-	Update Reference sensitivity for Band 66	13.2.0	13.3.0
2016-09	RAN#73	R5-165441	2868	-	Introduction of EVM test for UL 64QAM + 2UL CA (intra-band non-contiguous DL CA and UL CA)	13.2.0	13.3.0
2016-09	RAN#73	R5-165443	2870	-	Introduction of test requirements for AMPR inter-band UL CA + UL 64QAM	13.2.0	13.3.0
2016-09	RAN#73	R5-165444	2871	-	Introduction of TT in Annex F for UL 64QAM + 2UL CA	13.2.0	13.3.0
2016-09	RAN#73	R5-165454	2872	-	Correction to test case 7.3E Reference sensitivity level for UE category 0	13.2.0	13.3.0
2016-09	RAN#73	R5-165485	2876	-	Removal of SCC allocation in TCs 6.5.2A.x	13.2.0	13.3.0
2016-09	RAN#73	R5-165487	2878	-	Annex F: Addition of Uncertainties for chapter 7 ProSe TCs	13.2.0	13.3.0
2016-09	RAN#73	R5-165489	2880	-	Minor correction to TC 6.6.3.3A.2	13.2.0	13.3.0
2016-09	RAN#73	R5-165496	2885	-	Update to Annex C for CAT M1 testing	13.2.0	13.3.0

2016-09	RAN#73	R5-165510	2887	-	UE Power Class test requirements in Multi-Cluster PUSCH TCs	13.2.0	13.3.0
2016-09	RAN#73	R5-165512	2889	-	Correction of Reference sensitivity test settings for CA_26A-41C	13.2.0	13.3.0
2016-09	RAN#73	R5-165541	2890	-	Introduction of additional 3DL tolerances in TC 6.2.2A.2	13.2.0	13.3.0
2016-09	RAN#73	R5-165592	2894	-	Adding the Diversity characteristics requirements in chapter 7.2 for category NB1 UE.	13.2.0	13.3.0
2016-09	RAN#73	R5-165624	2909	-	New TC: FDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM3 interference model - Enhanced Performance Requirement Type B	13.2.0	13.3.0
2016-09	RAN#73	R5-165625	2910	-	New TC: TDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM3 interference model - Enhanced Performance Requirement Type B	13.2.0	13.3.0
2016-09	RAN#73	R5-165673	2924	-	Correction to CA sustained data rate tests for 256QAM	13.2.0	13.3.0
2016-09	RAN#73	R5-165674	2925	-	Clean up on UE DL category for 256QAM DL RMC	13.2.0	13.3.0
2016-09	RAN#73	R5-165675	2926	-	Correction to TDD eDL-MIMO performance test case with 256QAM	13.2.0	13.3.0
2016-09	RAN#73	R5-165676	2927	-	Addition of test points in 6.5.1A.1 Frequency error for CA	13.2.0	13.3.0
2016-09	RAN#73	R5-165680	2931	-	Correction to Annex F.3 for UL64QAM test cases	13.2.0	13.3.0
2016-09	RAN#73	R5-165681	2932	-	Clean up on TM4 CA and TDD FDD CA performance test cases	13.2.0	13.3.0
2016-09	RAN#73	R5-165682	2933	-	Correction to TDD FDD CA sustained data rate performance test cases	13.2.0	13.3.0
2016-09	RAN#73	R5-165683	2934	-	Correction to the minimum test time for TDD FDD CA performance test cases	13.2.0	13.3.0
2016-09	RAN#73	R5-165684	2935	-	Correction to TDD FDD soft buffer for 2DL CA	13.2.0	13.3.0
2016-09	RAN#73	R5-165690	2938	-	Correction of the test requirement for TC 6.6.2.1A.1 SEM for CA (intra-band contiguous DL CA and UL CA)	13.2.0	13.3.0
2016-09	RAN#73	R5-165695	2942	-	Addition of the FDD-FDD-TDD 3DL case into TC 9.6.1.3.2 TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (3DL CA)	13.2.0	13.3.0
2016-09	RAN#73	R5-165701	2948	-	Change of test points and requirements for NS_05 A-MPR for UL64QAM	13.2.0	13.3.0
2016-09	RAN#73	R5-165702	2949	-	Change of test points and requirements for NS_05 Additional spurious emissions for UL64QAM	13.2.0	13.3.0
2016-09	RAN#73	R5-165732	2951	-	Correction to spurious emission band UE co-existence limits references for Rel-13	13.2.0	13.3.0
2016-09	RAN#73	R5-165734	2952	-	NS_24 and NS_25 A-MPR test configuration and requirements	13.2.0	13.3.0
2016-09	RAN#73	R5-165735	2953	-	NS_24 and NS_25 A-Spurious emission test configuration and requirements	13.2.0	13.3.0
2016-09	RAN#73	R5-165785	2955	-	Addition of CQI report config IE for 4Rx TM9 test cases	13.2.0	13.3.0
2016-09	RAN#73	R5-165787	2956	-	Addition TC 6.3.2F Minimum Output power for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165790	2957	-	Addition TC 7.3F.1 Reference sensitivity test for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-165820	2966	-	36.521-1 UL CA frequency error clarification	13.2.0	13.3.0
2016-09	RAN#73	R5-165837	2970	-	Addition Out of-band blocking with 4 Rx antenna ports TC 7.6.2_1	13.2.0	13.3.0

2016-09	RAN#73	R5-165838	2971	-	Addition Narrow band blocking with 4 Rx antenna ports TC 7.6.3_1	13.2.0	13.3.0
2016-09	RAN#73	R5-165857	2975	-	New test case: FDD Multiple timing reference test for ProSe direct discovery	13.2.0	13.3.0
2016-09	RAN#73	R5-165858	2976	-	New test case: FDD power imbalance performance with two links for ProSe Direct communication	13.2.0	13.3.0
2016-09	RAN#73	R5-166001	2869	1	Introduction of test configurations for ASEM inter-band UL CA + UL 64QAM	13.2.0	13.3.0
2016-09	RAN#73	R5-166002	2930	1	Correction to interferer frequencies in In-band blocking for CA	13.2.0	13.3.0
2016-09	RAN#73	R5-166003	2884	1	Addition of test points to UL 64 QAM TC	13.2.0	13.3.0
2016-09	RAN#73	R5-166004	2905	1	Correction to TC 6.2.4A.1 A-MPR for CA (intra-band contiguous DL CA and UL CA)	13.2.0	13.3.0
2016-09	RAN#73	R5-166005	2929	1	Correction to Max Power for CA	13.2.0	13.3.0
2016-09	RAN#73	R5-166006	2928	1	Clean up on chapter 3, 6 and 7	13.2.0	13.3.0
2016-09	RAN#73	R5-166007	2941	1	Change of test points and requirements for NS_05 A-MPR	13.2.0	13.3.0
2016-09	RAN#73	R5-166008	2943	1	Change of test points and requirements for NS_05 Additional spurious emissions	13.2.0	13.3.0
2016-09	RAN#73	R5-166009	2945	1	Change of test points and requirements for NS_05 A-MPR for UL-MIMO	13.2.0	13.3.0
2016-09	RAN#73	R5-166010	2947	1	Change of test points and requirements for NS_05 Additional spurious emissions for UL-MIMO	13.2.0	13.3.0
2016-09	RAN#73	R5-166011	2818	1	Change of names of 3DL TCs	13.2.0	13.3.0
2016-09	RAN#73	R5-166012	2860	1	Update Reference sensitivity for additional requirement	13.2.0	13.3.0
2016-09	RAN#73	R5-166013	2883	1	Correction to applicability of Power Class 3 only UL TCs	13.2.0	13.3.0
2016-09	RAN#73	R5-166022	2799	1	Correction to Max Input power for 256QAM	13.2.0	13.3.0
2016-09	RAN#73	R5-166023	2939	1	Update of the test points of the TC 8.7.1.1_H.3	13.2.0	13.3.0
2016-09	RAN#73	R5-166027	2771	1	Update of Delta Tib tables in clause 6.2.5.3 for all Rel-13 CA configurations	13.2.0	13.3.0
2016-09	RAN#73	R5-166028	2772	1	Update of Delta Rib tables in clause 7.3.3 for all Rel-13 CA configurations	13.2.0	13.3.0
2016-09	RAN#73	R5-166029	2773	1	Update of CA operating bands and bandwidth for all Rel-13 CA configurations	13.2.0	13.3.0
2016-09	RAN#73	R5-166030	2768	1	Addition of CA_3A-5A BW set 3	13.2.0	13.3.0
2016-09	RAN#73	R5-166031	2819	1	Introduction of CA_8A-42A (2DL) to test case 7.3A.3	13.2.0	13.3.0
2016-09	RAN#73	R5-166033	2820	1	Introduction of CA_8A-42C (3DL) to test case 7.3A.5	13.2.0	13.3.0
2016-09	RAN#73	R5-166034	2853	1	Addition of CA_2A-28A in TS 36.521-1	13.2.0	13.3.0
2016-09	RAN#73	R5-166035	2858	1	Update power control and in-band emission requirement for CA_8B	13.2.0	13.3.0
2016-09	RAN#73	R5-166036	2862	1	Update TC 6.6.2.1A.1 requirement for CA_8B	13.2.0	13.3.0
2016-09	RAN#73	R5-166037	2902	1	Rel 13 CA_5B RF Test Cases Section 7	13.2.0	13.3.0
2016-09	RAN#73	R5-166038	2903	1	Rel 13 CA_3C-5A RF Test Cases Section 7	13.2.0	13.3.0
2016-09	RAN#73	R5-166039	2916	1	Introduction of New TC8.7.1.1_A.4 4DL CA	13.2.0	13.3.0
2016-09	RAN#73	R5-166040	2917	1	Introduction of New TC9.6.1.1_A.3 4DL CA	13.2.0	13.3.0

2016-09	RAN#73	R5-166041	2944	1	Updates of Rx test cases for 4DL CA	13.2.0	13.3.0
2016-09	RAN#73	R5-166042	2958	1	Addition CA_2A-4A-5A-30A in TS 36.521-1	13.2.0	13.3.0
2016-09	RAN#73	R5-166043	2960	1	Addition CA_2A-2A-4A-4A in TS 36.521-1	13.2.0	13.3.0
2016-09	RAN#73	R5-166044	2920	1	Update TC 6.6.2.3A.1 and 6.6.2.3A.1_1 requirement for CA_8B	13.2.0	13.3.0
2016-09	RAN#73	R5-166045	2921	1	Update TC 6.6.3.1A.1 requirement for CA_8B	13.2.0	13.3.0
2016-09	RAN#73	R5-166046	2922	1	Update TC 6.6.3.2A.1 requirement for CA_8B	13.2.0	13.3.0
2016-09	RAN#73	R5-166047	2923	1	Update TC 6.7A.1 requirement for CA_8B	13.2.0	13.3.0
2016-09	RAN#73	R5-166048	2940	1	Addition of the FDD-FDD-TDD 3DL case into TC 8.7.5.1.2 TDD FDD CA Sustained data rate performance for FDD PCell (3DL CA)	13.2.0	13.3.0
2016-09	RAN#73	R5-166060	2844	1	New test case: 6.3.5F.1 Power Control Absolute power tolerance for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-166061	2845	1	New test case: 6.3.5F.2 Power Control Relative power tolerance for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-166062	2846	1	New test case: 7.7F Spurious response for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-166063	2847	1	New test case: 7.8.1F Wide band Intermodulation for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-166064	2864	1	Introduction of TT for Configured UE transmitted output power in Annex F	13.2.0	13.3.0
2016-09	RAN#73	R5-166065	2865	1	Resubmission of 6.2.5F Configured UE transmitted Output Power for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-166066	2866	1	Resubmission of 6.5.2.1F.1 Error Vector Magnitude (EVM) for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-166067	2867	1	Resubmission of 6.5.2.2F Carrier leakage for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-166068	2895	1	Addition of In-band emissions for non allocated RB test case 6.5.2.3F for UE category NB1	13.2.0	13.3.0
2016-09	RAN#73	R5-166069	2775	1	New test case: 6.2.4EA Additional Maximum Power Reduction (A-MPR) for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166070	2791	1	New test case: 6.2.3EA Maximum Power Reduction (MPR) for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166071	2792	1	New test case: 6.6.3EA.1 Transmitter Spurious emissions for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166072	2793	1	New test case: 6.6.3EA.2 Spurious emission band UE co-existence for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166073	2794	1	New test case: 6.6.3EA.3 Additional spurious emissions for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166074	2795	1	New test case: 7.3EA Reference sensitivity level for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166075	2835	1	Introduction of General ON/OFF time mask for UE category M1	13.2.0	13.3.0

2016-09	RAN#73	R5-166076	2836	1	Introduction of PRACH and SRS ON/OFF time mask for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166077	2838	1	Introduction of Occupied bandwidth for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166078	2848	1	New test case: 7.7EA Spurious response for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166080	2850	1	New test case: 7.9EA Spurious emissions UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166084	2913	1	Update of TC6.3.5EA.3 Aggregate power control tolerance for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166085	2914	1	Update of TC7.4EA Maximum input level for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166086	2915	1	Update of TC7.5EA Adjacent Channel Selectivity (ACS) for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166087	2972	1	Adding narrowband and narrowband index definitions to 36.521-1	13.2.0	13.3.0
2016-09	RAN#73	R5-166103	2805	1	Corrections to LC MTC test case 7.4E and 7.5E	13.2.0	13.3.0
2016-09	RAN#73	R5-166104	2912	1	Update of TC 9.7.1.2 TDD CQI reporting definition under AWGN conditions for UE category 0	13.2.0	13.3.0
2016-09	RAN#73	R5-166105	2803	1	Introduction of NAICS RF TC 8.3.1.1.7	13.2.0	13.3.0
2016-09	RAN#73	R5-166106	2804	1	Introduction of NAICS RF TC 8.3.2.1.8	13.2.0	13.3.0
2016-09	RAN#73	R5-166108	2875	1	Removal of DL allocation from UL CA TCs	13.2.0	13.3.0
2016-09	RAN#73	R5-166109	2964	1	36.521-1: UL CA spurious updates	13.2.0	13.3.0
2016-09	RAN#73	R5-166111	2965	1	36.521-1: A-MPR and A-SEM corrections for inter-band UL CA	13.2.0	13.3.0
2016-09	RAN#73	R5-166112	2859	1	Additional Operation Band 46 for LAA	13.2.0	13.3.0
2016-09	RAN#73	R5-166113	2897	1	Update test case 7.6.3A.3 to add LAA band combinations	13.2.0	13.3.0
2016-09	RAN#73	R5-166114	2824	1	Update to TDD PCFICH/PDCCH single-antenna performance 1x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166115	2825	1	Update to TDD PCFICH/PDCCH transmit diversity 2x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166116	2826	1	Update to TDD PCFICH/PDCCH transmit diversity 4x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166117	2827	1	Introduction of FDD PHICH Single-antenna Port Performance 1x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166118	2828	1	Introduction of FDD PHICH Transmit Diversity 2x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166119	2829	1	Introduction of FDD PHICH Transmit Diversity 4x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166120	2830	1	Introduction of TDD PHICH Single-antenna Port Performance 1x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166121	2831	1	Introduction of TDD PHICH Transmit Diversity 2x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166122	2832	1	Introduction of TDD PHICH Transmit Diversity 4x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166123	2978	1	Addition of the 4Rx test case into the chapter 7	13.2.0	13.3.0
2016-09	RAN#73	R5-166133	2980	-	Change of test points and requirements for NS_05 A-MPR for Band 65	13.2.0	13.3.0
2016-09	RAN#73	R5-166134	2981	-	Change of test points and requirements for NS_05 Additional spurious emissions for Band 65	13.2.0	13.3.0
2016-09	RAN#73	R5-166135	2982	-	Change of test points and requirements for NS_05 A-MPR for UL-MIMO for Band 65	13.2.0	13.3.0
2016-09	RAN#73	R5-166136	2983	-	Change of test points and requirements for NS_05 Additional spurious emissions for UL-MIMO for Band 65	13.2.0	13.3.0

2016-09	RAN#73	R5-166137	2950	1	Correction to TC 6.6.3.2 Band 66 UE E-UTRA release requirements	13.2.0	13.3.0
2016-09	RAN#73	R5-166138	2967	1	36.521-1 Band 66 Receiver test cases updates	13.2.0	13.3.0
2016-09	RAN#73	R5-166139	2977	1	Updates to 4Rx Demod test cases	13.2.0	13.3.0
2016-09	RAN#73	R5-166141	2959	1	D2D New test cases: Power imbalance performance with two Sidelinks	13.2.0	13.3.0
2016-09	RAN#73	R5-166143	2901	1	Rel 13 CA_5A-5A RF Test Cases Section 7	13.2.0	13.3.0
2016-09	RAN#73	R5-166145	2937	1	Addition of some 4DL CA combinations into TC 7.3A.9.5	13.2.0	13.3.0
2016-09	RAN#73	R5-166147	2852	1	Updates of 7.3A.5 Channel bandwidth for CA_1A-3C	13.2.0	13.3.0
2016-09	RAN#73	R5-166148	2898	1	Introduction to new test case 6.2.5EA Configured transmitted power for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166152	2879	1	Corrections to TC 7.9A	13.2.0	13.3.0
2016-09	RAN#73	R5-166154	2896	1	Update test case 7.6.1A.3 to add LAA band combinations	13.2.0	13.3.0
2016-09	RAN#73	R5-166155	2877	1	Correction to 256QAM CQI TCs	13.2.0	13.3.0
2016-09	RAN#73	R5-166156	2806	1	Addition of CA_4A-12A Bandwidth combination set5 information	13.2.0	13.3.0
2016-09	RAN#73	R5-166157	2857	1	Update Maximum Output Power and MPR requirement for CA_8B	13.2.0	13.3.0
2016-09	RAN#73	R5-166158	2918	1	Update of Test Cases for 4DL CA	13.2.0	13.3.0
2016-09	RAN#73	R5-166160	2821	1	Update to FDD PCFICH/PDCCH single-antenna performance 1x4	13.2.0	13.3.0
2016-09	RAN#73	R5-166165	2855	1	Update to eMTC RF test case 6.3.5EA.1 for category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166166	2900	1	Introduction to new test case 6.3.3EA UE Transmit OFF power for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166169	2873	1	Corrections to TC 7.3A.4	13.2.0	13.3.0
2016-09	RAN#73	R5-166171	2899	2	Introduction to new test case 6.3.2EA Minimum Output Power for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166303	2874	2	Corrections to TC 7.3A.5	13.2.0	13.3.0
2016-09	RAN#73	R5-166309	2789	2	New test case: 9.8.1.1 FDD and half-duplex FDD CQI reporting definition under AWGN conditions in enhanced coverage	13.2.0	13.3.0
2016-09	RAN#73	R5-166310	2796	2	New test case: 8.11.1.1.1 FDD and half-duplex FDD (Fixed Reference Channel) demodulation of PDCCH in enhanced coverage	13.2.0	13.3.0
2016-09	RAN#73	R5-166311	2811	1	Adding RMCs for CAT M1 testing to Annex A	13.2.0	13.3.0
2016-09	RAN#73	R5-166312	2849	2	New test case: 7.8.1EA Wide band intermodulation for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166313	2891	2	Introduction of new test case In-band blocking for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166314	2892	2	Introduction of new test case Out-of-band blocking for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166315	2893	2	Introduction of new test case Narrow band blocking for UE category M1	13.2.0	13.3.0
2016-09	RAN#73	R5-166319	2973	2	36.521-1 Correction of intra-band cont CA spurious co-existence test case for Rel-10 and Rel-11 UEs	13.2.0	13.3.0

2016-09	RAN#73	R5-166053	2904	1	New CA band combination CA_1A-41A-42A - Updates of 5.4.2A Channel bandwidth	13.3.0	14.0.0
2016-09	RAN#73	R5-166054	2906	1	New CA band combination CA_1A-41A-42A - Updates of 6.2.5.3 Delta TIB	13.3.0	14.0.0
2016-09	RAN#73	R5-166055	2907	1	New CA band combination CA_1A-41A-42A - Updates of 7.3.3 Delta RIB	13.3.0	14.0.0
2016-09	RAN#73	R5-166056	2908	1	New CA band combination CA_1A-41A-42A - Updates of 7.3A Refsens	13.3.0	14.0.0
2016-12	RAN#74	R5-168019	2984	-	Adding MPDCCH aggregation level to Annex C for CAT M1 testing	14.0.0	14.1.0
2016-12	RAN#74	R5-168042	2995	-	Introduction of numbering rules guideline for category M1 in Annex I	14.0.0	14.1.0
2016-12	RAN#74	R5-168123	3007	-	Completion of 4Rx Test Cases for CQI reporting under AWGN	14.0.0	14.1.0
2016-12	RAN#74	R5-168125	3009	-	Correction to Initial conditions of TC 6.2.4A.2_1 for NS_03/NS_01	14.0.0	14.1.0
2016-12	RAN#74	R5-168126	3010	-	Correction to Initial conditions of TC 6.6.2.2A.2_1 for NS_03/NS_01	14.0.0	14.1.0
2016-12	RAN#74	R5-168189	3014	-	Chapter 3 introduction of symbols for NB-IoT	14.0.0	14.1.0
2016-12	RAN#74	R5-168190	3015	-	Chapter 5 change of frequency bands and channel arrangement for NB-IoT	14.0.0	14.1.0
2016-12	RAN#74	R5-168191	3016	-	6.2.5F Configured UE transmitted Output Power for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-168194	3019	-	Annex A Introduction of UL RMC for NB-IoT	14.0.0	14.1.0
2016-12	RAN#74	R5-168195	3020	-	Introduction of TT for EVM and Carrier leakage test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-168209	3021	-	Derivation of Test Requirements for 7.5A.4 ACS for intra-band non-contiguous DL CA	14.0.0	14.1.0
2016-12	RAN#74	R5-168294	3042	-	Update to eMTC RF test case 6.3.5EA.1 and 6.3.5EA.2 for category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-168310	3047	-	Updated chapter 2, 3, 4 and 5 for ProSe	14.0.0	14.1.0
2016-12	RAN#74	R5-168311	3048	-	Updated of Delta Tib tables in clause 6.2.5.3 for all Rel-14 CA configurations	14.0.0	14.1.0
2016-12	RAN#74	R5-168314	3051	-	Correction to RF TC 6.6.3.1A.1	14.0.0	14.1.0
2016-12	RAN#74	R5-168368	3053	-	Updates to section 7 4Rx single carrier TCs	14.0.0	14.1.0
2016-12	RAN#74	R5-168400	3063	-	Band 70 introduction to 36.521-1 Chapter 5	14.0.0	14.1.0
2016-12	RAN#74	R5-168401	3064	-	Band 70 introduction to 36.521-1 output power requirements	14.0.0	14.1.0
2016-12	RAN#74	R5-168405	3066	-	Correction to TX-RX frequency separation for Band 65	14.0.0	14.1.0
2016-12	RAN#74	R5-168420	3069	-	Update of TC 6.6.3.1A.2	14.0.0	14.1.0
2016-12	RAN#74	R5-168478	3070	-	Introduction of Power Class 2 in power control for HPUE	14.0.0	14.1.0
2016-12	RAN#74	R5-168484	3071	-	Update to 4 test cases 8.10.4.1.1, 8.10.4.1.2, 8.10.4.2.1 and 8.10.4.2.2 by adding connection diagram	14.0.0	14.1.0
2016-12	RAN#74	R5-168555	3093	-	Updates of the test number in TC 8.7.5.1_H.2 TDD FDD CA SDR for FDD PCell (3DL CA) for 256QAM in DL	14.0.0	14.1.0
2016-12	RAN#74	R5-168557	3094	-	Correction of the test point for TC 7.3A.9 REFSENS 4DL CA	14.0.0	14.1.0
2016-12	RAN#74	R5-168595	3103	-	Update to In-band blocking requirements 7.6.1A.0	14.0.0	14.1.0
2016-12	RAN#74	R5-168604	3105	-	Clean-up of 7.3A.3 test configuration tables	14.0.0	14.1.0

2016-12	RAN#74	R5-168647	3115	-	Correction of RB allocation in Additional Maximum Power Reduction (A-MPR) for CA and Additional Spectrum Emission Mask for CA	14.0.0	14.1.0
2016-12	RAN#74	R5-168654	3120	-	Corrections of Spurious Emissions TC for CA	14.0.0	14.1.0
2016-12	RAN#74	R5-168668	3126	-	Correction to tolerance value for CA_NS_01 for CA A-MPR test 6.2.4A.1	14.0.0	14.1.0
2016-12	RAN#74	R5-168669	3127	-	Correction to UL RB allocation in 6.5.1A Frequency error for CA	14.0.0	14.1.0
2016-12	RAN#74	R5-168670	3128	-	Clarification of test requirement for CA MPR test cases 6.2.3A.1 and 6.2.3A.1_1	14.0.0	14.1.0
2016-12	RAN#74	R5-168671	3129	-	Correction of Highest NRB_agg and REFSENS in 7.3A.5	14.0.0	14.1.0
2016-12	RAN#74	R5-168672	3130	-	Correction to DL modulation parameter for CA 5A-5A in Max Input Level test	14.0.0	14.1.0
2016-12	RAN#74	R5-168675	3133	-	Correction to reference channel of Multi-Layer Spatial Multiplexing test case for CA	14.0.0	14.1.0
2016-12	RAN#74	R5-168676	3134	-	Corrections regarding power allocation for TM9 performance and CQI tests	14.0.0	14.1.0
2016-12	RAN#74	R5-168749	3151	-	Update minimum conformance requirements for receiver 4 Rx antenna ports test cases and legacy test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-168785	3167	-	RF: Correction to RMC R.31-6 FDD	14.0.0	14.1.0
2016-12	RAN#74	R5-168792	3171	-	Updates to test case 6.2.3EA - MPR for category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-168794	3172	-	Updates to test case 6.2.4EA - A-MPR for category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-168795	3173	-	Updates to test case 6.6.2.1EA - SEM for category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-168796	3174	-	Updates to test case 6.6.2.2EA – Additional SEM for category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-168797	3175	-	Updates to test case 6.6.3EA.3 – Additional Spurious emissions for category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-168803	3179	-	Introduction of new test case 7.6.1F In-band blocking for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-168805	3181	-	Introduction of new test case 7.6.2F Out-of-band blocking for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-168807	3182	-	CSI-RS-Config-r10 message content aligned to minimum conformance requirements for TC 8.3.1.1.2_D	14.0.0	14.1.0
2016-12	RAN#74	R5-168816	3184	-	NB-IoT test frequencies algorithm for TRx test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-168827	3188	-	Addition Reference sensitivity with repetitions test for UE category NB1 7.3F.2	14.0.0	14.1.0
2016-12	RAN#74	R5-168829	3189	-	Default operation mode definition for TRx TCs	14.0.0	14.1.0
2016-12	RAN#74	R5-168845	3191	-	CA_70C introduction to 36.521-1 receiver requirements	14.0.0	14.1.0
2016-12	RAN#74	R5-168847	3192	-	Update UL RMC for CA_1A-3A-7A in 7.3A.5	14.0.0	14.1.0
2016-12	RAN#74	R5-168849	3193	-	Update test repetitions tables for receiver 4CC test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-168851	3194	-	Update test case 6.5.2A.2.1 to remove editor's notes	14.0.0	14.1.0
2016-12	RAN#74	R5-168852	3195	-	Update reference sensitivity level for some CA Configurations in test 7.3A.6	14.0.0	14.1.0
2016-12	RAN#74	R5-168857	3197	-	Editorial correction in TC 6.2.4A.1_1	14.0.0	14.1.0
2016-12	RAN#74	R5-168858	3198	-	Update reference tables in ASEM, ACLR, ASE for intra-band contiguous UL CA for UL 64QAM	14.0.0	14.1.0

2016-12	RAN#74	R5-168859	3199	-	Update test cases 6.2.4A.1 and 6.6.2.2A.1 to remove editor's notes	14.0.0	14.1.0
2016-12	RAN#74	R5-168974	3210	-	Addition of TM10 CQI reporting test cases with NAICS	14.0.0	14.1.0
2016-12	RAN#74	R5-168975	3211	-	Test tolerance update to MPDCCH performance test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-168979	3213	-	Update of test tolerance of 4-Rx Type A demod test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-168981	3215	-	Test Tolerances for FDD PDSCH Closed Loop Single Layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model – Enhanced Performance Requirement Type B (8.3.1.1.4)	14.0.0	14.1.0
2016-12	RAN#74	R5-168982	3216	-	Test Tolerances for FDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM3 interference model - Enhanced Performance Requirement Type B (8.3.1.1.6)	14.0.0	14.1.0
2016-12	RAN#74	R5-168983	3217	-	Test Tolerances for TDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type B (8.3.2.1.5)	14.0.0	14.1.0
2016-12	RAN#74	R5-168984	3218	-	Test Tolerances for TDD PDSCH Closed Loop Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM3 Interference Model - Enhanced Performance Requirement Type B (8.3.2.1.7)	14.0.0	14.1.0
2016-12	RAN#74	R5-168985	3219	-	Test Tolerances for FDD and TDD CQI Reporting under fading conditions - PUCCH 1-1 (CSI Reference Symbol) TM9 - Enhanced Receiver Type B (9.3.8.2.1 and 9.3.8.2.2)	14.0.0	14.1.0
2016-12	RAN#74	R5-169045	3229	-	Addition Transmit intermodulation for UE category M1 test case 6.7EA	14.0.0	14.1.0
2016-12	RAN#74	R5-169502	3080	1	Update to test case 8.7.5.1.2	14.0.0	14.1.0
2016-12	RAN#74	R5-169506	3006	1	Update of B3/39 UE co-existence requirements	14.0.0	14.1.0
2016-12	RAN#74	R5-169507	3058	1	Updates to SEM Test Cases for HPUE	14.0.0	14.1.0
2016-12	RAN#74	R5-169508	3067	1	Correction to Band 66 UL-MIMO test requirements 6.2.3B, 6.2.4B	14.0.0	14.1.0
2016-12	RAN#74	R5-169509	3068	1	Correction to NS_24 and NS_25 TC 6.6.3.3 test requirements	14.0.0	14.1.0
2016-12	RAN#74	R5-169510	3108	1	Correction of test description for NS_05 A-MPR	14.0.0	14.1.0
2016-12	RAN#74	R5-169511	3109	1	Correction of test description for NS_05 Additional spurious emissions	14.0.0	14.1.0
2016-12	RAN#74	R5-169512	3138	1	Correction of power tolerance in A-MPR TC	14.0.0	14.1.0
2016-12	RAN#74	R5-169513	3196	1	Update TC 6.6.3.3A.1 to remove editor's notes and modify additional requirements for CA_NS_07	14.0.0	14.1.0
2016-12	RAN#74	R5-169514	3097	1	Addition of missing CA_7A-8A for Refsens test	14.0.0	14.1.0
2016-12	RAN#74	R5-169519	3043	1	Introduction of new NB-IoT RF test case 6.3.3F for category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169520	3212	1	Addition of demod test case for NPDSCH with In-band mode	14.0.0	14.1.0
2016-12	RAN#74	R5-169521	3074	1	Update to test case 6.3.5F.2 Power Control Relative power tolerance for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169522	3076	1	Update to test case 7.8.1F Wide band Intermodulation UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169523	3214	1	Update to Annex H	14.0.0	14.1.0
2016-12	RAN#74	R5-169524	3099	1	Supplementation of test case 6.7F for Transmit Intermodulation for UE category NB1	14.0.0	14.1.0

2016-12	RAN#74	R5-169525	3177	1	Updates in test case 6.6.3F.1, Transmitter Spurious emissions for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169526	3185	1	Corrections for NB-IoT Rx test cases in TS 36.521-1	14.0.0	14.1.0
2016-12	RAN#74	R5-169527	3186	1	Corrections for NB-IoT Tx test cases in TS 36.521-1	14.0.0	14.1.0
2016-12	RAN#74	R5-169528	3227	1	Addition of demod test case for NPDCCH with In-band mode	14.0.0	14.1.0
2016-12	RAN#74	R5-169531	3056	1	Corrections to TC 7.3A.9	14.0.0	14.1.0
2016-12	RAN#74	R5-169532	3078	1	Add New TC of 9.6.1.3.3 for TDD FDD CQI Reporting under AWGN conditions - PUCCH 1-0 for FDD PCell (4DL CA)	14.0.0	14.1.0
2016-12	RAN#74	R5-169533	3079	1	Add New TC of 9.6.1.4.3 for TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD Pcell	14.0.0	14.1.0
2016-12	RAN#74	R5-169535	3089	1	Addition of the new TC 8.7.5.1.3 TDD FDD CA Sustained data rate performance for FDD PCell (4DL CA)	14.0.0	14.1.0
2016-12	RAN#74	R5-169536	3091	1	Addition of the new TC 8.2.3.1.1.3 TDD FDD CA PDSCH Single Antenna Port Performance for FDD PCell (4DL CA)	14.0.0	14.1.0
2016-12	RAN#74	R5-169537	3092	1	Addition of the new TC 8.7.5.1_H.3 TDD FDD CA Sustained data rate performance for FDD PCell (4DL CA) for 256QAM in DL	14.0.0	14.1.0
2016-12	RAN#74	R5-169539	3111	1	New CA band combination CA_1A-11A-18A - Updates of 7.3A Refsens	14.0.0	14.1.0
2016-12	RAN#74	R5-169541	3112	1	New CA band combination CA_41C-42C - Updates of 7.3A Refsens	14.0.0	14.1.0
2016-12	RAN#74	R5-169543	3113	1	New CA band combinations CA_1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of 6.2.2A UE maximum output power	14.0.0	14.1.0
2016-12	RAN#74	R5-169544	3117	1	New CA band combinations CA_1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of 6.6.3.1A Transmitter Spurious emissions	14.0.0	14.1.0
2016-12	RAN#74	R5-169545	3118	1	New CA band combinations CA_1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of 6.6.3.2A Spurious emission band UE co-existence	14.0.0	14.1.0
2016-12	RAN#74	R5-169546	3137	1	Introduction of exception for CA_4A-12A-30A in Refsense TC	14.0.0	14.1.0
2016-12	RAN#74	R5-169550	3164	1	Correction of CA_42-42 sub-block CA configuration	14.0.0	14.1.0
2016-12	RAN#74	R5-169567	2994	1	Updates of 7.3A Refsens for CA_1A-3A-41A	14.0.0	14.1.0
2016-12	RAN#74	R5-169568	3049	1	Updated of Delta Rib tables in clause 7.3.3 for all Rel-14 CA configurations	14.0.0	14.1.0
2016-12	RAN#74	R5-169569	3050	1	Updated of Reference sensitivity level in clause 7.3A.0 for all Rel-14 CA configurations	14.0.0	14.1.0
2016-12	RAN#74	R5-169570	3086	1	Updates of the test point of the TC 6.6.2.3EA ACLR for UE category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169571	3125	1	Correction to Rx test cases for Cat M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169572	3228	1	Update of CA operating bands and bandwidth for all CA configurations as per TS 36.101 v14.1.0	14.0.0	14.1.0
~~2016-12~~	~~RAN#74~~	~~R5-169573~~	~~3180~~	~~1~~	~~Introduction of FDD and Half-Duplex FDD Demodulation of MPDCCH in CE Mode B Test Case~~ (not implementable)	~~14.0.0~~	~~14.1.0~~
~~2016-12~~	~~RAN#74~~	~~R5-169574~~	~~3183~~	~~1~~	~~Introduction of TDD Demodulation of MPDCCH in CE Mode B Test Case~~ (not implementable)	~~14.0.0~~	~~14.1.0~~
2016-12	RAN#74	R5-169610	3170	1	Introduction of NAICS demod test cases 8.3.1.1.5 (FDD) and 8.3.2.1.6 (TDD)	14.0.0	14.1.0

2016-12	RAN#74	R5-169612	3022	1	Introduction of ProSe Transmit Off power Test case 6.3.3D.1	14.0.0	14.1.0
2016-12	RAN#74	R5-169613	3060	1	Updates to ProSe Receiver TCs	14.0.0	14.1.0
2016-12	RAN#74	R5-169615	3013	1	Update of TC 6.6.3.2A.2	14.0.0	14.1.0
2016-12	RAN#74	R5-169616	3055	1	Corrections to TC 7.3A.6	14.0.0	14.1.0
2016-12	RAN#74	R5-169620	3008	1	update Annex A with 4Rx RMCs	14.0.0	14.1.0
2016-12	RAN#74	R5-169621	3011	1	Addition of new 4Rx Test Case – TDD PMI reporting	14.0.0	14.1.0
2016-12	RAN#74	R5-169622	3012	1	Addition of new 4Rx Test Case - TDD FDD CA SDR (2DL CA)	14.0.0	14.1.0
2016-12	RAN#74	R5-169623	3023	1	Introduction of 4Rx new test case “FDD sustained data rate performance 4X4”	14.0.0	14.1.0
2016-12	RAN#74	R5-169624	3024	1	Introduction of 4Rx new test case “TDD sustained data rate performance 4X4”	14.0.0	14.1.0
2016-12	RAN#74	R5-169625	3025	1	Introduction of new 4Rx test case 9.9.2.1.1	14.0.0	14.1.0
2016-12	RAN#74	R5-169626	3026	1	Introduction of new 4Rx test case 9.9.2.1.2	14.0.0	14.1.0
2016-12	RAN#74	R5-169627	3027	1	Introduction of new 4Rx test case 9.9.2.2.1	14.0.0	14.1.0
2016-12	RAN#74	R5-169628	3028	1	Introduction of new 4Rx test case 9.9.2.2.2	14.0.0	14.1.0
2016-12	RAN#74	R5-169629	3030	1	Update connection diagram for PCFICH/PDCCH performance with 4Rx antenna ports	14.0.0	14.1.0
2016-12	RAN#74	R5-169630	3031	1	Update to FDD PHICH Single-antenna Port Performance 1x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169631	3032	1	Update to FDD PHICH Transmit Diversity 2x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169632	3033	1	Update to FDD PHICH Transmit Diversity 4x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169633	3034	1	Update to TDD PHICH Single-antenna Port Performance 1x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169634	3035	1	Update to TDD PHICH Transmit Diversity 2x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169635	3036	1	Update to TDD PHICH Transmit Diversity 4x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169636	3046	1	Update Reference sensitivity for additional requirement and TC7.3_1 test requirement	14.0.0	14.1.0
2016-12	RAN#74	R5-169637	3054	1	Updates to 4 Layer Spatial Multiplexing TCs	14.0.0	14.1.0
2016-12	RAN#74	R5-169638	3110	1	Correction of FDD and TDD Open-loop spatial multiplexing TCs with 3 Layer Multiplexing with 4 Tx Antenna Ports	14.0.0	14.1.0
2016-12	RAN#74	R5-169639	3123	1	Correction to 4Rx demodulation tests	14.0.0	14.1.0
2016-12	RAN#74	R5-169640	3178	1	Introduction of FDD 4Rx PDSCH demodulation test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-169650	3065	1	Band 70 introduction to 36.521-1 receiver requirements	14.0.0	14.1.0
2016-12	RAN#74	R5-169652	3156	1	Introduction of Band 41 HPUE Maximum Output Power	14.0.0	14.1.0
2016-12	RAN#74	R5-169653	3157	1	Introduction of Band 41 HPUE Maximum Output Power for CA	14.0.0	14.1.0
2016-12	RAN#74	R5-169654	3158	1	Introduction of Band 41 HPUE Maximum Output Power for UL-MIMO	14.0.0	14.1.0
2016-12	RAN#74	R5-169655	3159	1	Introduction of Band 41 HPUE Maximum Power Reduction	14.0.0	14.1.0
2016-12	RAN#74	R5-169656	3168	1	Introduction of Power Class 2 in test case 6.2.5_1 Configured UE transmitted Output Power for HPUE	14.0.0	14.1.0
2016-12	RAN#74	R5-169657	3169	1	Addition of TDD RMC for UL-DL configuration 0	14.0.0	14.1.0
2016-12	RAN#74	R5-169659	3136	1	Correction of CQI Reporting under AWGN conditions - PUCCH 1-1 (Cell-Specific Reference Symbols) TC	14.0.0	14.1.0

2016-12	RAN#74	R5-169660	3059	1	Updates to SEM Test Case for category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169662	3106	1	Correction to EPDCCH SDR tests	14.0.0	14.1.0
2016-12	RAN#74	R5-169665	3122	1	Corrections to 256QAM sustained data rate performance test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-169666	3082	1	Introduction of Rel-13 CA new test case “TDD Sustained data rate performance for CA (4DL CA)”	14.0.0	14.1.0
2016-12	RAN#74	R5-169667	3114	1	New CA band combinations CA_1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of 6.2.4A Additional Maximum Power Reduction (A-MPR)	14.0.0	14.1.0
2016-12	RAN#74	R5-169668	3116	1	New CA band combinations CA_1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of 6.6.2.2A Additional Spectrum Emission Mask	14.0.0	14.1.0
2016-12	RAN#74	R5-169669	3119	1	New CA band combinations CA_1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of 6.6.3.3A Additional spurious emissions	14.0.0	14.1.0
2016-12	RAN#74	R5-169671	3220	1	Addition of CA band combinations into TC 7.3A.9	14.0.0	14.1.0
2016-12	RAN#74	R5-169672	3221	1	Update of 4DL CA RX Test Cases	14.0.0	14.1.0
2016-12	RAN#74	R5-169675	3203	1	Addition of new case FDD RI Reporting- PUCCH 1-1 4x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169676	3204	1	Addition of new case TDD RI Reporting- PUSCH 3-1 4x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169677	3206	1	Addition of new case FDD RI Reporting- PUCCH 1-1 for eDL-MIMO 1x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169678	3207	1	Addition of new case TDD RI Reporting- PUCCH 1-1 for eDL-MIMO 1x4	14.0.0	14.1.0
2016-12	RAN#74	R5-169681	3160	1	Update some receiver test cases to add LAA band combinations	14.0.0	14.1.0
2016-12	RAN#74	R5-169682	3202	1	Update test case 7.8.1A.3 to add LAA band combinations	14.0.0	14.1.0
2016-12	RAN#74	R5-169683	3044	1	Updated to RF test case 6.3.4F.1 for Category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169684	3045	1	Introduction of new NB-IoT RF test case 6.3.4F.2 for category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169686	3075	1	Update to test case 7.7F Spurious response for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169687	3088	1	Updates of the TC 6.6.3F.2 Spurious emission band UE co-existence for category NB1 UE	14.0.0	14.1.0
2016-12	RAN#74	R5-169688	3098	1	Supplementation of test case 6.6.2.3F for ACLR for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169689	3100	1	Update of test case 6.6.1F Occupied bandwidth for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169690	3101	1	Update of test case 6.6.2.1F Spectrum Emission Mask for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169691	3102	1	Update of test case 6.5.2.3F In-band emissions for non allocated RB for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169692	3124	1	Update Adjacent Channel Selectivity (ACS) for UE category NB1 test case 7.5F	14.0.0	14.1.0
2016-12	RAN#74	R5-169693	3176	1	Updates in test case 6.2.3F, Maximum Power Reduction (MPR) for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169694	3225	1	Update of Test Case 6.5.1F Frequency Error for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169696	3017	1	6.5.2.1F.1 Error Vector Magnitude (EVM) for NB-IoT	14.0.0	14.1.0

2016-12	RAN#74	R5-169697	3018	1	6.5.2.2F Carrier leakage for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169699	2996	1	Updates to HD-FDD scheduling pattern for cat M1 RMCs in annex A	14.0.0	14.1.0
2016-12	RAN#74	R5-169700	2998	1	Update test case: 8.11.1.1.1, FDD Closed-loop spatial multiplexing performance for UE category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169701	2999	1	New test case: 8.11.1.1.2, FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169702	3000	1	New test cases: 8.11.1.1.3, FDD PDSCH Transmit Diversity 2x1 for UE category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169703	3001	1	New test case: 8.11.1.2.1, TDD Closed-loop spatial multiplexing performance for UE category M1 (Cell-Specific Reference Symbols)	14.0.0	14.1.0
2016-12	RAN#74	R5-169704	3002	1	New test case: 8.11.1.2.2, TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169705	3003	1	New test case: 8.11.1.2.3, TDD PDSCH Transmit Diversity for UE category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169706	3005	1	Updating eMTC test case 9.8.1.1, FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category M1	14.0.0	14.1.0
2016-12	RAN#74	R5-169707	3004	1	New test case: 8.11.1.2.3_1, TDD PDSCH Transmit Diversity for UE category M1 (CEModeB)	14.0.0	14.1.0
2016-12	RAN#74	R5-169713	3131	1	Correction to PCC SCC frequency mapping for CA_66A-66A	14.0.0	14.1.0
2016-12	RAN#74	R5-169715	3132	1	Correction of UL RMC for sustained data rate CA test cases	14.0.0	14.1.0
2016-12	RAN#74	R5-169716	3162	1	Update test procedure 9.2.1.5_E.1 and 9.2.1.6_E.1 test cases to align it with minimum conformance requirements	14.0.0	14.1.0
2016-12	RAN#74	R5-169719	3081	1	Introduction of Rel-13 CA new test case “FDD Sustained data rate performance for CA (5DL CA)”	14.0.0	14.1.0
2016-12	RAN#74	R5-169720	3083	1	Introduction of Rel-13 CA new test case “FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (5DL CA)”	14.0.0	14.1.0
2016-12	RAN#74	R5-169721	3104	1	Introduction of new TC 8.2.2.1.1_A.3 4DL CA	14.0.0	14.1.0
2016-12	RAN#74	R5-169722	3222	1	New TC: FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for 5DL CA	14.0.0	14.1.0
2016-12	RAN#74	R5-169723	3223	1	New TCs: TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for 4DL CA	14.0.0	14.1.0
2016-12	RAN#74	R5-169730	3121	2	Correction to test points for test cases refer to 6.2.3A	14.0.0	14.1.0
2016-12	RAN#74	R5-169732	3073	2	Update to test case 6.3.5F.1 Power Control Absolute power tolerance for UE category NB1	14.0.0	14.1.0
2016-12	RAN#74	R5-169735	3166	2	Update test requirements for test case 6.6.3.2A.1	14.0.0	14.1.0
2017-03	RAN#75	R5-170604	3238	-	Update 4Rx test cases 9.9.4.1.1/9.9.4.1.2/9.9.4.2.1/9.9.4.2.2	14.1.0	14.2.0
2017-03	RAN#75	R5-170606	3239	-	Update 4Rx test cases 9.9.4.1.1/9.9.4.1.2/9.9.4.2.1/9.9.4.2.2 information in Annex F and G.	14.1.0	14.2.0
2017-03	RAN#75	R5-170627	3249	-	Resubmission of R5-170017 Update of editor's note in NB-IoT receiver RF tests related to scheduling pattern issue	14.1.0	14.2.0
2017-03	RAN#75	R5-170630	3250	-	Resubmission of R5-170073 Update of editor's note in NB-IoT transmitter RF tests related to scheduling pattern issue	14.1.0	14.2.0
2017-03	RAN#75	R5-170631	3251	-	Resubmission of R5-170074 Update of test parameters for NPDCCH tests	14.1.0	14.2.0

2017-03	RAN#75	R5-170632	3252	-	Resubmission of R5-170328 New TC 6.3.5F.3 Aggregate power control tolerance for category NB1	14.1.0	14.2.0
2017-03	RAN#75	R5-170633	3253	-	Resubmission of R5-170333 Introduction of RMCs for NB-IoT demodulation tests	14.1.0	14.2.0
2017-03	RAN#75	R5-170641	3258	-	Update of TC 6.6.2.3_1 Adjacent Channel Leakage power Ratio for HPUE	14.1.0	14.2.0
2017-03	RAN#75	R5-170694	3269	-	Updates of the CQI reporting TC 9.6.1.4.2 for TDD FDD CA	14.1.0	14.2.0
2017-03	RAN#75	R5-170750	3273	-	Correction of typos in test cases 6.3.5.1, 6.3.5A.1.1, 6.3.5A.1.2, 6.3.5A.1.3, 6.3.5B.1, 6.3.5E.1 and 6.3.5EA.1	14.1.0	14.2.0
2017-03	RAN#75	R5-170751	3274	-	Update to test cases 6.5.1D.1 and 6.5.1D.2 Frequency error for ProSe	14.1.0	14.2.0
2017-03	RAN#75	R5-170757	3276	-	Uncertainties and Test Tolerances update to FDD and TDD CQI Reporting under fading conditions - PUCCH 1-0 - Enhanced Performance Requirement Type A 1x4	14.1.0	14.2.0
2017-03	RAN#75	R5-170758	3277	-	Uncertainties and test tolerances update to FDD and TDD CQI Reporting under fading conditions - PUCCH 1-1 - Enhanced Performance Requirement Type A 2x4	14.1.0	14.2.0
2017-03	RAN#75	R5-170760	3278	-	Update of test cases 8.7.9 and 8.7.10	14.1.0	14.2.0
2017-03	RAN#75	R5-170762	3279	-	Update of test cases 8.7.1.1_A.5, 8.7.2.1_A.3 and 9.6.1.1_A.4	14.1.0	14.2.0
2017-03	RAN#75	R5-170774	3280	-	Beamforming model missing in chapter 9 TM9 receiver type A tests	14.1.0	14.2.0
2017-03	RAN#75	R5-170806	3287	-	Correction of number of EREGs per ECCE for special subframe mentioned in TC 8.7.4	14.1.0	14.2.0
2017-03	RAN#75	R5-170811	3291	-	Correction of description of TC 8.2.2.4.2_1 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 (Release 9 and Forward)	14.1.0	14.2.0
2017-03	RAN#75	R5-170813	3292	-	Introduction of Minimum Test time for R.73 TDD	14.1.0	14.2.0
2017-03	RAN#75	R5-170814	3293	-	Update of Mapping of CQI Index to Modulation Coding Scheme	14.1.0	14.2.0
2017-03	RAN#75	R5-170816	3295	-	Correction of release of TC Error Vector Magnitude (EVM) for CA (inter-band DL CA and UL CA) for UL 64QAM	14.1.0	14.2.0
2017-03	RAN#75	R5-170823	3296	-	Removal of the power class restriction in the test applicability for Test Cases 6.2.2A.1 and 6.2.2A.2	14.1.0	14.2.0
2017-03	RAN#75	R5-170894	3304	-	Correction to feICIC CQI TCs	14.1.0	14.2.0
2017-03	RAN#75	R5-170895	3305	-	Annex E: Updates for NB-IoT	14.1.0	14.2.0
2017-03	RAN#75	R5-170896	3306	-	Annex E: Update to averaged EVM for D2D	14.1.0	14.2.0
2017-03	RAN#75	R5-170897	3307	-	Update of requirements in TC 6.2.2A.2 for CA_2A-5A and CA_2A-12A	14.1.0	14.2.0
2017-03	RAN#75	R5-170905	3310	-	Re-addition of Band 41 HPUE Maximum Output Power	14.1.0	14.2.0
2017-03	RAN#75	R5-170908	3312	-	Update of TC 6.6.3.3A.2 for CA_2A-5A and CA_2A-12A	14.1.0	14.2.0
2017-03	RAN#75	R5-170909	3313	-	Update of TC 6.6.2.2A.2 for CA_2A-5A and CA_2A-12A	14.1.0	14.2.0
2017-03	RAN#75	R5-170910	3314	-	Update of TC 6.6.2.2A.2_1 for CA_2A-5A and CA_2A-12A	14.1.0	14.2.0
2017-03	RAN#75	R5-170911	3315	-	Correction of RB allocation in TC 6.2.5A.3	14.1.0	14.2.0
2017-03	RAN#75	R5-170912	3316	-	Correction of RB allocation in TC 6.6.2.1A.2	14.1.0	14.2.0
2017-03	RAN#75	R5-170914	3317	-	Corrected test requirements for TC 6.2.3A.2_1	14.1.0	14.2.0
2017-03	RAN#75	R5-170915	3318	-	Correction to configuration table in TC 6.7A.2	14.1.0	14.2.0

2017-03	RAN#75	R5-170919	3321	-	Update of applicability for 4Rx CQI reporting under AWGN tests	14.1.0	14.2.0
2017-03	RAN#75	R5-170949	3324	-	Addition of CA_2A-66A and CA_5A-66A in TS 36.521-1	14.1.0	14.2.0
2017-03	RAN#75	R5-170957	3326	-	Update to test case 7.6.1F In-band blocking for category NB1	14.1.0	14.2.0
2017-03	RAN#75	R5-170958	3327	-	Update to test case 7.6.2F Out-of-band blocking for category NB1	14.1.0	14.2.0
2017-03	RAN#75	R5-170996	3332	-	New CA band combinations CA_1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of 7.3A.6 REFSENS	14.1.0	14.2.0
2017-03	RAN#75	R5-171006	3334	-	Update test configuration and requirement for CA_8B in clause 6	14.1.0	14.2.0
2017-03	RAN#75	R5-171010	3336	-	Update RF general section for V2X information	14.1.0	14.2.0
2017-03	RAN#75	R5-171040	3347	-	Update of test tolerance of 4-Rx TDD Type A demod test cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171085	3353	-	Addition of applicability and test rules for CA UE demodulation tests with 4DL and 5DL CCs	14.1.0	14.2.0
2017-03	RAN#75	R5-171092	3360	-	Addition of CA configuration CA_4A-5A-29A for Refsens test	14.1.0	14.2.0
2017-03	RAN#75	R5-171094	3362	-	Addition of CA configuration CA_20A-31A for Refsens test	14.1.0	14.2.0
2017-03	RAN#75	R5-171095	3363	-	Addition of CA configuration CA_7A-42A and CA_28A-40A for Refsens test	14.1.0	14.2.0
2017-03	RAN#75	R5-171097	3365	-	Addition of for CA_20A-42A and CA_20A-42A-42A Refsens test	14.1.0	14.2.0
2017-03	RAN#75	R5-171098	3366	-	Addition of for CA_40C Set 1 Refsens test	14.1.0	14.2.0
2017-03	RAN#75	R5-171153	3368	-	Update receiver test cases to remove DCI format 1C	14.1.0	14.2.0
2017-03	RAN#75	R5-171161	3369	-	Editorial correction in reference clause numbering for TC 6.3.4A.1.1	14.1.0	14.2.0
2017-03	RAN#75	R5-171162	3370	-	Update test configuration table and requirement for CA_8B in clause 7	14.1.0	14.2.0
2017-03	RAN#75	R5-171165	3371	-	Addition of 7.4A.3_H and 7.4A.4_H to Annex F	14.1.0	14.2.0
2017-03	RAN#75	R5-171167	3373	-	Clean up on clause 7 256QAM test cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171178	3382	-	Addition of Downlink Reference measurement channel for Cat-M1 TX characteristics	14.1.0	14.2.0
2017-03	RAN#75	R5-171182	3383	-	Clean up on Tx test cases for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171183	3384	-	Correction to general and additional Tx spurious for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171184	3385	-	Correction to HD-FDD PDSCH scheduling pattern for UE category M1 RMC	14.1.0	14.2.0
2017-03	RAN#75	R5-171185	3386	-	Correction to PUSCH-EVM with exclusion period for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171186	3387	-	Correction to Power control test cases for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171187	3388	-	Correction to ON/OFF time mask for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171188	3389	-	Clarification of test requirement for test cases 6.2.2A.1, 6.2.4A.1 and 6.2.4A.1_1	14.1.0	14.2.0
2017-03	RAN#75	R5-171190	3391	-	Correction to additional spurious emissions test	14.1.0	14.2.0
2017-03	RAN#75	R5-171191	3392	-	Correction to test procedure for test case 7.9A	14.1.0	14.2.0
2017-03	RAN#75	R5-171201	3396	-	Editorial correction in test case 6.3.5A.2.2	14.1.0	14.2.0

2017-03	RAN#75	R5-171202	3397	-	Alignment frequency ranges in TC 6.6.3.1A.2 for CA_3A-26A and CA_5A-17A to TR 36.905	14.1.0	14.2.0
2017-03	RAN#75	R5-171203	3398	-	Correction in configuration IDs for NS_24 in test cases 6.2.4_2 and 6.6.3.3_1	14.1.0	14.2.0
2017-03	RAN#75	R5-171226	3401	-	Update of Annex C to include 4 antenna ports in UE	14.1.0	14.2.0
2017-03	RAN#75	R5-171227	3402	-	Adding support for 4 Rx antenna port UEs in Receiver test cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171234	3406	-	Update of Reference Sensitivity test case for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171237	3409	-	Correction to test case 7.3F.2, Reference sensitivity level with repetitions for category NB1	14.1.0	14.2.0
2017-03	RAN#75	R5-171238	3410	-	Correction to test case header in 8.11.1.1.1, 8.11.1.1.2, 8.11.1.1.3 and 8.11.1.1.3_1	14.1.0	14.2.0
2017-03	RAN#75	R5-171247	3419	-	Update of Frequency error test case for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171315	3435	-	Clean up in test case 6.6.2.1A.2 to remove additional spectrum emission requirements	14.1.0	14.2.0
2017-03	RAN#75	R5-171349	3437	-	Correction to NS_24 and NS_25 test configurations to align use of Ful	14.1.0	14.2.0
2017-03	RAN#75	R5-171514	3439	-	Update TT of the TC 8.2.3.1.1.3 TDD FDD CA PDSCH Single Antenna Performance for FDD PCell(4DL CA)	14.1.0	14.2.0
2017-03	RAN#75	R5-171700	3248	1	Clean up editor's note for UL 64QAM	14.1.0	14.2.0
2017-03	RAN#75	R5-171701	3390	1	Correction to UL CA Tx tests	14.1.0	14.2.0
2017-03	RAN#75	R5-171707	3230	1	Updates of 7.3A Refsens for CA_1C-3A	14.1.0	14.2.0
2017-03	RAN#75	R5-171708	3297	1	Introduction of CA_3A-11A to section 7	14.1.0	14.2.0
2017-03	RAN#75	R5-171709	3298	1	Introduction of CA_8A-28A to section 7	14.1.0	14.2.0
2017-03	RAN#75	R5-171711	3300	1	Introduction of 3DL/1UL of CA_1A-8A-28A to section 7	14.1.0	14.2.0
2017-03	RAN#75	R5-171714	3301	1	Introduction of 3DL/1UL of CA_3A-8A-28A to section 7	14.1.0	14.2.0
2017-03	RAN#75	R5-171717	3302	1	Introduction of 3DL/1UL of CA_3A-28A-41A to section 7	14.1.0	14.2.0
2017-03	RAN#75	R5-171719	3438	1	CA_29A-66A, CA_29A-66A-66A, CA_29A-66C, CA_46A-66A Reference Sensitivity requirements	14.1.0	14.2.0
2017-03	RAN#75	R5-171725	3330	1	Updates of 6.6.3.2 Spurious emission band UE co-existence for Band 5	14.1.0	14.2.0
2017-03	RAN#75	R5-171733	3322	1	LAA: Applicability and test selection update to Section 8	14.1.0	14.2.0
2017-03	RAN#75	R5-171734	3270	1	Annexure update for LAA RF	14.1.0	14.2.0
2017-03	RAN#75	R5-171735	3328	1	Update of test case 7.6.1A.3	14.1.0	14.2.0
2017-03	RAN#75	R5-171736	3367	1	Update test case 7.5A.3 to add LAA band combinations	14.1.0	14.2.0
2017-03	RAN#75	R5-171748	3404	1	Test tolerance for NAICS demod test cases with CRS interference	14.1.0	14.2.0
2017-03	RAN#75	R5-171752	3329	1	Updates to test tolerances and test uncertainty for 4Rx TCs	14.1.0	14.2.0
2017-03	RAN#75	R5-171753	3271	1	LAA Uncertainties and Test Tolerances for Test Case 7.8.1A.3 Intermodulation for CA, inter band DL CA	14.1.0	14.2.0
2017-03	RAN#75	R5-171754	3320	1	LAA: Test case and test tolerance addition for Dual Layer DM-RS demod	14.1.0	14.2.0
2017-03	RAN#75	R5-171787	3265	1	Update to MPDCCH demod test cases in CE Mode A	14.1.0	14.2.0

2017-03	RAN#75	R5-171788	3289	1	Correction of DCI format in MTCe2 TCs and PDSCH and MPDCCH configuration	14.1.0	14.2.0
2017-03	RAN#75	R5-171790	3378	1	Clean up on TRx TCs for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171791	3379	1	Correction to Carrier leakage and In-band emissions for Cat-M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171792	3380	1	Correction to Carrier leakage and In-band emissions	14.1.0	14.2.0
2017-03	RAN#75	R5-171793	3412	1	New eMTC test case 9.8.2.1, FDD and half-duplex FDD UE-selected subband CQI for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171794	3414	1	New eMTC test case 9.8.2.2, TDD UE-selected subband CQI for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171795	3416	1	New eMTC test case 9.8.1.2, TDD CQI reporting definition under AWGN conditions for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171796	3408	1	Correction to test case 9.8.1.1, FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171813	3266	1	Introduction of FDD and Half-Duplex FDD Demodulation of MPDCCH in CE Mode B Test Case	14.1.0	14.2.0
2017-03	RAN#75	R5-171814	3267	1	Introduction of TDD Demodulation of MPDCCH in CE Mode B Test Case	14.1.0	14.2.0
2017-03	RAN#75	R5-171817	3235	1	Addition of bandwidth combinations 10+5+10MHz and 20+10+5+10MHz in Chapter 8 FDD 3CA and 4CA test cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171818	3237	1	Addition of bandwidth combinations 10+10+ 5MHz and 20+10+10+5MHz in TC 9.6.1.1_A.2 and 9.6.1.1_A.3	14.1.0	14.2.0
2017-03	RAN#75	R5-171819	3240	1	Addition of CA_2A-5A-12B test configuration and reference sensitivity in TC 7.3A.9.	14.1.0	14.2.0
2017-03	RAN#75	R5-171821	3233	1	Addition of CA_1A-3A-28A in 36.521-1	14.1.0	14.2.0
2017-03	RAN#75	R5-171823	3241	1	Addition of CA_2A-4A-30A test configuration and reference sensitivity in TC 7.3A.5.	14.1.0	14.2.0
2017-03	RAN#75	R5-171825	3243	1	Addition of CA_2A-4A-12A-30A test configuration and reference sensitivity in TC 7.3A.9.	14.1.0	14.2.0
2017-03	RAN#75	R5-171829	3242	1	Addition of CA_5A-12B test configuration and reference sensitivity in TC 7.3A.5.	14.1.0	14.2.0
2017-03	RAN#75	R5-171832	3260	1	Addition of CA_2A-4A-5A-12A test configuration and reference sensitivity in TC 7.3A.9	14.1.0	14.2.0
2017-03	RAN#75	R5-171834	3261	1	Addition of CA_2C-12A-30A test configuration and reference sensitivity in TC 7.3A.9	14.1.0	14.2.0
2017-03	RAN#75	R5-171837	3263	1	Addition of CA_2C-30A test configuration and reference sensitivity in TC 7.3A.5	14.1.0	14.2.0
2017-03	RAN#75	R5-171838	3255	1	Addition of CA_2A-2A-4A-5A in subclause 7.3A.9 of 36.521-1	14.1.0	14.2.0
2017-03	RAN#75	R5-171839	3256	1	Addition of CA_2A-2A-5A-12A in subclause 7.3A.9 of 36.521-1	14.1.0	14.2.0
2017-03	RAN#75	R5-171840	3257	1	Addition of CA_2A-2A-12B in subclause 7.3A.9 of 36.521-1	14.1.0	14.2.0
2017-03	RAN#75	R5-171842	3308	1	Update of TC 6.2.4A.2 for CA_2A-5A and CA_2A-12A	14.1.0	14.2.0
2017-03	RAN#75	R5-171844	3331	1	CA band combinations 1A-18A, 1A-26A, 1A-28A, 1A-42A and 18A-28A - Updates of 6.6.3.2A Spurious emission band UE co-existence	14.1.0	14.2.0
2017-03	RAN#75	R5-171846	3309	1	Update of TC 6.2.4A.2_1 for CA_2A-5A and CA_2A-12A	14.1.0	14.2.0
2017-03	RAN#75	R5-171847	3311	1	New test points in transmit modulation tests for CA_2A-5A and CA_2A-12A	14.1.0	14.2.0

2017-03	RAN#75	R5-171848	3426	1	Update of 4DL CA Test Cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171851	3341	1	Addition of the new TC 8.2.3.1.1.4 TDD FDD CA PDSCH Single Antenna Performance for FDD PCell(5DL CA)	14.1.0	14.2.0
2017-03	RAN#75	R5-171852	3351	1	Addition of the new TC 8.7.5.1_H.4 TDD FDD CA Sustained data rate performance for FDD PCell (5DL CA) for 256QAM in DL	14.1.0	14.2.0
2017-03	RAN#75	R5-171853	3375	1	Clean up on clause 7 CA test cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171860	3433	1	Correction to Rel 13 CA_5A-5A RF Test Cases Section 7	14.1.0	14.2.0
2017-03	RAN#75	R5-171861	3358	1	Addition of CA configuration CA_3A-40C, CA_3A-41C, CA_28A-40C for Refsens test	14.1.0	14.2.0
2017-03	RAN#75	R5-171862	3359	1	Addition of CA configuration CA_4A-28A for Refsens test	14.1.0	14.2.0
2017-03	RAN#75	R5-171863	3361	1	Addition of CA configuration CA_7A-42A-42A for Refsens test	14.1.0	14.2.0
2017-03	RAN#75	R5-171864	3342	1	Addition of the new TC 8.2.3.1.2.3 TDD FDD CA PDSCH Single Antenna Performance for TDD PCell(4DL CA)	14.1.0	14.2.0
2017-03	RAN#75	R5-171865	3343	1	Addition of the new TC 8.2.3.1.2.4 TDD FDD CA PDSCH Single Antenna Performance for TDD PCell(5DL CA)	14.1.0	14.2.0
2017-03	RAN#75	R5-171866	3344	1	Addition of the new TC 8.2.2.3.1_A.3 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (4DL CA)	14.1.0	14.2.0
2017-03	RAN#75	R5-171867	3354	1	Addition of for FDD PDSCH Single Antenna Port Performance for CA (4DL CA) (8.2.1.1.1_A.4)	14.1.0	14.2.0
2017-03	RAN#75	R5-171868	3355	1	Addition of for FDD PDSCH Single Antenna Port Performance for CA (5DL CA) (8.2.1.1.1_A.5)	14.1.0	14.2.0
2017-03	RAN#75	R5-171869	3356	1	Addition of for FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (4DL CA) (8.2.1.3.1_A.3)	14.1.0	14.2.0
2017-03	RAN#75	R5-171870	3357	1	Addition of for FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (5DL CA) (8.2.1.3.1_A.4)	14.1.0	14.2.0
2017-03	RAN#75	R5-171871	3372	1	Clarification of test points for sustained data rate test	14.1.0	14.2.0
2017-03	RAN#75	R5-171872	3400	1	Introduction of new Dual Connectivity test cases - Power Control Relative power tolerance	14.1.0	14.2.0
2017-03	RAN#75	R5-171875	3282	1	Addition of Band 47 for UE maximum output power for V2X Communication	14.1.0	14.2.0
2017-03	RAN#75	R5-171876	3284	1	Introduction of UE maximum output power with additional requirements for V2X Communication	14.1.0	14.2.0
2017-03	RAN#75	R5-171877	3285	1	Introduction of 6.2.5G Configured transmitted power for V2X Communication	14.1.0	14.2.0
2017-03	RAN#75	R5-171878	3286	1	Introduction of 6.3.4G.1 General ON/OFF time mask for V2X Communication	14.1.0	14.2.0
2017-03	RAN#75	R5-171879	3337	1	Add Operating bands, channel bandwidth and RMC for V2X	14.1.0	14.2.0
2017-03	RAN#75	R5-171880	3427	1	Introduction of Reference sensitivity level for V2X	14.1.0	14.2.0
2017-03	RAN#75	R5-171881	3428	1	Introduction of Maximum input level for V2X	14.1.0	14.2.0
2017-03	RAN#75	R5-171882	3429	1	Introduction of Adjacent Channel Selectivity (ACS) for V2X	14.1.0	14.2.0
2017-03	RAN#75	R5-171883	3430	1	Introduction of In-band blocking for V2X	14.1.0	14.2.0
2017-03	RAN#75	R5-171884	3431	1	Introduction of Out-of-band blocking for V2X	14.1.0	14.2.0
2017-03	RAN#75	R5-171885	3432	1	Introduction of Spurious response for V2X	14.1.0	14.2.0
2017-03	RAN#75	R5-171887	3288	1	Correction of payload in fixed reference channel for CDM-multiplexed DM RS with four CSI-RS antenna ports	14.1.0	14.2.0

2017-03	RAN#75	R5-171888	3350	1	Updates to legacy CSI test cases to include 4Rx UE	14.1.0	14.2.0
2017-03	RAN#75	R5-171889	3376	1	Correction to 3 or 4 layers 4Rx demodulation tests	14.1.0	14.2.0
2017-03	RAN#75	R5-171890	3403	1	Introduction of TDD 4Rx PDSCH demodulation test cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171896	3303	1	Power Class 2: Update to A-MPR for NS_04	14.1.0	14.2.0
2017-03	RAN#75	R5-171897	3268	1	Updates of the SDR TC 8.7.5.2.2 and 8.7.5.2_H.2 for TDD FDD CA	14.1.0	14.2.0
2017-03	RAN#75	R5-171898	3425	1	Update of test configuration table of 4DL CA	14.1.0	14.2.0
2017-03	RAN#75	R5-171916	3236	1	TDD FDD CA Sustained data rate performance for TDD PCell (4DL CA)	14.1.0	14.2.0
2017-03	RAN#75	R5-171917	3424	1	Update of test configuration table of 3DL CA	14.1.0	14.2.0
2017-03	RAN#75	R5-171918	3281	1	Introduction to Performance test case 8.7.5.1.4 TDD FDD CA Sustained data rate performance for FDD PCell (5DL CA)	14.1.0	14.2.0
2017-03	RAN#75	R5-171919	3345	1	Introduction of LAA Closed-Loop spatial multiplexing performance test cases for 4Tx antenna ports	14.1.0	14.2.0
2017-03	RAN#75	R5-171921	3348	1	Test Tolerance updates to CQI reporting with enhanced receiver typeB test case	14.1.0	14.2.0
2017-03	RAN#75	R5-171922	3246	1	Update of NPDCCH single-antenna demodulation test	14.1.0	14.2.0
2017-03	RAN#75	R5-171923	3247	1	Update of NPDSCH demodulation test in standalone and Guard-band	14.1.0	14.2.0
2017-03	RAN#75	R5-171924	3339	1	Updates to In-band mode NPDSCH and NPDCCH Demodulation Performance tests for category NB1	14.1.0	14.2.0
2017-03	RAN#75	R5-171932	3381	1	Correction to PDSCH demodulation test cases for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171934	3299	1	Introduction of CA_11A-28A to section 7	14.1.0	14.2.0
2017-03	RAN#75	R5-171936	3283	1	Introduction of UE maximum output power for modulation / channel bandwidth for V2X Communication	14.1.0	14.2.0
2017-03	RAN#75	R5-171937	3231	1	Update TS 36.521-1 with Addition of LTE Band 48	14.1.0	14.2.0
2017-03	RAN#75	R5-171938	3399	1	Addition configuration IDs to test case 6.2.3A.1_1 for CA configuration 10+20 MHz	14.1.0	14.2.0
2017-03	RAN#75	R5-171940	3393	1	Correction to TDD FDD 2CA Soft buffer test cases	14.1.0	14.2.0
2017-03	RAN#75	R5-171941	3352	1	Add minimum testing time in Annex G for SCE performance requirements	14.1.0	14.2.0
2017-03	RAN#75	R5-171942	3349	1	Updates to legacy demod test cases to include 4Rx UE	14.1.0	14.2.0
2017-03	RAN#75	R5-171945	3440	-	Band 41 HPUE Maximum Output Power	14.1.0	14.2.0
2017-03	RAN#75	R5-171946	3441	-	Adjacent Channel Leakage power Ratio for HPUE	14.1.0	14.2.0
2017-03	RAN#75	R5-171949	3442	1	Update of RMCs for NB-IoT RF tests	14.1.0	14.2.0
2017-03	RAN#75	R5-171963	3275	2	Update to test case 6.3.5F.2 Power Control Relative power tolerance for UE category NB1	14.1.0	14.2.0
2017-03	RAN#75	R5-171967	3377	2	Correction to Aggregate power control tolerance for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171968	3417	2	Update of RMCs for UE category M1 in Annex A	14.1.0	14.2.0
2017-03	RAN#75	R5-171969	3420	2	Minimum requirements updates in section 8.11 test case for UE category M1	14.1.0	14.2.0
2017-03	RAN#75	R5-171997	3405	2	Introduction of LAA PDCCH/PCFICH demodulation test case with FDD Pcell	14.1.0	14.2.0

2017-06	RAN#76	R5-172116	3447		NB-IoT bands 11, 25, 31, and 70 introduction to receiver requirements	14.2.0	14.3.0
2017-06	RAN#76	R5-172142	3450		Uncertainties and Test Tolerances for new LAA Test Cases - CQI reporting / PUSCH 3-1	14.2.0	14.3.0
2017-06	RAN#76	R5-172196	3457		Correction to typos in UL-MIMO test cases 6.3.2B	14.2.0	14.3.0
2017-06	RAN#76	R5-172198	3458		Clarification to measurement of SEM in test procedure of TC 6.6.2.1A.2	14.2.0	14.3.0
2017-06	RAN#76	R5-172199	3459		Introduction of switched case for inter-band CA transmit modulation test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-172200	3460		Introduction of switched case for TC 6.5.2A.1.2_1	14.2.0	14.3.0
2017-06	RAN#76	R5-172201	3461		Update of test requirements in TC 7.3A.3 for missing CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-172203	3463		Update of TC 7.3_1 to align with minimum conformance requirements	14.2.0	14.3.0
2017-06	RAN#76	R5-172206	3464		Update of TC 6.6.2.2A.2 for CA_2A-5A and CA_2A-12A	14.2.0	14.3.0
2017-06	RAN#76	R5-172207	3465		Update of TC 6.6.3.3A.2 for CA_2A-5A and CA_2A-12A	14.2.0	14.3.0
2017-06	RAN#76	R5-172214	3467		Remove content of SDR test cases for 4Rx	14.2.0	14.3.0
2017-06	RAN#76	R5-172216	3468		Update of requirements in TC 6.2.2A.2 for new Rel-14 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-172219	3471		Update of test requirements in TC 6.6.3.1A.2 for new Rel-14 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-172221	3473		Update of initial conditions in TC 6.6.3.3A.2 for new Rel-14 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-172224	3476		Update of test requirements in TC 7.3A.6 for new Rel-14 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-172255	3477		Update of the TC about TDD FDD CA Sustained data rate performance	14.2.0	14.3.0
2017-06	RAN#76	R5-172260	3478		Update of the TC 7.3A.5 REFSENS for 3DL CA (CA_1A-19A-42A, 1A-21A-42A, 19A-21A-42A)	14.2.0	14.3.0
2017-06	RAN#76	R5-172307	3488		Update to the Dual Connectivity performance test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-172345	3494		Alignment of Fixed Reference Channel two antenna ports for UE category M1 to TS 36.101	14.2.0	14.3.0
2017-06	RAN#76	R5-172347	3495		Invalid csi-ReportMode-r10 in message exceptions of CSI reporting for 4Rx UE TC	14.2.0	14.3.0
2017-06	RAN#76	R5-172350	3498		Correction of UL RMC for 5+10+10 MHz test step in TC 8.7.1.1_A.2	14.2.0	14.3.0
2017-06	RAN#76	R5-172351	3499		Editorial correction of references to tables in clause UE category M1 TCs	14.2.0	14.3.0
2017-06	RAN#76	R5-172352	3500		Editorial correction of test case heading	14.2.0	14.3.0
2017-06	RAN#76	R5-172353	3501		Removal of duplicate Test step in TC 8.2.3.1.2.3	14.2.0	14.3.0
2017-06	RAN#76	R5-172359	3504		Update to chapter 8 & 9 PCC/SCC frequency mapping	14.2.0	14.3.0
2017-06	RAN#76	R5-172360	3505		Editorial update to Annex G for DL 256QAM	14.2.0	14.3.0
2017-06	RAN#76	R5-172362	3506		New eMTC test case 6.5.1EA_1, Frequency Error for UE category M1 (CE Mode B)	14.2.0	14.3.0
2017-06	RAN#76	R5-172374	3516		Align CA capability definitions for demodulation test cases in sub-clause 8.1.2.2 with TS 36.101 v14.3.0	14.2.0	14.3.0

2017-06	RAN#76	R5-172375	3517		Align CA delta RIB in sub-clause 7.3.3 with TS 36.101 v14.3.0	14.2.0	14.3.0
2017-06	RAN#76	R5-172376	3518		Align CA delta TIB in sub-clause 6.2.5.3 with TS 36.101 v14.3.0	14.2.0	14.3.0
2017-06	RAN#76	R5-172377	3519		Align CA minimum requirements for reference sensitivity in sub-clause 7.3A.0 with TS 36.101 v14.3.0	14.2.0	14.3.0
2017-06	RAN#76	R5-172392	3521		Updated to NB-IoT RF tests cases	14.2.0	14.3.0
2017-06	RAN#76	R5-172397	3524		Updated to Table of E-UTRA channel numbers for SDL Band 69	14.2.0	14.3.0
2017-06	RAN#76	R5-172422	3526		Resubmission to update Annex F for test case 7.5A.3 to add LAA band combinations	14.2.0	14.3.0
2017-06	RAN#76	R5-172431	3528		Correction of codebookSubsetRestriction in test case 9.9.1.3.2	14.2.0	14.3.0
2017-06	RAN#76	R5-172433	3529		Updates to FDD and half-duplex FDD demodulation of MPDCCH in CE Mode A and TDD demodulation of MPDCCH in CE Mode A	14.2.0	14.3.0
2017-06	RAN#76	R5-172463	3540		Addition of Annex F for TDD FDD CA PDSCH Open Loop Multiplexing 2x2 Performance Test cases (4 & 5DL CA)	14.2.0	14.3.0
2017-06	RAN#76	R5-172487	3544		Change of UE target power configuration for Carrier leakage and In-band emissions tests	14.2.0	14.3.0
2017-06	RAN#76	R5-172527	3551		Introduction of CA_8A-11A-28A to section 7	14.2.0	14.3.0
2017-06	RAN#76	R5-172602	3578		Addition of Annex G.3A.5 and G.3A.6 for 4DL CA test cases.	14.2.0	14.3.0
2017-06	RAN#76	R5-172603	3579		Removing of redundant editor's note for 4DL CA test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-172626	3585		Correction to message contents for 4DL CA Rx tests	14.2.0	14.3.0
2017-06	RAN#76	R5-172628	3587		Correction to message contents of 4DL CA 8.2.1.4.2_A.3	14.2.0	14.3.0
2017-06	RAN#76	R5-172634	3589		Introducing uncertainty of receiver spurious emission for band 46	14.2.0	14.3.0
2017-06	RAN#76	R5-172641	3594		Correction to Annex A.2 and A.3 for Cat-M1	14.2.0	14.3.0
2017-06	RAN#76	R5-172644	3597		Correction to Annex A.4 for Cat-M1	14.2.0	14.3.0
2017-06	RAN#76	R5-172650	3601		Correction to spurious emission band UE co-existence test	14.2.0	14.3.0
2017-06	RAN#76	R5-172651	3602		Editorial correction to 6.2.5	14.2.0	14.3.0
2017-06	RAN#76	R5-172652	3603		Correction to message contents of 3DL CA Rx tests	14.2.0	14.3.0
2017-06	RAN#76	R5-172656	3607		Correction to message contents for 2DL CA Rx tests	14.2.0	14.3.0
2017-06	RAN#76	R5-172658	3609		Correction to PMI test for TM9 with 8 TX and with 4TX enhanced codebook	14.2.0	14.3.0
2017-06	RAN#76	R5-172710	3610		Test tolerance and statistical test time addition to 4Rx demodulation test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-172715	3611		Addition of NS_27 for Band 48 in A-MPR test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-172718	3614		Introduction of test case LAA PCFICH/PDCCH Transmit Diversity 2x2 with TDD as Pcell	14.2.0	14.3.0
2017-06	RAN#76	R5-172720	3616		Applicability correction for eDL-MIMO test cases in part 1	14.2.0	14.3.0
2017-06	RAN#76	R5-172724	3617		Correction to test case references in tables for applicability and test rules in clause 8.1.2.3	14.2.0	14.3.0
2017-06	RAN#76	R5-172814	3625		Update of minimum conformance requirement in 7.4A.0	14.2.0	14.3.0
2017-06	RAN#76	R5-172824	3628		Introduction of 8.2.3.2.1.3 TDD FDD CA PDSCH Open Loop Multi Layer Spatial Multiplexing 2x2 for FDD Pcell (4DL CA)	14.2.0	14.3.0

2017-06	RAN#76	R5-172825	3629		Introduction of 8.2.3.2.1.4 TDD FDD CA PDSCH Open Loop Multi Layer Spatial Multiplexing 2x2 for FDD Pcell (5DL CA)	14.2.0	14.3.0
2017-06	RAN#76	R5-173052	3621	1	Updates to legacy CA CQI reporting test cases to include 4Rx UE	14.2.0	14.3.0
2017-06	RAN#76	R5-173053	3622	1	Updates to legacy single carrier CQI reporting test cases to include 4Rx UE	14.2.0	14.3.0
2017-06	RAN#76	R5-173054	3623	1	Updates to legacy PMI and RI test cases to include 4Rx UE	14.2.0	14.3.0
2017-06	RAN#76	R5-173063	3595	1	Correction to CSI tests for Cat-M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173064	3596	1	Correction to MPDCCH aggregation level for Cat-M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173065	3598	2	Correction to Cat-M1 demodulation test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-173070	3550	2	Introduction of CA_1A-11A-28A to section 7	14.2.0	14.3.0
2017-06	RAN#76	R5-173071	3557	2	Update of 2DL/1UL of CA_3A-3A and CA_7A-7A to section 7.3A.3	14.2.0	14.3.0
2017-06	RAN#76	R5-173072	3558	2	Introduction of 3DL/1UL of CA_3A-3A-7A and CA_3A-7A-7A to section 7.3A.5	14.2.0	14.3.0
2017-06	RAN#76	R5-173073	3559	2	Introduction of 4DL/1UL of CA_3A-3A-7A-7A to section 7.3A.9	14.2.0	14.3.0
2017-06	RAN#76	R5-173200	3523	1	Updated Test Applicability for TC 6.2.3E	14.2.0	14.3.0
2017-06	RAN#76	R5-173201	3456	1	Correction to typos in Rx test cases for CA	14.2.0	14.3.0
2017-06	RAN#76	R5-173202	3522	1	Updated table references related to reference sensitivity in test description and test requirements	14.2.0	14.3.0
2017-06	RAN#76	R5-173203	3604	1	Correction to UL configuration for REFSENS test for CA_41C and CA_7C	14.2.0	14.3.0
2017-06	RAN#76	R5-173204	3605	1	Clean up on test configuration tables for intra-contiguous 2CA Rx tests	14.2.0	14.3.0
2017-06	RAN#76	R5-173205	3493	1	Update of NAICS demodulation TCs	14.2.0	14.3.0
2017-06	RAN#76	R5-173206	3608	1	Correction to Annex B.2.2	14.2.0	14.3.0
2017-06	RAN#76	R5-173209	3443	1	Update of test points and test requirements in TC 7.3A.5 for CA_4A-12A-30A	14.2.0	14.3.0
2017-06	RAN#76	R5-173210	3451	1	New CA band combinations CA_1A-41A-42C and 1A-41C-42A - Updates of 7.3A.9 REFSENS	14.2.0	14.3.0
2017-06	RAN#76	R5-173212	3452	1	New CA band combinations CA_3C-8A - Updates of 7.3A.5 REFSENS	14.2.0	14.3.0
2017-06	RAN#76	R5-173215	3472	1	Update of TC 6.6.3.2A.2 for Rel-14 CA configuration CA_2A-7A	14.2.0	14.3.0
2017-06	RAN#76	R5-173216	3520	1	Align operating bands and Channel bandwidths in sub-clause 5.2, 5.2A, 5.4.2.1 and 5.4.2A with TS36.101 v14.3.0	14.2.0	14.3.0
2017-06	RAN#76	R5-173217	3527	1	Addition of CA_13A-66A in TS 36.521-1	14.2.0	14.3.0
2017-06	RAN#76	R5-173220	3552	1	Corrections on 3A-28A-41A in Test Configuration Table of section 7.3A.5.4.1	14.2.0	14.3.0
2017-06	RAN#76	R5-173221	3554	1	Introduction of 2UL/2DL CA_41A-42A to section 7	14.2.0	14.3.0
2017-06	RAN#76	R5-173223	3600	1	Addition of CA configuration CA_66A-66C, CA_xA-66A-66A and CA_66A-66A-xA for Refsens test	14.2.0	14.3.0
2017-06	RAN#76	R5-173228	3624	1	Test Tolerances and general updates to NB-IoT performance test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-173276	3448	1	Addition of new LAA Test Case - CQI reporting / PUSCH 3-1 / FDD Pcell	14.2.0	14.3.0

2017-06	RAN#76	R5-173277	3449	1	Addition of new LAA Test Case - CQI reporting / PUSCH 3-1 / TDD Pcell	14.2.0	14.3.0
2017-06	RAN#76	R5-173278	3525	1	Introduction of LAA Dual-Layer Spatial Multiplexing with DM-RS with TDD as Pcell Test Case	14.2.0	14.3.0
2017-06	RAN#76	R5-173279	3542	1	Update test case 7.6.2A.3 to add LAA band combinations	14.2.0	14.3.0
2017-06	RAN#76	R5-173280	3543	1	Update test case 7.7A.3 to add LAA band combinations	14.2.0	14.3.0
2017-06	RAN#76	R5-173281	3626	1	LAA: Addition of CQI Reporting with FDD as PCELL	14.2.0	14.3.0
2017-06	RAN#76	R5-173288	3453	1	Introduction to New Rx test case 7.6.3A.8 Narrow band blocking for 5DL CA	14.2.0	14.3.0
2017-06	RAN#76	R5-173289	3454	1	Introduction to New Rx test case 7.7A.8 Spurious response for 5DL CA	14.2.0	14.3.0
2017-06	RAN#76	R5-173290	3455	1	Introduction to New Rx test case 7.8.1A.8 Wideband intermodulation for 5DL CA	14.2.0	14.3.0
2017-06	RAN#76	R5-173291	3466	1	Update of test requirements in TC 7.3A.6 for new Rel-13 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-173295	3535	1	Introduction of 8.2.3.2.2.3 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (4DL CA)	14.2.0	14.3.0
2017-06	RAN#76	R5-173296	3536	1	Introduction of 8.2.3.2.2.4 TDD FDD CA PDSCH Open Loop Spatial Multiplexing 2x2 for TDD PCell (5DL CA)	14.2.0	14.3.0
2017-06	RAN#76	R5-173298	3560	1	Correction of 3DL CA & 4DL CA RX TC	14.2.0	14.3.0
2017-06	RAN#76	R5-173299	3561	1	Introduction of New TC7.3A.10 Reference sensitivity level for 5DL CA	14.2.0	14.3.0
2017-06	RAN#76	R5-173301	3562	1	Addition of CA_8A-41C in test configuration in TC 7.3A.5	14.2.0	14.3.0
2017-06	RAN#76	R5-173302	3539	1	Addition of G.3A for TDD FDD CA PDSCH Single Antenna and Open Loop Spatial Multiplexing 2x2 Performance Test cases (4 & 5DL CA)	14.2.0	14.3.0
2017-06	RAN#76	R5-173303	3555	1	Update of 2DL/1UL of CA_3A-42A, CA_28A-42A, CA_41A-42A and CA_42A-46A to section 7.3A.3	14.2.0	14.3.0
2017-06	RAN#76	R5-173305	3556	1	Introduction of 3DL/1UL of CA_2A-4A-7A and CA_3A-41A-42A to section 7.3A.5	14.2.0	14.3.0
2017-06	RAN#76	R5-173306	3618	1	Addition of test case TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for FDD PCell (5DL CA) (9.6.1.3.4)	14.2.0	14.3.0
2017-06	RAN#76	R5-173307	3619	1	Addition of test case TDD FDD CQI Reporting under AWGN conditions – PUCCH 1-0 for TDD PCell (5DL CA) (9.6.1.4.4)	14.2.0	14.3.0
2017-06	RAN#76	R5-173316	3510	1	Updates to eMTC test case 8.11.1.1.3, FDD and half-duplex FDD PDSCH Transmit Diversity 2x1 for UE category M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173317	3514	1	Updates to eMTC test case 8.11.1.2.3, TDD PDSCH Transmit Diversity for UE category M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173318	3515	1	Updates to eMTC test case 9.8.1.1, FDD and Half duplex FDD CQI reporting definition under AWGN conditions for UE category M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173329	3496	1	Sending of MaxLayersMimo-r10 IE for 4Rx TCs with more than 2 Layers	14.2.0	14.3.0
2017-06	RAN#76	R5-173330	3530	1	Updates to legacy FDD PDSCH demod test cases to include 4Rx UE	14.2.0	14.3.0
2017-06	RAN#76	R5-173331	3531	1	Updates to legacy TDD PDSCH demod test cases to include 4Rx UE	14.2.0	14.3.0
2017-06	RAN#76	R5-173332	3532	1	Updates to legacy TDD FDD CA PDSCH demod test cases to include 4Rx UE	14.2.0	14.3.0

2017-06	RAN#76	R5-173333	3533	1	Updates to legacy sustained data rate test cases to include 4Rx UE	14.2.0	14.3.0
2017-06	RAN#76	R5-173339	3612	1	Addition of NS_27 for Band 48 in A-SEM test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-173340	3613	1	Addition of NS_27 for Band 48 in A-Spurious test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-173341	3444	1	Correction to Band 70 test frequencies to clarify the use of two duplex spacings	14.2.0	14.3.0
2017-06	RAN#76	R5-173342	3508	1	Updates to eMTC test case 8.11.1.1.1, FDD and half-duplex FDD Closed-loop spatial multiplexing performance for UE category M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173343	3509	1	Updates to eMTC test case 8.11.1.1.2, FDD and half-duplex FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173344	3512	1	Updates to eMTC test case 8.11.1.2.1, TDD Closed-loop spatial multiplexing performance for UE category M1 (Cell-Specific Reference Symbols)	14.2.0	14.3.0
2017-06	RAN#76	R5-173345	3513	1	Updates to eMTC test case 8.11.1.2.2, TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 for UE category M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173346	3497	1	eHST RF: Practical and consistent model definition for HST-SFN scenario	14.2.0	14.3.0
2017-06	RAN#76	R5-173347	3549	1	Introduction of reference channels for enhanced high speed train test	14.2.0	14.3.0
2017-06	RAN#76	R5-173348	3481	1	Update of the TC 6.6.3F.2 Spurious emission band UE co-existence for category NB1 for Release 14	14.2.0	14.3.0
2017-06	RAN#76	R5-173349	3581	1	NB-IoT band 70 introduction to transmitter requirements	14.2.0	14.3.0
2017-06	RAN#76	R5-173351	3446	1	CA_46A-46A-66A, CA_46C-66A Receiver requirements	14.2.0	14.3.0
2017-06	RAN#76	R5-173354	3482	1	Update to operating bands for V2X Communication	14.2.0	14.3.0
2017-06	RAN#76	R5-173355	3483	1	Introduction of 6.2.2G UE Maximum Output Power for V2X Communication	14.2.0	14.3.0
2017-06	RAN#76	R5-173356	3484	1	Update to 6.2.3G.1 Maximum Power Reduction (MPR) for V2X Communication / Power class 3 / Contiguous allocation of PSCCH and PSSCH	14.2.0	14.3.0
2017-06	RAN#76	R5-173357	3485	1	Update to 6.2.4G.1 Additional Maximum Power Reduction (A-MPR) for V2X Communication / Non-concurrent with E-UTRA uplink transmission	14.2.0	14.3.0
2017-06	RAN#76	R5-173358	3486	1	Update to TC 6.2.5G.1 Configured UE transmitted Output Power for V2X Communication / Non-concurrent with E-UTRA uplink transmission	14.2.0	14.3.0
2017-06	RAN#76	R5-173359	3489	1	Introduction of 6.2.2G.2 UE Maximum Output Power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmission	14.2.0	14.3.0
2017-06	RAN#76	R5-173360	3490	1	Introduction of 6.2.5G.2 Configured UE transmitted Output Power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmission	14.2.0	14.3.0
2017-06	RAN#76	R5-173361	3492	1	Introduction of 6.2.3G.1.3 Maximum Power Reduction (MPR) for V2X Communication / Power class 3 / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmission	14.2.0	14.3.0
2017-06	RAN#76	R5-173370	3566	1	Update of 7.3G.1 Reference sensitivity level for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	14.2.0	14.3.0
2017-06	RAN#76	R5-173372	3568	1	Introduction of 7.3G.3 Reference sensitivity level for V2X Communication / Intra-band contiguous MCC operation	14.2.0	14.3.0

2017-06	RAN#76	R5-173373	3569	1	Update of 7.4G.1 Maximum input level for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	14.2.0	14.3.0
2017-06	RAN#76	R5-173374	3570	1	Introduction of 7.4G.2 Maximum input level for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.2.0	14.3.0
2017-06	RAN#76	R5-173375	3571	1	Introduction of 7.4G.3 Maximum input level for V2X Communication / Intra-band contiguous MCC operation	14.2.0	14.3.0
2017-06	RAN#76	R5-173376	3572	1	Update of 7.5G.1 Adjacent channel selectivity (ACS) for V2X Communication / Non-concurrent	14.2.0	14.3.0
2017-06	RAN#76	R5-173377	3573	1	Introduction of 7.5G.2 Adjacent channel selectivity (ACS) for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.2.0	14.3.0
2017-06	RAN#76	R5-173378	3574	1	Introduction of 7.5G.3 Adjacent channel selectivity (ACS) for V2X Communication / Intra-band contiguous MCC operation	14.2.0	14.3.0
2017-06	RAN#76	R5-173379	3575	1	Update of 7.6.1G.1 In-band blocking for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	14.2.0	14.3.0
2017-06	RAN#76	R5-173380	3576	1	Introduction of 7.6.1G.2 In-band blocking for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	14.2.0	14.3.0
2017-06	RAN#76	R5-173381	3577	1	Introduction of 7.6.1G.3 In-band blocking for V2X Communication / Intra-band contiguous MCC operation	14.2.0	14.3.0
2017-06	RAN#76	R5-173382	3582	1	Introduction of TC 7.8.1G Wide band Intermodulation for V2X	14.2.0	14.3.0
2017-06	RAN#76	R5-173383	3583	1	Introduction of TC7.9G Spurious emissions for V2X	14.2.0	14.3.0
2017-06	RAN#76	R5-173384	3487	1	Correction to the A-SE requirement for Band 41	14.2.0	14.3.0
2017-06	RAN#76	R5-173385	3469	1	Update of TC 6.2.4A.2 for new Rel-14 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-173386	3470	1	Update of TC 6.2.4A.2_1 for new Rel-14 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-173387	3474	1	Update of TC 6.6.2.2A.2 for new Rel-14 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-173388	3475	1	Update of TC 6.6.2.2A.2_1 for new Rel-14 CA configurations	14.2.0	14.3.0
2017-06	RAN#76	R5-173390	3553	1	Introduction of 2UL/2DL CA_41A-42A to section 6	14.2.0	14.3.0
2017-06	RAN#76	R5-173395	3564	1	Addition of CA bands in test configuration in TC 7.3A.5	14.2.0	14.3.0
2017-06	RAN#76	R5-173396	3565	1	Addition of CA bands in test configuration in TC 7.3A.9	14.2.0	14.3.0
2017-06	RAN#76	R5-173397	3580	1	Introduction of 3DL/1UL of CA_3A-20A-32A to section 7	14.2.0	14.3.0
2017-06	RAN#76	R5-173399	3563	1	Addition of CA_12A-66A in test configuration in 7.3A.3	14.2.0	14.3.0
2017-06	RAN#76	R5-173400	3545	1	Change of UE target power configuration for EVM test	14.2.0	14.3.0
2017-06	RAN#76	R5-173401	3479	1	Update of the TC 7.3A.9 REFSENS for 4DL CA (CA_1A-3A-19A-42A, 1A-19A-21A-42A, 1A-19A-42C, 1A-21A-42C, 19A-21A-42C)	14.2.0	14.3.0
2017-06	RAN#76	R5-173402	3534	1	Correction to Test configuration Tables in subclause 7.3A for 3DL CA and 4DL CA	14.2.0	14.3.0
2017-06	RAN#76	R5-173403	3584	1	Correction to 4DL CA out of band blocking interferer	14.2.0	14.3.0
2017-06	RAN#76	R5-173404	3620	1	Correction of CA configuration CA_28A-40C Refsens test	14.2.0	14.3.0
2017-06	RAN#76	R5-173409	3591	1	Clean up on Cat-M1 Rx test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-173410	3592	1	Clean up on Cat-M1 Tx test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-173411	3593	1	Correction to spurious emission band UE co-existence for UE category M1	14.2.0	14.3.0

2017-06	RAN#76	R5-173417	3462	1	Update of legacy Reference Sensitivity CA tests for 4Rx	14.2.0	14.3.0
2017-06	RAN#76	R5-173421	3507	1	Updates to Annex A and Annex G for eMTC test cases	14.2.0	14.3.0
2017-06	RAN#76	R5-173422	3511	1	Updates to eMTC test case 8.11.1.1.3_1, FDD PDS and half-duplex FDD CH Transmit Diversity 2x1 for UE category M1 (CEmodeB)	14.2.0	14.3.0
2017-06	RAN#76	R5-173423	3546	1	Clean up NPDCCH single-antenna performance test	14.2.0	14.3.0
2017-06	RAN#76	R5-173424	3547	1	Clean up NPDSCH demodulation test in standalone and Guard-band mode	14.2.0	14.3.0
2017-06	RAN#76	R5-173427	3606	1	Correction to 3DL CA out of band blocking interferer	14.2.0	14.3.0
2017-06	RAN#76	R5-173428	3590	1	Correction to transmit signal quality tests for category M1	14.2.0	14.3.0
2017-06	RAN#76	R5-173431	3502	1	Updates to A-MPR, A-SEM and A-Spur TCs	14.2.0	14.3.0
2017-06	RAN#76	R5-173436	3567	2	Introduction of 7.3G.2 Reference sensitivity level for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.2.0	14.3.0
2017-09	RAN#77	R5-173529	3630	-	Correction of Test Settings for CA_4A-12A-30A in TC 7.3A.5	14.3.0	14.4.0
2017-09	RAN#77	R5-173617	3637	-	Addition of CA_2A-5A-66A in TS 36.521-1	14.3.0	14.4.0
2017-09	RAN#77	R5-173619	3639	-	Addition of CA_2A-13A-66A in TS 36.521-1	14.3.0	14.4.0
2017-09	RAN#77	R5-173694	3645	-	Addition of CA_XA-YC-ZA to 7.4A.7	14.3.0	14.4.0
2017-09	RAN#77	R5-173695	3646	-	Addition of CA_XA-YC-ZA to 7.5A.7	14.3.0	14.4.0
2017-09	RAN#77	R5-173696	3647	-	Addition of CA_XA-YC-ZA to 7.6.1A.7	14.3.0	14.4.0
2017-09	RAN#77	R5-173697	3648	-	Addition of CA_XA-YC-ZA to 7.6.2A.7	14.3.0	14.4.0
2017-09	RAN#77	R5-173698	3649	-	Addition of CA_XA-YC-ZA to 7.6.3A.7	14.3.0	14.4.0
2017-09	RAN#77	R5-173699	3650	-	Addition of CA_XA-YC-ZA to 7.8.1A.7	14.3.0	14.4.0
2017-09	RAN#77	R5-173784	3652	-	Editorial correction to 4Rx Applicability for CSI	14.3.0	14.4.0
2017-09	RAN#77	R5-173785	3653	-	Addition of FS3 OCNG pattern to Rx tests	14.3.0	14.4.0
2017-09	RAN#77	R5-173787	3655	-	Clarification on UL RMC for category NB1	14.3.0	14.4.0
2017-09	RAN#77	R5-173797	3658	-	Addition of measurement period for 9.8.2.1 in Annex G.5.4	14.3.0	14.4.0
2017-09	RAN#77	R5-173798	3659	-	Removing editor's note regarding UE's declaration on carrier center frequency for Cat M1	14.3.0	14.4.0
2017-09	RAN#77	R5-173912	3667	-	Editorial: Addition of band 40 for eMTC	14.3.0	14.4.0
2017-09	RAN#77	R5-173942	3674	-	Editorial: Addition of V2V reference resource pooll configurations	14.3.0	14.4.0
2017-09	RAN#77	R5-173949	3676	-	Addition of new Rel-13 CA RF test case 7.4A.8	14.3.0	14.4.0
2017-09	RAN#77	R5-173962	3678	-	Update to test requirements in TC 6.7	14.3.0	14.4.0
2017-09	RAN#77	R5-173963	3679	-	Updates to test requirements for CA tests with interferers	14.3.0	14.4.0
2017-09	RAN#77	R5-173984	3683	-	Correction of test procedure and test requirement in TC 6.6.3.2A.2 (editorial change)	14.3.0	14.4.0
2017-09	RAN#77	R5-173993	3686	-	eMTC correction of missing references for UL RMCs	14.3.0	14.4.0
2017-09	RAN#77	R5-173994	3687	-	Correction of test requirement in TC 7.3_1 (editorial change)	14.3.0	14.4.0
2017-09	RAN#77	R5-173999	3690	-	New eMTC test case, 6.3.5EA.3_1 Aggregate power control tolerance for UE category M1 (CE Mode B)	14.3.0	14.4.0
2017-09	RAN#77	R5-174006	3694	-	Addition of new 4Rx SDR test cases - Annex F	14.3.0	14.4.0

2017-09	RAN#77	R5-174007	3695	-	Update Annex A with RMCs for 4Rx and 5MHz (editorial change)	14.3.0	14.4.0
2017-09	RAN#77	R5-174024	3700	-	Addition of new CA Configuration CA_3A-38A to TS 36.521-1	14.3.0	14.4.0
2017-09	RAN#77	R5-174026	3701	-	Editorial Change of TC 8.10.1.1.3 – Alignment to TS 36.101	14.3.0	14.4.0
2017-09	RAN#77	R5-174027	3702	-	Correction of RB allocation in TC 6.5.2.3EA	14.3.0	14.4.0
2017-09	RAN#77	R5-174029	3704	-	Editorial Change of RBstart expression in category M1 TC	14.3.0	14.4.0
2017-09	RAN#77	R5-174031	3706	-	Editorial Change of heading format for TC 6.3.3F	14.3.0	14.4.0
2017-09	RAN#77	R5-174090	3713	-	Editorial change of CA configuration for CA_41C-42A and CA_41C-42C	14.3.0	14.4.0
2017-09	RAN#77	R5-174092	3714	-	New CA band combination CA_41A-42C(2UL) and CA_41C_42A(2UL) - Updates of 7.3A.5 REFSENS	14.3.0	14.4.0
2017-09	RAN#77	R5-174096	3716	-	Correction of test frequency in 6.2.4EA for NS_17	14.3.0	14.4.0
2017-09	RAN#77	R5-174097	3717	-	Correction of test frequency in 6.6.3EA.3 for NS_17	14.3.0	14.4.0
2017-09	RAN#77	R5-174135	3724	-	Editorial Change to align LAA capability definitions for demodulation test cases in sub-clause 8.1.2 with TS 36.101 v14.4.0	14.3.0	14.4.0
2017-09	RAN#77	R5-174136	3725	-	Added CA band combination to test requirement	14.3.0	14.4.0
2017-09	RAN#77	R5-174152	3729	-	Addition of 1.4 and 3 MHz to Ch 5 in 36.521-1 for Band 65	14.3.0	14.4.0
2017-09	RAN#77	R5-174153	3730	-	Addition of 1.4 and 3 MHz to Ch 7 in 36.521-1 for Band 65	14.3.0	14.4.0
2017-09	RAN#77	R5-174155	3731	-	Receiver requirements for CA_29A-70A, CA_29A-46A-66A, CA_46A-66A-66A, CA_46A-66C, CA_46A-70A	14.3.0	14.4.0
2017-09	RAN#77	R5-174178	3732	-	Editorial Change of tables for channel bandwidths per operating band for CA	14.3.0	14.4.0
2017-09	RAN#77	R5-174244	3738	-	Introduction of the new TC7.5A.8 ACS for 5DL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-174245	3739	-	Introduction of the new TC7.6.1A.8 In-band blocking for 5DL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-174246	3740	-	Introduction of the new TC7.6.2A.8 Out-of-band blocking for 5DL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-174256	3743	-	FDD Enhanced Downlink Control Channel Performance Type A for PCFICH/PDCCH, 2 Tx Antenna Port under Asynchronous Network	14.3.0	14.4.0
2017-09	RAN#77	R5-174257	3744	-	FDD Enhanced Downlink Control Channel Performance Type A for PCFICH/PDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.3.0	14.4.0
2017-09	RAN#77	R5-174258	3745	-	Test procedure correction for CQI-RI test cases	14.3.0	14.4.0
2017-09	RAN#77	R5-174261	3748	-	TDD Enhanced Downlink Control Channel Performance Type A for PCFICH/PDCCH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer	14.3.0	14.4.0
2017-09	RAN#77	R5-174262	3749	-	TDD Enhanced Downlink Control Channel Performance Type A for PCFICH/PDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.3.0	14.4.0
2017-09	RAN#77	R5-174264	3751	-	Addition of test points in test configuration table for RX sensitivity TCs	14.3.0	14.4.0
2017-09	RAN#77	R5-174270	3755	-	TDD Enhanced Downlink Control Channel Performance Type B for PCFICH/PDCCH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer	14.3.0	14.4.0

2017-09	RAN#77	R5-174271	3756	-	TDD Enhanced Downlink Control Channel Performance Type B for PCFICH/PDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.3.0	14.4.0
2017-09	RAN#77	R5-174342	3769	-	Introduction of new Dual Connectivity test cases - General ON/OFF time mask for Dual Connectivity	14.3.0	14.4.0
2017-09	RAN#77	R5-174346	3772	-	Updates to FDD and TDD Dual-Layer Spatial Multiplexing 2x4 (User-Specific Reference Symbols)	14.3.0	14.4.0
2017-09	RAN#77	R5-174356	3774	-	Editorial correction to Cat M1 MPDCCH test case	14.3.0	14.4.0
2017-09	RAN#77	R5-174357	3775	-	Editorial change to include note 2 reference for Band 22 tolerance in 6.2.2 UE Maximum Output Power	14.3.0	14.4.0
2017-09	RAN#77	R5-174429	3785	-	Editorial change to modify wrong references in category NB1 test cases	14.3.0	14.4.0
2017-09	RAN#77	R5-174440	3789	-	Addtion of test tolerance statement for TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 (4&5 DL CA) in Annex F	14.3.0	14.4.0
2017-09	RAN#77	R5-174680	3697	1	Editorial Change - Correction of band sets for CA_7A-46C and CA_7A-46D	14.3.0	14.4.0
2017-09	RAN#77	R5-175001	3681	1	Addition of test requirement in TC 7.3A.5 for CA_2A-7A-12A	14.3.0	14.4.0
2017-09	RAN#77	R5-175002	3720	1	Update to Rx test case 7.6.3A.8 Narrow band blocking for 5DL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175003	3721	1	Update to Rx test case 7.7A.8 Spurious response for 5DL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175004	3722	1	Update to Rx test case 7.8.1A.8 Wideband intermodulation for 5DL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175005	3726	1	Editorial Change to align CA capability definitions for demodulation test cases in sub-clause 8.1.2.3 with TS 36.101 v14.4.0	14.3.0	14.4.0
2017-09	RAN#77	R5-175006	3741	1	Addition of the CA_1A-3A, 1A-19A, 1A-21A, 3A-19A, 19A-21A for 2UL 64QAM TCs	14.3.0	14.4.0
2017-09	RAN#77	R5-175007	3765	1	Updated RF general section 4.1 to align with core specification	14.3.0	14.4.0
2017-09	RAN#77	R5-175008	3777	1	Add New TC of 6.2.2A.4.1 of UE Maximum Output Power for intra-band contiguous 3 UL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175009	3778	1	Add New TC of 6.2.2A.4.2 for UE Maximum Output Power for inter-band 3 UL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175010	3779	1	Add New TC of 6.5.1A.4.1 for Frequency error for intra-band contiguous 3 UL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175011	3780	1	Add New TC of 6.5.1A.4.2 of Frequency error for inter- band 3 UL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175012	3790	1	Addtion of minimum test time statement for TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 (4&5 DL CA) in Annex G	14.3.0	14.4.0
2017-09	RAN#77	R5-175025	3715	1	New CA band combination CA_1A-41C-42C - Updates of 7.3A.10 REFSENS	14.3.0	14.4.0
2017-09	RAN#77	R5-175026	3698	1	Addition of a few Band 46 CA Configurations to TS 36.521-1	14.3.0	14.4.0
2017-09	RAN#77	R5-175027	3712	1	Addition of Rel-14 CA minimun and test requirements for Spurious emission band UE co-existence for CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175052	3666	1	Editorial Change to TC7.3 minimum conformance requirements of 4Rx to same text in core spec	14.3.0	14.4.0
2017-09	RAN#77	R5-175055	3767	1	Introduction of A-SEM test case with PUSCH frequency hopping	14.3.0	14.4.0

2017-09	RAN#77	R5-175056	3781	1	Correction to test applicability of test cases 8.2.1.3.1 and 8.2.1.3.1_1	14.3.0	14.4.0
2017-09	RAN#77	R5-175057	3685	1	Correction of initial conditions in TC 6.6.2.2A.2_1 (editorial change)	14.3.0	14.4.0
2017-09	RAN#77	R5-175058	3782	1	Editorial Change - Reordering of Tables according to NS value	14.3.0	14.4.0
2017-09	RAN#77	R5-175059	3708	1	Editorial Change – Cleanup of Test Configuration Tables of TC 7.3A.5	14.3.0	14.4.0
2017-09	RAN#77	R5-175060	3661	1	Correction to TDD PMI Reporting Multiple PMI for eDL-MIMO test case 9.4.2.3.2_D	14.3.0	14.4.0
2017-09	RAN#77	R5-175065	3657	1	Correction to UE-selected subband CQI test for Cat M1	14.3.0	14.4.0
2017-09	RAN#77	R5-175066	3696	1	Correction of minimum test time for ETU1 in annex G	14.3.0	14.4.0
2017-09	RAN#77	R5-175067	3705	1	Editorial Change – Correction of minimum test time for TC 8.11.1.1.3	14.3.0	14.4.0
2017-09	RAN#77	R5-175068	3773	1	Completion of eMTC A-MPR test cases for NS_07	14.3.0	14.4.0
2017-09	RAN#77	R5-175075	3692	1	Addition of new 4Rx SDR test case - FDD 2DL	14.3.0	14.4.0
2017-09	RAN#77	R5-175076	3693	1	Addition of new 4Rx SDR test case - FDD 3DL	14.3.0	14.4.0
2017-09	RAN#77	R5-175077	3746	1	FDD Enhanced Downlink Control Channel Performance Type B for PCFICH/PDCCH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer	14.3.0	14.4.0
2017-09	RAN#77	R5-175078	3747	1	FDD Enhanced Downlink Control Channel Performance Type B for PCFICH/PDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.3.0	14.4.0
2017-09	RAN#77	R5-175079	3768	1	Introduction of new Dual Connectivity test cases - Power Control Relative power tolerance	14.3.0	14.4.0
2017-09	RAN#77	R5-175085	3631	1	Introduction of In-band emissions for non-allocated RB for V2X Communication / Non-concurrent with E-UTRA uplink transmissions in 6.5.2.3G.1	14.3.0	14.4.0
2017-09	RAN#77	R5-175086	3633	1	Update of TC7.6.2G Out-of-band blocking for V2X Communication	14.3.0	14.4.0
2017-09	RAN#77	R5-175087	3634	1	Update of TC 7.8.1G.1 Wide band Intermodulation for V2X	14.3.0	14.4.0
2017-09	RAN#77	R5-175088	3635	1	Update of TC7.9G Spurious emissions for V2X	14.3.0	14.4.0
2017-09	RAN#77	R5-175089	3642	1	Introduction of Spurious emission for V2X Communication / Non-concurrent with E-UTRA uplink transmissions in 6.6.3G.1	14.3.0	14.4.0
2017-09	RAN#77	R5-175090	3675	1	Addition of V2V new test case 6.5.1G.1	14.3.0	14.4.0
2017-09	RAN#77	R5-175091	3718	1	Adding new TC 6.6.1G.1 Occupied bandwidth for V2X Communication/ Non-concurrent with E-UTRA uplink transmissions	14.3.0	14.4.0
2017-09	RAN#77	R5-175092	3723	1	GNSS Reference signal for V2V	14.3.0	14.4.0
2017-09	RAN#77	R5-175093	3733	1	Introduction of Spurious emission band UE co-existence for V2X Communication / Non-concurrent with E-UTRA uplink transmissions in 6.6.3G.1_1	14.3.0	14.4.0
2017-09	RAN#77	R5-175094	3764	1	Introduction of Additional Spectrum Emission Mask for V2X Communication / Non-concurrent with E-UTRA uplink transmissions in 6.6.2.2G.1	14.3.0	14.4.0
2017-09	RAN#77	R5-175095	3784	1	Editorial: Addition of V2V RMC for performance requirements	14.3.0	14.4.0
2017-09	RAN#77	R5-175096	3787	1	New test cases: Demodulation performance Requirements for V2X Sidelink communications	14.3.0	14.4.0

2017-09	RAN#77	R5-175102	3643	1	Introduction of Spurious emission for V2X Communication / Intra-band contiguous MCC operation in 6.6.3G.3	14.3.0	14.4.0
2017-09	RAN#77	R5-175103	3752	1	Editorial change for V2X reference sensitivity TC	14.3.0	14.4.0
2017-09	RAN#77	R5-175104	3753	1	Update & editorial change for V2V RX Test Cases	14.3.0	14.4.0
2017-09	RAN#77	R5-175105	3757	1	Introduction ofSpurious emission band UE co-existence for V2X Communication / Intra-band contiguous MCC operation in 6.6.3G.3_1	14.3.0	14.4.0
2017-09	RAN#77	R5-175106	3766	1	Update RF general section 3 for V2X information	14.3.0	14.4.0
2017-09	RAN#77	R5-175107	3791	1	Introduction of Spectrum Emission Mask for V2X Communication / Intra-band contiguous MCC operation in 6.6.2.1G.3	14.3.0	14.4.0
2017-09	RAN#77	R5-175111	3786	1	Editorial change to align 7.8.1F minimun and test requirements with core spec	14.3.0	14.4.0
2017-09	RAN#77	R5-175113	3750	1	Addition of test requirement & test points in test configuration table for 3A-69A	14.3.0	14.4.0
2017-09	RAN#77	R5-175114	3776	1	Addition of Band 69 in Receiver test cases	14.3.0	14.4.0
2017-09	RAN#77	R5-175115	3788	1	Addition of Cat1bis demod test cases	14.3.0	14.4.0
2017-09	RAN#77	R5-175122	3669	1	New TC: FDD PDSCH performance in HST-SFN scenario	14.3.0	14.4.0
2017-09	RAN#77	R5-175123	3670	1	New TC: TDD PDSCH performance in HST-SFN scenario	14.3.0	14.4.0
2017-09	RAN#77	R5-175125	3770	1	Addition of Rel14 bands for NB-IoT in Clause 5	14.3.0	14.4.0
2017-09	RAN#77	R5-175126	3771	1	Addition of Rel14 bands in NB-IoT Transmitter test cases	14.3.0	14.4.0
2017-09	RAN#77	R5-175127	3699	1	Editorial Change – Cleanup of Test Configuration Tables of TC 7.3A.9 and TC 7.3A.10	14.3.0	14.4.0
2017-09	RAN#77	R5-175128	3727	1	Updated to test requirement to clause 8 test cases	14.3.0	14.4.0
2017-09	RAN#77	R5-175129	3737	1	Introduction of TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (4DL CA)	14.3.0	14.4.0
2017-09	RAN#77	R5-175130	3742	1	Update of the test requirement about TC 7.3A.10 REFSENS for 5DL CA	14.3.0	14.4.0
2017-09	RAN#77	R5-175137	3662	1	Introduction ofTDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (4DL CA) in 8.2.3.3.1.3	14.3.0	14.4.0
2017-09	RAN#77	R5-175138	3663	1	Introduction of TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for FDD PCell (5DL CA) in 8.2.3.3.1.4	14.3.0	14.4.0
2017-09	RAN#77	R5-175139	3664	1	Introduction of TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (4DL CA) in 8.2.3.3.2.3	14.3.0	14.4.0
2017-09	RAN#77	R5-175140	3665	1	Introduction of TDD FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for TDD PCell (5DL CA) in 8.2.3.3.2.4	14.3.0	14.4.0
2017-09	RAN#77	R5-175145	3673	1	Addition of LAA test case 9.2.6.2	14.3.0	14.4.0
2017-09	RAN#77	R5-175146	3758	1	NBIoT correction of bandwidth	14.3.0	14.4.0
2017-09	RAN#77	R5-175160	3689	1	Correction to eMTC test case (CEModeB) to support repetition factor >1	14.3.0	14.4.0
2017-09	RAN#77	R5-175161	3710	1	Updates for FDD and HD-FDD and TDD Demodulation of MPDCCH in CE Mode B Test Cases	14.3.0	14.4.0
2017-09	RAN#77	R5-175168	3644	1	New CA band combinations CA_1A-3C-8A - Updates of 7.3A.9 REFSENS	14.3.0	14.4.0
2017-09	RAN#77	R5-175169	3680	1	Introduction of CA_1A-3A-11A to section 7	14.3.0	14.4.0
2017-09	RAN#77	R5-175170	3682	1	Introduction of CA_3A-8A-11A to section 7	14.3.0	14.4.0

2017-09	RAN#77	R5-175171	3684	1	Introduction of CA_3A-11A-28A to section 7	14.3.0	14.4.0
2017-09	RAN#77	R5-175176	3783	1	Update test case 7.6.2A.3 for LAA band combinations	14.3.0	14.4.0
2017-09	RAN#77	R5-175177	3638	1	Introduction of EVM equalizer spectrum flatness for V2X Communication / Non-concurrent with E-UTRA uplink transmissions in 6.5.2.4G.1	14.3.0	14.4.0
2017-09	RAN#77	R5-175178	3640	1	Introduction of Spectrum Emission Mask for V2X Communication / Non-concurrent with E-UTRA uplink transmissions in 6.6.2.1G.1	14.3.0	14.4.0
2017-09	RAN#77	R5-175179	3636	1	Introduction of In-band emissions for non-allocated RB for V2X Communication / Intra-band contiguous MCC operation in 6.5.2.3G.3	14.3.0	14.4.0
2017-09	RAN#77	R5-175180	3719	1	Adding new TC 6.6.1G.2 Occupied bandwidth for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.3.0	14.4.0
2017-09	RAN#77	R5-175181	3754	1	Update & editorial change for V2X RX Test Cases	14.3.0	14.4.0
2017-09	RAN#77	R5-175185	3761	1	Update to Configured UE transmitted Output Power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.3.0	14.4.0
2017-09	RAN#77	R5-175190	3691	1	Addition of new 4Rx SDR test case - FDD single carrier	14.3.0	14.4.0
2017-09	RAN#77	R5-175191	3711	1	Introduction of TDD-FDD CA PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model-Enhanced Performance Requirement Type A for TDD Pcell (2DL CA)	14.3.0	14.4.0
2017-09	RAN#77	R5-175192	3734	1	Introduction of TDD-FDD CA PDSCH Closed Loop Single Layer Spatial Multiplexing 2x4 with TM4 Interference Model-Enhanced Performance Requirement Type A for FDD Pcell (2DL CA)	14.3.0	14.4.0
2017-09	RAN#77	R5-175197	3632	1	Editorial correction to In-band emissions for non allocated RB in 6.5.2.3.4.2	14.3.0	14.4.0
2017-09	RAN#77	R5-175199	3672	1	Addition of eIMTA performance test case 8.2.2.2.5	14.3.0	14.4.0
2017-09	RAN#77	R5-175203	3654	1	Correction to NB-IoT test cases 6.5.1F and 6.6.2.1F	14.3.0	14.4.0
2017-09	RAN#77	R5-175206	3735	2	Introduction of TDD-FDD CA PDSCH Single-layer Spatial Multiplexing 2x4 on antenna ports 7 or 8 with TM9 Interference Model-Enhanced Performance Requirement Type A for TDD Pcell (2DL CA)	14.3.0	14.4.0
2017-09	RAN#77	R5-175207	3736	2	Introduction of TDD-FDD CA PDSCH Single-layer Spatial Multiplexing 2x4 on antenna ports 7 or 8 with TM9 Interference Model-Enhanced Performance Requirement Type A for FDD Pcell (2DL CA)	14.3.0	14.4.0
2017-09	RAN#77	R5-175208	3688	1	Editorial change, correction of RMC for Cat-M1 TDD PDSCH demodulation requirements	14.3.0	14.4.0
2017-09	RAN#77	R5-175210	3707	1	Update of TC 6.3.4F ON/OFF time mask for category NB1	14.3.0	14.4.0
2017-09	RAN#77	R5-175217	3656	1	Correction to Test Parameters for Cat M1 CQI tests	14.3.0	14.4.0
2017-09	RAN#77	R5-175220	3759	2	Update to 6.2.2G.2 UE Maximum Output Power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmission	14.3.0	14.4.0
2017-09	RAN#77	R5-175221	3760	2	Update to Maximum Power Reduction (MPR) for V2X Communication / Power class 3 / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmission	14.3.0	14.4.0
2017-12	RAN#78	R5-176118	3793	-	Correction of eMTC minimum test time	14.4.0	14.5.0
2017-12	RAN#78	R5-176196	3806	-	Update of Annexes F.1.4 and F.3.4	14.4.0	14.5.0

2017-12	RAN#78	R5-176229	3809	-	Introduction of New TC 6.5.2A.1.4 Error Vector Magnitude (EVM) for CA (3UL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-176230	3810	-	Introduction of New TC 6.5.2A.2.4 Carrier leakage for CA (3UL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-176231	3811	-	Introduction of New TC 6.5.2A.3.4 In-band emissions for non allocated RB for CA (3UL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-176245	3818	-	Correction of eMTC test case 7.3EA	14.4.0	14.5.0
2017-12	RAN#78	R5-176246	3819	-	Aligning CA delta TIB in sub-clause 6.2.5.3 with TS 36.101 v14.5.0	14.4.0	14.5.0
2017-12	RAN#78	R5-176247	3820	-	Aligning CA delta RIB in sub-clause 7.3.3 with TS 36.101 v14.5.0	14.4.0	14.5.0
2017-12	RAN#78	R5-176252	3822	-	Adding missing ULCA bandwidth class B MPR	14.4.0	14.5.0
2017-12	RAN#78	R5-176299	3827	-	Updated Annex I.2.2 Tests for CA	14.4.0	14.5.0
2017-12	RAN#78	R5-176300	3828	-	Updated Annex G for new 4DL CA test cases	14.4.0	14.5.0
2017-12	RAN#78	R5-176301	3829	-	Added TC7.3A.9 test requirement for CA_2A-2A-5A-30A	14.4.0	14.5.0
2017-12	RAN#78	R5-176308	3832	-	Updated to Annex A for RMC and reference resource pool configuration	14.4.0	14.5.0
2017-12	RAN#78	R5-176336	3846	-	Addition of new 4Rx SDR test cases - Annex F	14.4.0	14.5.0
2017-12	RAN#78	R5-176386	3850	-	New CA band combinations CA_1A-3A-8A-40A - Updates of 7.3A.9 REFSENS	14.4.0	14.5.0
2017-12	RAN#78	R5-176388	3851	-	Updates of the SDR TC 8.7.5.1_H.3 for TDD FDD CA	14.4.0	14.5.0
2017-12	RAN#78	R5-176418	3860	-	Introduction of Spurious response for V2X in 7.7G.2	14.4.0	14.5.0
2017-12	RAN#78	R5-176423	3862	-	Update of 4DL CA Test Cases	14.4.0	14.5.0
2017-12	RAN#78	R5-176425	3863	-	Correction to applicability statement of 4Rx CQI test cases	14.4.0	14.5.0
2017-12	RAN#78	R5-176430	3864	-	Update the applicability of test points for CA configurations 3A-3A and 7A-7A	14.4.0	14.5.0
2017-12	RAN#78	R5-176431	3865	-	Update REFSENS of 3DL CA for multiple CA configurations in 7.3A.5	14.4.0	14.5.0
2017-12	RAN#78	R5-176432	3866	-	Addition of REFSENS of 2A-4A-7A-7A in 7.3A.9	14.4.0	14.5.0
2017-12	RAN#78	R5-176453	3869	-	Update of UE co-existence requirements for Band 39 in 6.6.3.2	14.4.0	14.5.0
2017-12	RAN#78	R5-176477	3870	-	Missed Addition of Cat1bis demod test case	14.4.0	14.5.0
2017-12	RAN#78	R5-176493	3875	-	Correction to test procedure for 6.3.5F.2	14.4.0	14.5.0
2017-12	RAN#78	R5-176496	3878	-	Correction to 6.5.2.1F.1 and 6.5.2.3F	14.4.0	14.5.0
2017-12	RAN#78	R5-176503	3881	-	Correction to requirement of 9.4.1.3.2_D	14.4.0	14.5.0
2017-12	RAN#78	R5-176504	3882	-	Editorial correction to 8.2.1.4.2_A.3	14.4.0	14.5.0
2017-12	RAN#78	R5-176505	3883	-	Clean up on LAA demodulation test cases	14.4.0	14.5.0
2017-12	RAN#78	R5-176507	3885	-	Correction to the test applicability for 2Rx SDR tests (36.521-1)	14.4.0	14.5.0
2017-12	RAN#78	R5-176541	3889	-	Introduction of TDD FDD CA Sustained data rate performance for TDD PCell (5DL CA) in 8.7.5.2.4	14.4.0	14.5.0
2017-12	RAN#78	R5-176553	3892	-	Correction of test points for intra band non-contiguous 2DL CA Max input level	14.4.0	14.5.0
2017-12	RAN#78	R5-176555	3894	-	Editorial correction of title for 4Rx chapter 9 TCs in 36.521-1	14.4.0	14.5.0

2017-12	RAN#78	R5-176559	3896	-	Alignment of TC 9.9.2.2.1 & 9.9.2.2.2 with 36.101	14.4.0	14.5.0
2017-12	RAN#78	R5-176614	3902	-	Introduction of UE Transmit OFF power for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	14.4.0	14.5.0
2017-12	RAN#78	R5-176616	3904	-	Update of test configuration for Maximum input level for 4DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-176618	3905	-	Update of test configuration for ACS for 4DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-176619	3906	-	Update of test configuration for In-band blocking for 4DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-176620	3907	-	Update of test configuration for Out-band blocking for 4DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-176621	3908	-	Update of test configuration for Narrow band blocking for 4DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-176622	3909	-	Update of test configuration for Wideband intermodulation for 4DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-176631	3912	-	FDD Enhanced Downlink Control Channel Performance Type A for PHICH, 2 Tx Antenna Port under Asynchronous Network	14.4.0	14.5.0
2017-12	RAN#78	R5-176632	3913	-	FDD Enhanced Downlink Control Channel Performance Type A for PHICH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-176634	3914	-	FDD Enhanced Downlink Control Channel Performance Type B for PHICH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-176635	3915	-	FDD Enhanced Downlink Control Channel Performance Type B for PHICH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-176636	3916	-	TDD Enhanced Downlink Control Channel Performance Type A for PHICH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-176638	3918	-	TDD Enhanced Downlink Control Channel Performance Type B for PHICH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-176639	3919	-	TDD Enhanced Downlink Control Channel Performance Type B for PHICH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-176640	3920	-	FDD Enhanced Downlink Control Channel Performance Type A for EPDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-176642	3922	-	TDD Enhanced Downlink Control Channel Performance Type A for EPDCCH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-176643	3923	-	FDD Enhanced Downlink Control Channel Performance Type A for EPDCCH, 2 Tx Antenna Port under Asynchronous Network	14.4.0	14.5.0
2017-12	RAN#78	R5-176654	3925	-	Correction to e-MTC TM9 PDSCH.	14.4.0	14.5.0
2017-12	RAN#78	R5-176721	3937	-	Missed additions and corrections in TS 36.521-1	14.4.0	14.5.0
2017-12	RAN#78	R5-176722	3938	-	Correction to test requirements for B42 in TC 6.2.2A.2	14.4.0	14.5.0
2017-12	RAN#78	R5-176773	3940	-	Alignment of 7.9A measurement frequency ranges with TS 36.101	14.4.0	14.5.0
2017-12	RAN#78	R5-176776	3941	-	Correction of MPDCCH test cases	14.4.0	14.5.0
2017-12	RAN#78	R5-176780	3942	-	Corrections for NPDSCH-ConfigCommon-NB-DEFAULT in 6.3.4F.1	14.4.0	14.5.0
2017-12	RAN#78	R5-176792	3943	-	Update of UL CA relative power control	14.4.0	14.5.0

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2017-12	RAN#78	R5-176839	3951	-	Change of V2V TC names in TS 36.521-1	14.4.0	14.5.0
2017-12	RAN#78	R5-176840	3952	-	Correction of eMTC chapter 8 TC	14.4.0	14.5.0
2017-12	RAN#78	R5-176841	3953	-	Editorial Change – Alignment of HST-SFN scenario and requirements to TS 36.101	14.4.0	14.5.0
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2017-12	RAN#78	R5-176848	3958	-	New feMTC test case 6.2.2EB UE Maximum Output Power for UE category M2	14.4.0	14.5.0
2017-12	RAN#78	R5-176849	3959	-	Correction 6.6.2.3F NB-IoT ACLR test conditions	14.4.0	14.5.0
2017-12	RAN#78	R5-177092	3888	1	Change of eMTC demodulation test cases numbering	14.4.0	14.5.0
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2017-12	RAN#78	R5-177113	3877	1	Correction to test condition for 6.5.1F	14.4.0	14.5.0
2017-12	RAN#78	R5-177114	3879	2	Clean up on NB-IoT demodulation tests	14.4.0	14.5.0
2017-12	RAN#78	R5-177117	3932	1	eLAA: Updates to Maximum output power	14.4.0	14.5.0
2017-12	RAN#78	R5-177300	3934	1	Updates of the Receiver Test cases for 5DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-177301	3936	1	Updates of the Receiver Test cases for 4DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-177303	3849	1	New CA band combinations CA_1A-3A-40A, CA_1A-8A-40A, and CA_3A-8A-40A - Updates of 7.3A.5 REFSENS	14.4.0	14.5.0
2017-12	RAN#78	R5-177304	3903	1	Update of A-MPR and Additional spurious emissions for inter-band DL and UL CA for UL 64QAM	14.4.0	14.5.0
2017-12	RAN#78	R5-177305	3911	1	Update of test case 9.6.1.1_A.4	14.4.0	14.5.0
2017-12	RAN#78	R5-177306	3927	1	Add a new test case 6.2.2A.4 to merge test cases 6.2.2A.4.1 and 6.2.2A.4.2 of UE Maximum Output Power for 3 UL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-177317	3917	1	TDD Enhanced Downlink Control Channel Performance Type A for PHICH, 2 Tx Antenna Port with Non-Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-177318	3921	1	TDD Enhanced Downlink Control Channel Performance Type A for EPDCCH, 2 Tx Antenna Port with Colliding CRS Dominant Interferer	14.4.0	14.5.0
2017-12	RAN#78	R5-177320	3926	1	Correction to test case 6.2.2A.1	14.4.0	14.5.0
2017-12	RAN#78	R5-177321	3880	1	Update 3DL CA Rx tests to support LAA band	14.4.0	14.5.0
2017-12	RAN#78	R5-177323	3831	1	Updated to RF section 8 & 9 test cases for missing TM9 in Test applicability	14.4.0	14.5.0
2017-12	RAN#78	R5-177324	3884	1	Correction to Test Parameters for Cat M1 PUCCH 1-0 static tests	14.4.0	14.5.0
2017-12	RAN#78	R5-177325	3901	1	Editorial correction to the operating bands for the vehicle mounted Band 30 UE	14.4.0	14.5.0
2017-12	RAN#78	R5-177327	3930	1	Correction to test case 9.3.2.1	14.4.0	14.5.0

2017-12	RAN#78	R5-177333	3834	1	Update to existing FDD 4Rx SDR test cases	14.4.0	14.5.0
2017-12	RAN#78	R5-177335	3837	1	Addition of new 4Rx SDR test case - TDD single carrier	14.4.0	14.5.0
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2017-12	RAN#78	R5-177341	3841	1	Addition of new 4Rx SDR test case - TDD 5DL	14.4.0	14.5.0
2017-12	RAN#78	R5-177342	3842	1	Addition of new 4Rx SDR test case - TDD FDD 2DL	14.4.0	14.5.0
2017-12	RAN#78	R5-177343	3843	1	Addition of new 4Rx SDR test case - TDD FDD 3DL	14.4.0	14.5.0
2017-12	RAN#78	R5-177344	3845	1	Addition of new 4Rx SDR test case - TDD FDD 5DL	14.4.0	14.5.0
2017-12	RAN#78	R5-177349	3960	-	Add a new test case 6.5.1A.4 to merge test cases 6.5.1A.4.1 and 6.5.1A.4.2 of Frequency error for CA (3UL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-177352	3857	1	Update of V2V RX Test cases	14.4.0	14.5.0
2017-12	RAN#78	R5-177353	3794	1	Update of TC7.6.2G.1 Out-of-band blocking for V2X Communication	14.4.0	14.5.0
2017-12	RAN#78	R5-177354	3797	1	Update of TC 7.8.1G.1 Wide band Intermodulation for V2X	14.4.0	14.5.0
2017-12	RAN#78	R5-177355	3802	1	Update of TC7.9G Spurious emissions for V2X	14.4.0	14.5.0
2017-12	RAN#78	R5-177356	3808	1	Introduction of new test case 6.3.5G.1 Power Control Absolute power tolerance for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	14.4.0	14.5.0
2017-12	RAN#78	R5-177357	3858	1	Introduction of Spurious response for V2V in 7.7G.1	14.4.0	14.5.0
2017-12	RAN#78	R5-177362	3859	1	Update of V2X RX Test cases	14.4.0	14.5.0
2017-12	RAN#78	R5-177363	3792	1	Update to 5.2, 5.2G and 5.4.2G	14.4.0	14.5.0
2017-12	RAN#78	R5-177364	3795	1	Introduction of TC7.6.2G.2 Out-of-band blocking for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.4.0	14.5.0
2017-12	RAN#78	R5-177365	3796	1	Introduction of TC7.6.2G.3 Out-of-band blocking for V2X Communication / Intra-band contiguous multi-carrier operation	14.4.0	14.5.0
2017-12	RAN#78	R5-177366	3798	1	Introduction of TC 7.8.1G.2 Wide band Intermodulation for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.4.0	14.5.0
2017-12	RAN#78	R5-177367	3799	1	Introduction of TC 7.8.1G.3 Wide band Intermodulation for V2X Communication / Intra-band contiguous multi-carrier operation	14.4.0	14.5.0
2017-12	RAN#78	R5-177368	3814	1	Introduction of New TC 6.3.2G.3 Minimum output power for V2X Communication / Intra-band contiguous multi-carrier operation	14.4.0	14.5.0
2017-12	RAN#78	R5-177369	3815	1	Introduction of new test case 6.3.5G.2 Power Control Absolute power tolerance for V2X Communication / Intra-band contiguous multi-carrier operation	14.4.0	14.5.0
2017-12	RAN#78	R5-177370	3861	1	Introduction of Spurious response for V2X in 7.7G.3	14.4.0	14.5.0
2017-12	RAN#78	R5-177371	3946	1	Addition of new TC for V2X_Demod	14.4.0	14.5.0
2017-12	RAN#78	R5-177373	3816	1	Introduction of numbering rules guideline for category M2 in Annex I	14.4.0	14.5.0

2017-12	RAN#78	R5-177379	3847	1	Correction to NB-IOT NPDSCH demod parameters	14.4.0	14.5.0
2017-12	RAN#78	R5-177381	3939	1	Correction in 8.12.2.1.2 to accommodate number of antennas	14.4.0	14.5.0
2017-12	RAN#78	R5-177390	3825	1	Updated clause 5.2E to include operating bands for UE category 1bis	14.4.0	14.5.0
2017-12	RAN#78	R5-177391	3948	1	Addition of new CAT1-bis TM9 Demod TCs	14.4.0	14.5.0
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2017-12	RAN#78	R5-177395	3804	1	Introduction of TC 8.9.1.1.2_1 FDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x1 for UE Category 1bis.	14.4.0	14.5.0
2017-12	RAN#78	R5-177396	3805	1	Introduction of TC 8.9.1.2.2_1 TDD PDSCH Closed Loop Single Layer Spatial Multiplexing 2x1 for UE Category 1bis	14.4.0	14.5.0
2017-12	RAN#78	R5-177407	3833	1	Introduction of new test case 6.3.5A.1.x Power Control Absolute power tolerance for CA (SRS carrier based switching)	14.4.0	14.5.0
2017-12	RAN#78	R5-177408	3962	1	Introduction of new test case TC 6.7A.4 "Transmit intermodulation for CA (3DL CA and 3UL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-177418	3817	1	Update to Rx test case 7.6.3A.8 and 7.8.1A.8 for 5DL CA	14.4.0	14.5.0
2017-12	RAN#78	R5-177419	3854	1	Update test parameters for TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (4DL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-177420	3961	1	Introduction of new test case TC 6.6.1A.4 “Occupied bandwidth for CA (3DL CA and 3UL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-177421	3935	1	Introduction of the new Test case 8.7.5.2_H.3 TDD-FDD 4DL CA SDR for 256QAM	14.4.0	14.5.0
2017-12	RAN#78	R5-177423	3803	1	Introduction of TC7.9F Spurious emissions for category NB1	14.4.0	14.5.0
2017-12	RAN#78	R5-177424	3868	1	Update of 6.7F the transmit intermodulation for category NB1	14.4.0	14.5.0
2017-12	RAN#78	R5-177427	3855	1	Introduction of TDD CQI Reporting under AWGN conditions – PUCCH 1-0 for CA (5DL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-177428	3812	1	Introduction of New TC 6.3.2G.1 Minimum output power for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	14.4.0	14.5.0
2017-12	RAN#78	R5-177430	3899	1	Adding new TC 6.7G.1 Transmit intermodulation for V2X Communication / Non-concurrent with E-UTRA uplink transmissions	14.4.0	14.5.0
2017-12	RAN#78	R5-177433	3844	1	Addition of new 4Rx SDR test case - TDD FDD 4DL	14.4.0	14.5.0
2017-12	RAN#78	R5-177434	3852	1	Introduction of TDD-FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x4 with 256QAM for FDD PCell (2DL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-177435	3853	1	Introduction of TDD-FDD CA PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x4 with 256QAM for TDD PCell (2DL CA)	14.4.0	14.5.0
2017-12	RAN#78	R5-177436	3824	1	Introduction of RF TC 8.9.2.1.1_1	14.4.0	14.5.0
2017-12	RAN#78	R5-177437	3813	1	Introduction of New TC 6.3.2G.2 Minimum output power for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.4.0	14.5.0
2017-12	RAN#78	R5-177438	3856	1	Introduction of Additional Maximum Power Reduction (A-MPR) for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.4.0	14.5.0

2017-12	RAN#78	R5-177439	3890	1	Introduction of In-band emissions for non-allocated RB for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions in 6.5.2.3G.2	14.4.0	14.5.0
2017-12	RAN#78	R5-177440	3900	1	Adding new TC 6.7G.2 Transmit intermodulation for V2X Communication / Simultaneous E-UTRA V2X sidelink and E-UTRA uplink transmissions	14.4.0	14.5.0
2017-12	RAN#78	R5-177443	3821	1	Optimisation for test cases 7.6.2A.x, statistical significance change.	14.4.0	14.5.0
2017-12	RAN#78	R5-177452	3924	1	Clarification on the Order of SCCs	14.4.0	14.5.0

History

Document history		
V14.2.0	April 2017	Publication
V14.3.0	August 2017	Publication
V14.4.0	November 2017	Publication
V14.5.0	February 2018	Publication